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AN EPITOMIZED REVIEW

OF THE

PRINCIPLES AND PRACTICE

OF

MARITIME SANITATION.

BY

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JOSEPH HOLT, M. D.,

presented by the author
Former President of the Louisiana State Board of Health, 1884-1888.

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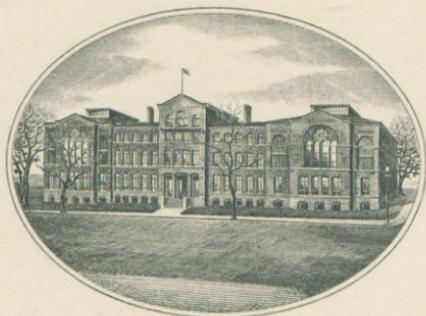
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CONTENTS.

	Page.
Introduction	3
Terms Quarantine and Maritime Sanitation Defined.....	6
Originating Causes of Quarantine—Schedule of Diseases.....	8
Quarantine as a Question of State.....	11
Quarantine Maintenance	13
A Schedule of Quarantine Charges	15
A Legislative Act Compelling the Reduction of Quarantine Revenue to the Limits of Quarantine Maintenance.....	15
Quarantine and Commerce.....	17
Dangers which Threaten the Efficiency of Maritime Sanitation	25
Period of Quarantine Detention.....	26
The Quarantine System in Louisiana.....	26
International Sanitation.....	27
Resolutions on International Sanitation	29
Interstate Notification of an Actual or "Suspicious" Case of Pes- tential Disease.....	31
Promptly Telling the Whole Truth Concerning the Public Health and All that Pertains to It.....	33
The Commission of Medical Experts.....	36
Introduction of the Bichloride of Mercury.....	37
The Quarantine Methods of Louisiana—Maritime Sanitation.....	37
Application of Bichloride of Mercury.....	42
Sulphurous Oxide Fumigation.....	46
Application of Dry and Moist Heat	49
Annual Quarantine Proclamation.....	55
Special Suggestions to Owners, Agents, Masters of Vessels and Passengers	57
Regulation of the Tropical Fruit Trade and Passenger Traffic.....	77
Improvement in Apparatus	80
Conclusion	83
Opinions Abroad and at Home.....	86

INDEX TO PLATES.

Plate 1. Chart of Mississippi River.....	59
Plate 2. Tug Boat with Fumigating Apparatus	61
Plate 3. View of Disinfecting Wharf.....	63
Plate 4. Sulphur Oxide Generator, Reservoir and Exhaust Fan.....	65
Plate 5. Front View of Sulphur Oxide Generator.....	67
Plate 6. Front View of Closed Moist Steamheating Chamber.....	69
Plate 7. Moist Steamheating Chamber, Two Panels Drawn Open.....	71
Plate 8. Boiler and Steam Connection with Superheating Chamber	73
Plate 9. Steam Coil.....	75
Plate 10. End View of Open Moist Steamheating Chambers.....	94
Plate 11. Rear End of Moist Steamheating Chambers.....	94
Plate 12. Front View of Sulphur Oxide Generator.....	94
Plate 13. Side View of Sulphur Oxide Generator.....	94

INTRODUCTION.

The subject treated in the following pages is so intimately associated with the transactions of the Louisiana State Board of Health during the official term of 1884-1886, inclusive, as to necessitate frequent and liberal quotations from pamphlets, letters and other records of that organization. These were published and widely distributed during that period embracing the conception, invention and establishment of the interdependent municipal and maritime sanitary system, including the perfecting of our health relations with States of the interior, together with municipal provisions for certain emergencies and a complete system of maritime sanitation at the quarantine stations of the Mississippi river, below New Orleans.

The eminent services of Mr. John J. Barr, Mr. Joseph A. Shakspeare and Dr. L. F. Salomon, of the Quarantine Committee, invariably seconded by Col. W. M. Smallwood (deceased), Mr. Joseph Kohn, Drs. Charles E. Kells, S. R. Olliphant, L. H. Von Gohrén and Hon. Albert Voorhies, members of the board, the admirable administration of its wishes by the resident physician and directing quarantine officer of the entire system, Dr. Thomas Y. Aby, to whose integrity, prudence and executive ability is so largely due the successful enforcement of the principles involved; the hearty endorsement and able support at all times accorded by the New Orleans *Times-Democrat*, the *Daily Picayune*, the *Daily States*, and the *City Item*, the services of these command the recognition of a public and personal debt; an obligation which far exceeds the ability of their fellow citizens to repay except in the acknowledgment of gratitude.

The work of the Board of Health during that period is unalterably sealed in the commercial, the scientific and the State history of the time. No subsequent occurrence

can break that seal or mar the glory which of right belongs to an achievement as unselfish in patriotic purpose as it is far-reaching and permanent in humane influence.

No claim of authorship in conceiving and inventing is of value without the concurrent claim which exists in the assistance of those mentioned, together with the financial aid in the liberal appropriation of thirty thousand dollars, in 1884, by the General Assembly of the State.

The advent of Asiatic cholera in Eastern Europe, approaching along the lines of former visitations in its westward girdling of the world, has suggested the preparation of this treatise, in the earnest hope that it may help in giving scientific precision to efforts made in the construction of defensive barriers against its lodgement beyond western seas, or against epidemic spread, if by some unfortunate mishap it finds its way inside the cordon of our coast guards.

The following letter which appeared in the *Marine Journal*, New York, Saturday, July 23, so distinctly explains the character and purpose of this publication as to make it peculiarly available here for a prefatory use:

NEW ORLEANS, July 11, 1892.

Editor Marine Journal, New York: DEAR SIR—
Please accept my assurance of grateful appreciation of your recent editorial recognition of my authorship in connection with the modern system of Maritime Sanitation, as practically demonstrated in the quarantine methods enforced in the "Lower Mississippi."

The significance of this work, in the magnitude of its far-reaching effect, was clearly understood and liberally commented on, during its evolution, by the *Marine Journal*, and was endorsed by that authority as a practical solution of the "Quarantine and Commerce" problem. The terms of that problem involved a complete reconciliation between the preservation of the public health and the preservation of the public livelihood; for to throw open and unguarded the gates of commerce is destructive of the

one, and to shut them against trade destroys the other. We are compelled to harmonize and satisfy two masters.

The fears, the impairment of confidence and disturbance of inter-State and international communication which have grown out of this question have vexed the heads of government and have harassed the ingenuity of political economists and health authorities in every nation of the earth, from the earliest history of their foreign military expeditions and trade ventures.

Instead of ameliorating the necessities growing out of this question of protection against pestilence, the increasing complexities of modern civilization, notably rapid transit and increased travel, have largely added to them while more urgently demanding a remedy.

The international sanitary conferences held in Constantinople, 1866, in Vienna, 1874, Rome in 1885 and Washington in 1888, with representative scientists and quarantine specialists, from thirty-one of the powers of the world, were all convened to consider, and, if possible, in co-operative council to solve, the "QUARANTINE AND COMMERCE" problem.

Unfortunately, however, while the world is indebted to those assemblies of savants for an amazing display of scientific lore and contrariety of opinion, the subject was left by them no nearer a practical solution than where they found it in the beginning.

The failure to grasp the subject in its commercial largeness, as well as in its professional limitations and microscopic relation to germs, was a scholarly tribute to medical training, but fatally one-sided.

In the light of such history, it fills me, as an American, with pardonable pride to consider that while the universal sanitary congress was yet in session at Rome, 1885, the "NEW SYSTEM OF MARITIME SANITATION" was set in smoothly working operation, and the portal of the valley of the Mississippi was flung wide open to the commerce of the world, and vessels from cholera and yellow fever

ports invited to come and be cleansed of pestilential taint. This was done, too, with the full knowledge and consent of the States of the interior, cementing in a closer bond our maritime and interior relations; nor has that portal been closed an hour since to any of its highways of traffic and travel.

The same guarantees of protection established by inventive science in the emancipation of the port of New Orleans are freely offered for adoption and are being accepted by the world in the construction of its defences against pestilential invasion.

The daily telegrams feebly inform us of the consternation and frenzied but unavailing efforts to check the advance of Asiatic cholera in its westward march along its historic courses of the trans-Caucasus and "Upper Route." These reports are pitiful disclosures of the ignorance and old-time methods still prevailing in middle and Eastern Europe, while they admonish the enlightened Western world to rest its faith upon the stability of natural law in the acceptance and enforcement of the sufficient provisions of applied science. In this alone is the only rational hope, and in these provisions the only sure defence against the importation of pestilence, while keeping open the channels of trade and maintaining the reciprocal balance of undisturbed industries. I remain, sir,

Very respectfully,

JOSEPH HOLT, M. D.,

Ex-President Louisiana State Board of Health.

TERMS QUARANTINE AND MARITIME SANITATION
DEFINED.

Among the more enlightened communities of the world the term quarantine has lost its original signification of forty days' detention as a safeguard against the transmission of epidemical contagions, and is now used technically as comprehending the appointed sanitary stations, together with the rules, regulations and measures of sani-

tary treatment thereat, of all carriers of merchandise, persons and things whatsoever, arriving over the highway of traffic and travel guarded by the same. Being historic and conveniently adapted by a change of definition to modern requirement, the word quarantine, although essentially faulty, is unalterably established in legal, scientific and commercial nomenclature.

Until 1885 quarantine had been, and is now as generally practised, a rudimentary expression of an imperative necessity of protection from the sweeping ravages of certain malignant diseases, its methods and traditions bearing the stamp of the ignorance, superstition and inhuman selfishness which characterized the time of its inception in the darkest period of the Middle Ages. While we tolerate the name, the very mention of quarantine is tainted with the ideas of ruinous detention, arbitrary regulations, barbarous and useless treatment, including the imposition of iniquitous exactions in fees, fines and other inordinate taxations, mercilessly levied upon the stranger at the gateway, oftentimes in distress.

Every quarantine not thoroughly modernized and equipped is an instrument for the infliction of grievous wrongs, legalized by the community and State through whose sufferance it exists. The principles of its operation are shrouded in ignorance, and its practices chargeable with cupidity, tyranny, and fraud in its pretended protection.

The term MARITIME SANITATION is of recent origin, and signifies the application of modern methods suggested by sanitary science and approved by experience in the treatment of all carriers, persons and things traversing the seas; whether applied at the port of departure, on the voyage or in quarantine at the port of entry. It has no reference to any period of detention beyond the few hours of delay in the process of cleansing and disinfection through the agency of efficient apparatus amply provided, except in the case of vessels known to be infected.

If a quarantine station is inadequately equipped, the

term maritime sanitation can not be truthfully used, and becomes deceptive and mischievous.

A quarantine not entitled to the use of this technical term deserves no recognition except as an obstacle to commerce and a gateway to disease, as abundantly demonstrated historically.

Preventive medicine has achieved no other work comparing in variety of results, magnitude and importance with the establishment of Maritime Sanitation as a clearly defined and strictly scientific system of defence against pestilential importation. State medicine can reach no higher eminence in protecting care of the commonwealth.

ORIGINATING CAUSES OF QUARANTINE—SCHEDULE OF DISEASES.

Quarantine is an ultimate result of a physical fact influencing an instinctive sentiment. The fact exists in certain living organisms, of malignant pathogenic powers, capable of rapid and widespread propagation coincident with limiting conditions of temperature, moisture and pabulum. The instinct is that of fear operating under the law of self-preservation.

The desolations of pestilence, and all efforts to fly from, to prevent or cure the malady, are logical sequences of these two fundamentals.

The earliest recorded quarantine regulations were instituted against the "plague of leprosy,"—Leviticus xiii, 46-59.

These consisted in a seven or fourteen days' detention of the suspected case for observation, and permanent isolation if pronounced "unclean." ("He shall dwell alone; without the camp shall his habitation be.") The clothing was cleaned by washing or "burnt in fire," the very best protective management of leprosy to-day.

Venice took the lead in measures to check the spread of plague, and established in 1484 the first "*quarantine*" against the dreaded Black Death.

By an act of the British Parliament, in 1824, "yellow

fever was recognized as calling for quarantine measures along with plague.”

Cholera was generally quarantined against without the slightest impediment to its extension during the first invasion of the world, 1831 to 1836, and the three subsequent general invasions, concluding with that of 1865 to 1873. What a distressing demonstration of quarantine according to the “old system.”

Small-pox being generally domiciled was not scheduled in the quarantine list prior to inclusion in the international bill of health, adopted by the international sanitary congress, at Washington, 1881.

At the present time, yellow fever, cholera and small-pox are the pestilential infections which, by universal consent, come within the purview of special quarantine consideration. The reason is apparent in the destructive capacity and alarming tendency to spread which characterize these true pestilences.

It matters not how many die, relatively, of tuberculosis, diphtheria, typhoid and the ordinary eruptive fevers, it is yellow fever, small-pox and Asiatic cholera which leave their swath of dead, as upon a vast battle-field, and carry terror into the hearts of nations, prostrating industries and paralyzing commerce. These are the diseases which disturb social order, at times upsetting the peaceful relations of communities and states while inaugurating a condition of anarchy closely akin to war. These, too, are the diseases which strain friendly relations on account of alleged violation of international comity, compelling treaty provisions for certain observances and for mutual aid.

To illustrate this we present the following associated press telegrams in morning papers:

ST. PETERSBURG, July 22, 1892.

The *Novoe Vremya*, describing scenes in the cholera infected districts, says:

“The Baku Railroad station was filled with a tumul-

tuous crowd of fugitives. When the doors were opened the crowd rushed to the platform and soon over-crowded the trains. Many sat on the floor rather than be left behind. The stench of the atmosphere was suffocating.

“Passengers sprinkled their own and their neighbors’ clothes with carbolic acid. A doctor looks at the tongues and feels the passenger’s pulse. Everybody protests that he or she is in perfect health. The train starts and within a few minutes a passenger is taken ill with the cholera. The inmates of the patient’s compartment at once become panic stricken. The patient is removed and the place where he sat is sprinkled with carbolic acid, and the passengers immediately refill their places. A similar scene occurs frequently. At each station the same perfunctory examination is made. No wonder cholera is spreading in Tiflis and other places.”

“Six cases of cholera and four deaths have occurred at Kolomn, sixty-three miles from Moscow, where there are extensive factories and iron works. Two deaths from cholera have occurred in a village nearer Moscow and two within Moscow. None of these, however, have been reported officially.

“Few of the principal merchants intend to visit the Nijni-Novgorod fair. *Many will send subordinates* (sic).

“Galician papers report that differences have arisen between Russia and Persia owing to the fact that a number of Persians have died from cholera in Baku. Persia has demanded compensation, on the ground that Russia has not taken proper sanitary precautions.”

MERCHANTS OBLIGED TO ASK FOR GRACE.

BERLIN, July 23.—The Cologne *Gazette’s* St. Petersburg correspondent says:

“Numbers of Baku merchants have telegraphed to the minister of finance asking that they be granted terms of grace in the meeting of their obligations, owing to the injury business has suffered through the cholera

epidemic. There have been several failures at Astrakhan and Saritzin, and other failures are expected during the holding of the Nijni-Novgorod fair."

QUARANTINE AS A QUESTION OF STATE.

Growing out of the fundamental law of self-preservation, the right of enforcing quarantine is inherent and universally conceded as a natural right of every government in the protection of its people.

The question of the constitutional right of a State to protect its citizens by interposing quarantine as a bar to the importation of pestilence, and of maintaining the same by an equitable charge upon shipping, for services rendered in such treatment as may be required to allow entry without endangering the inhabitants of its ports, and thence of its interior, is one vital, not only to the health and industrial integrity of the people, but involves the whole question of the reserved right to regulate the internal arrangements affecting its police powers.

The constitutionality of charges for quarantine services was decided by the Supreme Court of the United States at Washington, in favor of the Board, May 10, 1886, in the case of *Morgan's La. & Texas R. R. & S. S. Co. vs. The Board of Health of the State of Louisiana*, intervenor.

The Board of Health held in that suit the ground that no such inherent or natural right has ever been parted from the State and lodged by any constitutional provision in the Federal Government. Indeed, the Constitution does not contemplate, in any clause, the regulation of health matters within the States; therefore, by its reticence, we may believe, it has properly left the question entirely to the States themselves, to be determined in practice by the particular exigencies as they arise.

Upon the decision rendered in that case depended the existence of a self-sustaining quarantine system in every port of the United States.

Apart from the constitutional right in this matter, the natural right is perfectly apparent, and is universally admitted.

In the codified "Laws Relating to Her Majesty's Dominion at Home and Abroad, and of the Principal Foreign States," prepared by Sir Shirston Baker, Bart., this principle of right is distinctly announced.

"Quarantine is established and recognized by International Law for the common security and protection of States against those diseases which are supposed to be importable.

"Although the chief source of the intercourse of States, in their individual capacity, is the exchange of commodities of natural or artificial production, and a mutual exchange of superfluous commodities is, as a rule, reciprocally advantageous to both nations—and it may even be said that it is the moral duty of a nation not to refuse commerce with another nation—yet this duty always presupposes the safeguard that such commerce is not hurtful to the nation which imports. * * *

"And although it is contrary to sound policy for a nation to impose quarantine merely for the purpose of providing a revenue to the country in which it is established, this is not to be understood of certain dues or duties which are imposed on ships entering the ports of a State, for the legitimate purpose of maintaining the quarantine or sanitary establishments of the country."

While it is true that foreign nations are here referred to, the principle of self-protection is the same; whether it be against small-pox from New York or yellow fever from Mexico.

In the natural conditions affecting quarantine, the States of the Federal Union, subdividing a vast part of a continent, have the significance of nations.

They present every variety of climate and of physical condition known on the continents of Europe or of Asia between the extremes of north temperate and semi-tropical latitudes.

Some of the nations—so called States—in this confederation are adjoining, while widely separated from others. The natural conditions which influence the quarantines of Boston and Galveston or San Diego are as widely removed as those governing St. Petersburg and Barcelona.

The dangers of the introduction of infection, and the sacrifice of human life in Louisiana, is not mitigated because the destructive agent may have been imported from a sister State; nor is protection, and all that may be required to secure it, less incumbent.

If a State has a natural right to protect itself from the importation of pestilence from one direction, it has an equal right to do so from every other; and if it is reasonable and just to charge for services rendered a visiting ship in enabling her to conform to needful regulations under that right in the one instance, it is also just and reasonable in the other.

To discriminate against any one by failing to make uniform charges for uniform services is invidious, harsh and unjust.

Every vessel enjoying privileges afforded by the quarantine measures of a State is obligated by every rule of justice to return a fair compensation for the maintenance of the institution of which it is the beneficiary. On the other hand, an equal moral obligation rests upon the State to render true service and to present the lowest possible pro-rata charge for quarantine maintenance only.

QUARANTINE MAINTENANCE.

Through legislative appropriation the State should pay for construction and equipment of quarantine stations. The maintenance is accomplished wholly (a doubtful policy) through a carefully arranged schedule of charges, not as a tax upon tonnage, but as a return, a *quid pro quo*, for services rendered in the inspection and sanitary treatment necessary to permit entry without jeopardy to the port.

The inspection fees should be fixed by legislative enactment. The cleansing and disinfection charges should be established by the board of quarantine control, in strict accordance with the work accomplished.

The revenues derived from quarantine sources should never exceed the necessary expenditure in quarantine maintenance economically administered. This should be made compulsory by legislative enactment.

The application of methods adequate to the speedy and thorough disinfection and cleansing of a vessel, the keeping of a station for infected vessels only, the general sustenance, in short, of a system of efficient maritime sanitation necessarily requires a considerable outlay of money, which redounds to the immediate saving to the ship and to commerce of many times the amount so expended.

As a matter of best paying economy and the wisest course in the long run, everything should be done to invite trade, by removing every possible obstruction to shipping. With a high quarantine tariff and ruinous port charges, including enormous wharfage dues, vessels are practically treated as enemies to be spoiled, and are often kept away as effectually as by a blockade.

Every sentiment of equitable dealing and principle of progressive movement condemns this short-sighted policy; for, by right, the State and its maritime port are, at least, one-half beneficiaries of commerce, and these should bear at least one-half the entire expense of quarantine maintenance, reducing the necessary charges one-half.

Considered alone from the position of a State and of a sea port, and in the line of a far-seeing and sound economic policy, vessels should not be charged quarantine dues of any kind except for quarantine maintenance, and these should be strictly proportioned to the services rendered, and should be reduced, pro rata, as rapidly as the increasing amount of shipping will allow.

A SCHEDULE OF QUARANTINE CHARGES.

The quarantine inspection fees for the port of New Orleans are fixed by legislative enactment, as follows: Steamships and ships, \$15; barks, \$12; brigs, \$7.50; schooners, \$5.

Fees for disinfection of vessels fixed by the board: steamships, \$130; ships, \$70; barks, \$60; brigs, \$60; schooners, \$17.50.

Under the "old system" the charges were: inspection fees, steamships and ships, \$30; barks, \$20; brigs \$10; schooners, \$7.50.

The so-called disinfection fee, for burning a few pounds of sulphur in pots placed in the hold, and sprinkling around some crude carbolic acid, with long detention of the vessel, was, together with actual cost to the vessel and cargo, an uncertain amount, ranging from \$200 to approximating \$3000, according to the notions of the board of health, character of vessel, cargo and other determining incidents.

To furnish a more exact idea of quarantine expenses under the old regime, we will cite the incoming of a cargo of 20,000 bags of coffee from Rio de Janeiro per steamship. Reckoning all quarantine expenses as if borne by the cargo (as a rule the ship bears them), under the present system the rate per bag would amount to four-fifths of one cent. The same cargo per sailing vessel would amount to one-half cent per bag, as against the former cost under the old system, of not less than ten cents per bag, or about \$2000. Instances in other parts of the world of quarantine costs of 5 per cent. on the total value of the cargo, and some exceeding this, are on record.

A LEGISLATIVE ACT COMPELLING THE REDUCTION OF QUARANTINE REVENUE TO THE LIMITS OF QUARANTINE MAINTENANCE.

While heretofore quarantine revenues have not exceeded the cost of quarantine maintenance, the ability of the

Board of Health under then existing legislation to allow an indefinite accumulation of money from this source was so apparent that future protection of the State and of commerce against the dangerous use of a privilege demanded anticipatory remedy.

In order, therefore, to prevent the Board of Health from ever taking advantage of the power it enjoyed of making quarantine revenues a source of accumulation and hoarding up of money under the specious title of a sinking fund or reserve fund, this body, through its representatives, went before the General Assembly during the last session and prayed to be shorn of this dangerous power in order not to be led into temptation; declaring that it was impossible to possess such power without eventually using it oppressively to commerce, and subversive of the public welfare; that the large accumulation of money by such a body, political in its being, was unnecessary, corrupting and pernicious.

The Legislature, thoroughly appreciating our motives, granted the request, as set forth in the following, Section 4 of Act No. 23 of the regular session of 1886:

SEC. 4. *Be it further enacted, etc.*, That all sums of money which may be collected hereafter, or which may be due for past services accruing from the fees for quarantine inspection, disinfection and fumigation, shall constitute a special trust fund, to be known as "the Louisiana Quarantine Trust Fund," to be exclusively applied to the maintenance and support of the quarantine system of the State, and should any amount for any one year or period of years be collected in excess of the quarantine expenses, the Board of Health shall adjust and fix its budget for the ensuing year to make such pro rata decrease and deductions in the rate of charges for inspection and disinfection as shall bring the revenues from the quarantine system within the amount exclusively and absolutely necessary to sustain the quarantine system, and it shall not be lawful to appropriate any sums of

money derived from the quarantine charges to any other purpose than the maintenance and support of the quarantine system and the payment of the salaries and expenses connected therewith, as at present administered.

QUARANTINE AND COMMERCE.

This question can be properly understood only by rising to a broad comprehension of the correlated principles and generalizations of State Medicine and Commerce.

Unfortunately for quarantine as a progressive science and art, it has been the foster-child of the specialists in medicine and commerce, who move and have their being in the narrowest of professional grooves. These nurses with their ancient measures as swaddling bands have repressed development, not by reason of a lack of intelligence, but because of the special education and high training of a *professionally restricted* intelligence.

To provide for the common defence against disaster and to promote the general welfare, chiefly by fostering the general livelihood, comprehends the purpose, duty and obligation of government, State and national.

The fact of pestilential foreign invasion, second only to invasions of war, compels measures of exclusion, which have heretofore in a proportional degree embargoed trade; the necessity of preserving the public health has clashed with the necessity of preserving the public maintenance. The instrument of the former necessity, quarantine, as heretofore practised, emphasized this conflict by a complete failure of its protective intention, finally compelling boards of health to rely upon the primitive prolonged detention, and even to abandon quarantine altogether and fly to proclamations of non-intercourse, in an ultimate acknowledgment of their own deficiencies.

No casual observer can realize the amount of inconvenience, anxiety, deprivation and actual suffering occasioned by the futile but oppressive measures of the "OLD SYSTEM." The history of quarantine in Louisiana, ex-

tending through a period of sixty-four years, 1821-1884, furnishes a singularly clear demonstration of this entire question. It is a chronological record of pestilential appearances and epidemics, along with inflictions upon commerce, destructive of extensive branches of trade and associated industries; it is a long chapter in the history of yellow fever and cholera, furnishing the only explanation why New Orleans strategically located, with its soft and delightful climate, varied and abundant food-supply, so exceptionally desirable as a home, is not to-day second only to New York in population and as a commercial and manufacturing centre. It is an epitome of quarantine operations, from its inception, 1484, to the beginning of its end, 1884, the date of the inception of the "NEW SYSTEM."

There are four natural laws governing commercial movement, as profound, as universal, and invariable as the law of gravity which determines the rotation of the planets around the sun, more persistently operative than international or local regulations.

1. *The currents of trade seek the shortest course.*
2. *It is a law of commerce, as of fluids, to follow the course of least resistance.*
3. *With increase of distance traversed there must be increased assurance of entry.*
4. *In the interchange of commodities, the normal direction of commerce is chiefly from north to south, coincident with longitude and across isotherms and parallels of latitude.*

We announce the first, second and third propositions as axiomatic and proven by all experience; chiefly in the fact that a departure is not an exception to a rule, but invariably incurs the penalty of a *violated* law.

A quarantine of ten days as effectually destroys commerce eventually as a declaration of non-intercourse. The difference is one of a force slowly or quickly acting.

The necessities of modern civilization are wholly in the direction of rapid transit. If a particular port does not choose to adapt itself to this higher law, it must endure the consequences in a complete transfer of its trade to ports in competition, where wisdom, shrewdness and energy combine for the preservation of the public interest in its entirety; the public health and the public wealth.

When a port permits the obstruction of her commercial gateways, she deflects her trade in a direction of least resistance, and starves her own children while she feeds the hungry multitudes of rival ports. None but an enemy or a fool saturated with ignorance can insist upon the continuance of such a monstrous course.

A physical bar obstructing the mouth of the river presented itself for years as a formidable obstacle to the commerce of the Mississippi. The genius of Eads displayed before Congress a plan whereby this bar could be jettied and an opening made to the commerce of the world. Congress, upon mere faith in his plans, which were yet experimental, appropriated, subject to his call, \$5,000,000, and to-day the mouth of the Mississippi is open to the heaviest tonnage of the maritime world.

When the genius of man had overcome this physical bar commerce was yet confronted by a legal barrier more obstinate, more insuperable, than the physical detention.

Of what use could be the removal of a sand bar of uncertain obstruction, when there remained one imposed by law more obdurate than rock?

The necessities of their existence as a commercial people demand that the ports of the Mexican Gulf and southern Atlantic seaboard shall jetty their quarantines and limit them to a narrow channel, obstructive to importation of pestilence, but open as a highway to commerce.

While the North Atlantic seaports may enjoy peculiar privileges and exercise a certain degree of boldness in regard to yellow fever, due to the exemption afforded by

high latitude, there is not one now operating under the "Old System" but would be thrown into an agony of anxiety and downright terror by such an occurrence as the reception in quarantine of a ship with passengers and crew dying of Asiatic cholera. In proof of this very serious charge, no stronger case in evidence could be cited than the reception accorded the steamship *Alesea*, which arrived at the quarantine of New York on the night of Sept. 22, 1887, having on board 600 passengers from Marseilles and Palermo, then being ravaged by cholera; several passengers having died of it during the voyage.

The numerous press telegrams preserved and now before us indicate how the entire country was flooded with startling accounts of intense excitement in New York, describing the situation as extremely grave on account of the lack of public confidence in the quarantine, ridiculing the antiquated methods and total lack of preparation for such an emergency; openly accusing their authorities of having "obtained an unsavory reputation in the matter of making fees out of the disinfection of imported rags; hence the intense public anxiety as to their line of action in the existing emergency." Nor did this public terror check short of the extraordinary abandonment which expressed itself in an open demand for the refusal of quarantine asylum, and that the vessel be turned about and put back to sea with her living freight of cholera-stricken men, women and children.

No record of the Dark Ages exceeds this proposition in enormity and as a monstrous confession of utter helplessness and abject fear. Fortunately, with extraordinary effort and time, the ship was thoroughly treated by hastily improvised methods, and public fears allayed.

The lesson contained in this brief historic recital is of incalculable value, if studied in the light of its singular significance. In addition to the narrow escape of an entire continent, perhaps, it unquestionably establishes

the fact that even the port of New York, if subjected to periodic and frequent shocks such as this, would be compelled either to change radically the quarantine methods evidently prevailing at that time and perhaps at present, or suffer enormous damage in its shipping and industrial interests, for Asiatic cholera is no respecter of latitude.

To enter the commercial field in competition, a maritime port must have an equal chance with others. How disastrous, then, that system of quarantine which compels its Board of Health, while officially and perfunctorily endeavoring to keep out pestilence, also to suspend its commerce by handicapping with prolonged detention and excessive charges for cleansing and disinfection, often not performed. Under such a system, the conservators of the public health become, perforce, the destroyers of the public livelihood.

Such, in fact, is the urgency for the reconciliation of the imperative interests of the public health with the scarcely less imperative interests of the public livelihood that to-day it is recognized as a question among nations second in magnitude only to that involving the exigencies of war; and, as in the costly but improved modern armament, just so in the defences against pestilential invasion, the application of past experience must compel a change, not only of armament, but also of strategy and tactics.

These prodigious material and moral associated forces have already compelled the governments of the entire world to invoke the aid of sanitary councils and congresses, held at Constantinople, Vienna, Paris, Rome and Washington, hoping in such largeness of representative ability to discover a solution to the one question alone which they were called upon to consider, the solution of this mighty problem of QUARANTINE AND COMMERCE. Unfortunately for all the question was invariably left by them as entirely unsolved at the end as at the beginning.

A careful study of the "*past experience*" alluded to

sheds no light, however, upon quarantine as a science and art. Maritime sanitation emerged, and was soon full-fledged, from the womb of all experience and accumulation of science, and not in the line of hereditary descent from the disreputable "old system."

Having neither literature nor precedents, as the sire of a royal house, it was its own ancestor, born in the Louisiana quarantine out of the loins of aseptic and antiseptic surgery.

Maritime Sanitation, resting its faith upon the immutability of natural law, and formulated as an exact science, practised as an art in a clearly defined and consistent system of defense, offers itself as positive. It does not say that yellow fever or cholera shall never again ravage New Orleans, but furnishes the highest assurance within the scope of reason that these shall never again enter by way of the Gulf and Mississippi river.

The accumulating necessities of the enlightened world demand and will compel the adoption of a distinctly formulatèd and thoroughly tried system, wherein is harmonized and brought into perfect reconciliation the interests of the public health and all the interests comprehended in the public livelihood.

Viewed from any point of observation, whether from that of humanity or science, whether from that of the grand future of commerce with our exterior or interior connections, the solution of this problem is the most important and absolutely imperative question that can engage the attention of the scientists, the statesmen or the merchants of the Gulf States and Mississippi Valley, as well also as those of exposed maritime ports throughout the world.

The foregoing, and indeed this entire treatise, is a condensation from the following pamphlets, published reports and letters by Joseph Holt, M. D., president of the Board of Health of the State of Louisiana—1884-1888.

ADDRESS BEFORE THE SANITARY CONFERENCE OF STATE
BOARDS OF HEALTH,

Held at New Orleans, June 2, 3 and 4, 1884. "Quarantine Improvements—Is the Present System of Quarantine an Exact Science? Are Boards of Health of the Gulf States Doing Their Whole Duty?" Being a general reply to inquiries, "No. 1—Can an effective quarantine be enforced along the Gulf Coast?" "No. 2—How to enforce quarantine so as to produce the least possible injury to commerce?" "No. 3—Non-intercourse—under what circumstances justified?" "No. 4—Period of quarantine detention?" "No. 5—The disposal of non-infected and infected vessels under quarantine. Treatment of vessels and cargoes with a view to disinfection?"

QUARANTINE AND COMMERCE.

"Their Antagonism Destructive to the Prosperity of City and State. A Reconciliation an Imperative Necessity. How This May Be Accomplished. An Address Before the Exchanges and Other Commercial Bodies of New Orleans, June 20, 1884."

THE OBLIGATIONS OF LOUISIANA IN RELATION TO QUARANTINE AS A QUESTION OF STATE.

"A Synopsis of the Argument Addressed to the Senate Committee of Finance in Urging Upon the General Assembly the Necessity for an Ample Appropriation for the Establishment of a More Efficient Quarantine System," June 26, 1884.

ADDRESS BEFORE THE JOINT COMMITTEE OF THE COMMERCIAL BODIES OF NEW ORLEANS,

"In Conference with the United States, Mexican, Central and South American Commission," Dec. 30, 1884.

A COMPARATIVE REVIEW OF QUARANTINE AND MARITIME SANITATION.

THE NEW QUARANTINE SYSTEM.

New Orleans Medical and Surgical Journal, June, 1885.

PREVENTION OF YELLOW FEVER—COMMERCIAL RELATIONS
WITH BRAZIL AS AFFECTED BY QUARANTINE REGULA-
TIONS.

“A Reply to a Letter from Dom Salvador de Mendonca, Brazilian Consul General at New York, Complimentary to the Improvements in Maritime Sanitation Introduced During the Present Season by the Board of Health of the State of Louisiana.” Oct. 17, 1885.

BRAZIL AND NEW ORLEANS.

Editorial from the *Journal de Commercio*, Rio de Janeiro, November 24, 1885.”

THE SANITARY PROTECTION OF NEW ORLEANS, MUNICIPAL AND MARITIME.

“Read before the American Public Health Association, at Washington, D. C., December 10, 1885.”

The proposed yellow fever commission and the National Board of Health, New Orleans, March 27, 1886.

THE NATIONAL BOARD OF HEALTH.

“In its relations to the Mississippi Valley and States of the Gulf.” Presented to both houses of Congress, 1886.

EXCERPTA FROM THE BIENNIAL REPORT OF THE BOARD OF
HEALTH OF THE STATE OF LOUISIANA, TO THE GENERAL
ASSEMBLY, 1884-1885.

Interstate notification, its principles as demonstrated in the history of yellow fever at Biloxi, Harrison county, Mississippi, in 1886.

CONFERENCE OF THE AMERICAN SHIPPING AND INDUSTRIAL
LEAGUE. Held at Pensacola, Fla., November 10-12, 1886.

“An address on the relation of quarantine to shipping interests, being a reply to the inquiry entitled ‘No. 5. *Can a state of public health be maintained at the Gulf ports while constant intercourse is had with the tropics?*’”

THE QUARANTINE SYSTEM OF LOUISIANA.

Methods of Disinfection Practised, with illustrations. By Joseph Holt, M. D. An Addendum to the Report of the Committee on Disinfectants of the American Public Health Association, submitted at Memphis, Tenn., November, 1887.

Excerpta from the Biennial Report of the Board of Health (with photographic plates) to the General Assembly of Louisiana, 1886-1887.

DANGERS WHICH THREATEN THE EFFICIENCY OF MARITIME SANITATION.

While exact in principle and unbending in requirement of intelligent and faithful work, in its practical operation there must be in Maritime Sanitation a judicious mixture of definiteness in principle and conscientiousness in thoroughness of work, with elasticity of scope in administrative details. A complete code of invariable rules of detail is impossible and undesirable.

A failure of the system to prevent the passage of pestilence through its portal is no evidence of a failure of law or of the sufficiency of scientific principles and appliances any more than could be charged to its twin sister, the science and art of Listerian Surgery.

The recent collapse of a steel bridge over Licking river, Kentucky, with fearful loss of life, did in no wise unsettle the engineering principles and practices of bridge building, but confirmed them.

The stability of natural law and the perfecting of apparatus can furnish no guarantee of safety, except as instruments of intelligent control. They possess no power to save beyond the intellectual and moral capacity of the Quarantine Physician in charge. If he is negligent, venal, sometimes intoxicated, a man of low moral tone, cajoled and treated and feasted by ships' officers, a gambler or otherwise unreliable, the entire station in all of its workings, falls to the plane of its presiding officer.

Considering its strategic position, and how the lives and livelihood of perhaps millions of people may be jeopardized by the obliquities of one man, it becomes at once apparent that the right selection of a man of unquestionably good habits and more profoundly impressed with the greatness of his responsibility rather than of himself, is the *sine qua non* of success, even of the best equipped

system. Without this the service becomes a sinecure, and the station a mere political machine depot, with an undeserved but high-sounding name: a precursor of disaster with disgrace; but not of the principles and practice of marine sanitation.

There is no position in the State which so imperatively demands a man of high honor and integrity, chosen solely on acknowledged merit.

PERIOD OF QUARANTINE DETENTION.

This can not be scheduled for general practice, but must be determined by local experience modified by the scientifically tested working efficiency of the quarantine plant.

The generalization governing the case is that, under the "new system," days of detention are reduced to hours, because ships cleansed, disinfected and fumigated in name are so in fact.

The schedule in force for this port is contained in the "Annual Proclamation," page 55.

THE QUARANTINE SYSTEM OF LOUISIANA.

A system of quarantine protection as applied to a seaport occupying a strategic position upon the world's great thoroughfares must not be understood as restricted to the narrow limits of a quarantine station. A localized view gives no adequate idea of the scope of its operation as reciprocally dependent upon every other constituent of public health defence. A properly appointed quarantine plant is really an intermediate station between our exterior and interior relations; and is in such vital and instant communication with both as to be a compound element of a complex and far-reaching sanitary system.

The system which was conceived, invented and established as the interdependent maritime and municipal sanitary system of Louisiana consists of several closely associated and reciprocally acting elements, which we consider

after a brief study of maritime sanitation in its exterior or foreign aspect.

With its earliest inception the "new system" has contemplated sanitary preparation in the port of departure, and prompt international notification of pestilential infection as the true beginning of Maritime Sanitation.

INTERNATIONAL SANITATION.

This question is so comprehensively treated in the able letter, with accompanying resolutions of Col. Walter M. Smallwood, deceased (one of the most erudite, far-seeing and practical minds it was ever the good fortune of a State to engage in the service of its higher interests), that we reproduce it entire and without comment.

NEW ORLEANS, May 29, 1884.

Joseph Holt, M. D., President Louisiana State Board of Health: DEAR SIR—Inasmuch as I was the author of the resolution calling for a conference of delegates from the Boards of Health of the States of Florida, Alabama, Mississippi, Louisiana and Texas, I greatly regret that absence from the city will prevent me from attending its sittings. I hope the best possible results will flow from the conference, and that confidence and co-operation will be established between the health authorities of the States mentioned. The exclusion of contagious or infectious diseases from one is essential to the security of all the other States. The reasons that prevail in one State for zeal in excluding sickness exist with equal force in all the others. There is, therefore, every reason for mutual confidence and such co-operation as will lead to the establishment of an effective system of quarantine that shall be common to all.

The policy of health authorities in dealing with the seaboard should be to establish such systems of detention, fumigation and cleansing of vessels as shall be scientific and effective, and at the same time offer as little hindrance as possible to commercial activities. In my judg-

ment the theory of mere detention is a shallow conceit, and in itself is worthless. The views expressed by yourself on this point ought to be enforced upon the attention of the conference, and I sincerely hope you will take occasion to do so. A vessel that has been cleansed and fumigated is either clean or it is not. If clean, further detention is worse than useless ; it is oppression.

There should be no hesitation in doing whatever is necessary to preserve the health of the Gulf States, but boards of health ought not to take a step beyond that. That is all that is required by reason or public sentiment. It does not belong to us to make war on commerce, but rather that our boards should become the protectors and the promotors of commercial communications. Your plan of such *thoroughness* in fumigating and cleansing a vessel at quarantine as that the official performing the service can say, after it is done, that the vessel is *clean*, will end all arguments for mere detention, and tend to promote commerce rather than to restrict it.

Your plan also of a lower quarantine at New Orleans, as you are aware, is one in which I take a profound interest. It is a scheme also strictly in the interest of commerce, and is only incipient to your broad and scientific plans mentioned above. Until these measures are carried into execution there can be no abatement in the rigors of quarantine as applied to non-infected vessels.

But there remains another subject of inquiry by the conference which looks equally to the exclusion of sickness and the promotion of commerce. There should be an appeal to Congress to enact such laws relating to consular agents of the government in foreign ports as will require them to cause vessels in such ports, and about to load for ports in the United States, to be thoroughly cleansed in advance of receiving cargoes. I am aware that there are great difficulties in the way of such legislation, but whatever power is lacking in Congress might be reached through treaties or conventions. Would it not

be advisable to urge upon Congress the importance of negotiating special treaties or conventions with the States in the tropics, providing for a system of international sanitation. The best method of quarantine sanitation should begin its work at the port of departure, and be completed at the port of entry, to include approved methods of ship sanitation, under competent authority, pending the voyage of a vessel from one port to another. The hazards of importation of infectious diseases would certainly be immensely reduced if there could be a guaranty that all vessels loading in foreign countries for ports in the United States are thoroughly cleansed and rendered non-infected before being allowed to receive their cargoes. It will readily be perceived how such a system of international sanitation, by preventing the shipments and exportation of disease, would insure safety and promote commerce.

Herewith I submit preamble and resolutions on this vastly important subject, with the request that you will bring them before the interstate health conference, which is to meet here next Monday.

As this is the short session of Congress, it will be important to use all possible expedition in this matter, should it receive the indorsement of the Conference, in order that action may be taken in time to secure immediately the benefits of the system of international sanitation proposed.

I respectfully submit the following preamble and resolutions, and request that the same, if they shall meet your views, be presented for the consideration of the Conference.

I am, dear sir, your obedient servant,

WALTER M. SMALLWOOD.

RESOLUTIONS ON INTERNATIONAL SANITATION.

WHEREAS, In view of the rapid and intimate intercourse which the expanding commerce of the United States has established with all foreign and especially

tropical countries has greatly enhanced the danger arising from the importation and dissemination of infectious diseases; and

WHEREAS, It would greatly aid the vigilant and efficient health authorities of the national and State governments if measures could be taken, with the approval and co-operation of the foreign powers having dominion over this continent, its islands and its isthmus, as would effectually prevent the exportation and transportation of such infectious diseases from such ports and places as may be declared in quarantine by the executive authority of any State of this Union; and

WHEREAS, The constitutional authority of the national government in foreign countries, exercised through its ministers and consuls, as well as its undoubted jurisdiction over its own vessels, or others clearing for entry in its own ports, will with the co-operation of our domestic guardians of the public health, furnish a continuous watch over all sanitary intercourse from the point of apprehended infection to any locality within our own country; therefore,

Resolved, That our Representatives and Senators are hereby respectfully requested to introduce simultaneously into both Houses of Congress bills—

1. Extending the provisions of the act regulating the transportation of passengers and merchandise passed May 3, 1855, and the acts amendatory thereof, over all ports and places upon the continents and islands of America so far as the same may be necessary or applicable, and also over all vessels and other vehicles clearing from such ports or places for the United States while in such foreign ports or places, or while in voyage or other transit between such ports or places of foreign departure and their destination in the United States.

2. Conferring the force and sanction of law upon all sanitary ordinances issued by the Department of State, under the act of June, 1879, and especially providing

that all sanitary duties imposed by law upon consuls or commercial representatives of the United States, as well as upon shipmasters and owners or conductors of such vessels or other vehicles, shall be enforced by adequate and summary penalties, personal and pecuniary.

That the President of the United States shall be empowered and instructed to negotiate such conventions with the foreign powers hereinbefore referred to as will effectually prevent the exportation of infectious diseases from any port or place within their dominions so declared in quarantine to any port or place in the United States; that the same may be incorporated as a means of international sanitation in the legislative codes of all civilized nations.

Resolved, That in consideration of the universal interest which the whole people of the United States have in the preservation of the public health against the importation of infectious diseases, an appeal is respectfully addressed to the members of both bodies of Congress, to permit the most prompt action upon the proposed measure of international sanitation consistent with the deliberation due to a subject of such vital importance.

Resolved, That copies of the foregoing resolutions, properly attested by the president and secretary of this health conference, be forwarded to the Representatives and Senators in Congress from the several States bordering on the Gulf of Mexico, and other members of Congress who may be expected to take an interest in them.

Resolved, That a committee of three be appointed by the chair to enforce these resolution by a proper memorial to Congress.

Adopted as part of the maritime committee's report.

INTERSTATE NOTIFICATION OF AN ACTUAL OR "SUSPICIOUS" CASE OF PESTILENTIAL DISEASE.

Under the terms of the compact entered into between health authorities of the States of the gulf and Tennessee, June 2, 3, and 4, 1884, and subsequently extended to,

and its obligations assumed by, the majority of the States of the Union and the Provinces of the Dominion of Canada, interstate notification of the existence of cholera, yellow fever or small-pox is compulsory. The parties to this compact are also compelled to report "any case which presents symptoms seriously suspicious of the aforementioned diseases." The following is the text of the agreement:

WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be given of the existence of cholera, yellow fever and small-pox. Be it

1. *Resolved*, That it is the sense of the National Conference of State Boards of Health that it is the duty of each State, Provincial and Local Board of Health in any locality in which said diseases may at any time occur, to furnish immediately information of the existence of such diseases to Boards of Health of neighboring and Provincial States, and to the local Boards in such States as have no State Board.

2. *Resolved*, That upon rumors or reports of the existence of pestilential disease, and definite information not being obtainable from the proper health authority, this Conference recommends that the health officials of one State shall be privileged and justified to go into another State for the purpose of investigating and establishing the truth or falsity of such reports.

3. *Resolved*, That whenever practicable, the investigations made under the preceding section, shall be done with the co-operation of the State or local health authorities.

4. *Resolved*, That any case which presents symptoms seriously suspicious of one of the aforementioned diseases shall be treated as suspicious, and reported as provided for in cases announced as actual.

5. *Resolved*, That any case respecting which reputable and experienced physicians disagree as to whether the

disease is or is not pestilential, shall be reported as suspicious.

6. *Resolved*, That any case respecting which efforts are made to conceal its existence, full history and true nature, shall be deemed as suspicious, and so acted upon.

7. *Resolved*, That in accordance with the provisions of the foregoing resolutions the Boards of Health of the United States and Canada, represented at this conference, do pledge themselves to an interchange of information as herein provided. (See Transactions American Public Health Association, Vol. XII, page 326.)

PROMPTLY TELLING THE WHOLE TRUTH CONCERNING THE PUBLIC HEALTH AND ALL THAT APPERTAINS TO IT.

The surest prevention of a conflagration is to quench the first spark; the surest preventive of an epidemic is to act on the mere possibility of the existence of infection. Hence the necessity of the term "suspicious" in the schedule of Interstate Notification. Without that term the compact is a mere fiction in effect; offering too palpably a convenient opening for evasion not to be availed of in the embarrassing emergencies of supposed pestilential first occurrence.

Not proclaiming itself by such outward evidences as light, heat and smoke, but intangible, imponderable, incognizable in essence to any of the senses, except through objective symptoms of its existence, we must wage instant fight as we would with fire, upon the *suspicion* of a pestilential manifestation. The subtle nature of the essential agent of pestilence compels in practice the retention of the term "*suspicious*" as applied to first cases of which we can not be assured unless willing to invoke the confirmation in its epidemic spread.

How infinitely better to proclaim and extinguish the spark and thus prevent further proof of its true nature. We can far better stand "*suspicion*" than we can "*epidemic*."

In maritime sanitation we subject to treatment every ship coming from cholera or yellow fever regions, regardless of bills of health, however clean; while in municipal sanitation we attack, *in loco*, with the same agents of destruction applied with the extremest exaction of scientific requirement, the slightest signs of these diseases.

To cite an instance of the latter: Small-pox declared itself in nine distinct foci during the winter of 1884-85 in the most crowded parts of this city. Being treated with these agents of destruction—bichloride, immersion of all things before leaving room, isolation, with nurse wiping all surfaces with the solution, immediate boiling of all clothing, etc. taken (bichlorided) from room, thorough sulphuric fumigation and bichloride washing of all surfaces, burning mattresses and blankets after saturation for safety in removal—in no instance did the disease spread beyond the primary cases. Such would be true of cholera and of yellow fever if this sanitary treatment is timely and applied boldly and lavishly.

Communities themselves have encouraged the growth, and are wholly to blame for the pernicious and suicidal spirit of concealment of pestilential infections. They have pandered to the vicious passion of a trade element, as merciless as it is sordid and depraved, and ever ready to raise a hue and cry against a physician who makes properly known a case which his professional knowledge leads him to know or suspect to be a case of cholera or yellow fever; small-pox speaks for itself. The community in this matter, therefore, becomes not only a partaker, but the instigator of this mighty guilt. The saloon keepers, innkeepers and petty trades people have fostered many a sweeping epidemic.

Feeble-spirited and superserviceable health authorities, and even bureaus of government, timorously submitting to the dictum of this unrighteous mammon, have suppressed, and do now suppress the truth; have falsified reports; and have consigned States and nations to the

ravages of unresisted pestilence, when thousands of lives might have been saved, at least by timely flight, and distant communities, forewarned, might have protected themselves.

Witness the outrageous transactions in France, Spain and Italy during the prevalence of cholera in 1886, and witness the scenes being now transacted in Eastern Europe, together with repeated and common occurrences of like kind in town and country in our own land in times gone by.

From to-day's papers we quote the following Associated Press telegram:

LONDON, July 25th.—The *Time's* St. Petersburg correspondent says: "Nobody takes the official cholera returns as the real state of things. Efforts are made to conceal the facts. It will be felt more as a hinderance to commerce than as a danger to the population."

As custodians of a sacred trust, health authorities must be true to their allegiance, and that allegiance demands perfect candor and timely warning to the people; not only of a community, but of all communities whom it may concern. Yea, more! This principle of action should be woven as a living thread into the texture of international relations. It should exist as an essential element in the comity of nations.

Health authorities must at all times be courageous, bold, and ever ready for any sacrifice in resisting and putting under foot the insolent power that would make of them instruments for a cowardly and perfidious service.

The subject of prompt announcement is so woven into the affairs of practical municipal and maritime sanitation as to necessitate its fullest recognition as an elementary and indispensable part.

Let the world beware of a *politic* board of health! for it is a body without truth! The one must and invariably does subordinate the other.

It is inconsistent with every known law of God, of every principle of sound policy and of well-doing among men, that an individual, or a city, or a State, can successfully protect itself behind the flimsy barrier of a lie, particularly in dealing with the phenomena of nature.

It is not the proper way to deal either with the phenomenon itself, or the inhabitants who are subject to its mischievous action.

If a case of cholera occurs in a city and be hidden under the disguise of a simple intestinal derangement "*to avoid public clamor and injury to the commerce and revenues of State,*" as was done in Naples, in the cities of Spain and in Marseilles, the last hope of destroying the contagion is wiped away, and thousands of lives and the general ruin of industry must pay the penalty of a sordid, short-sighted, wretched policy. So of small-pox and so of yellow fever.

The deadliest enemy of a State is the man guilty of intentional concealment. It is a capital offence and should be made statutory by legislative enactment.

THE COMMISSION OF MEDICAL EXPERTS.

The Board of Health has provided for the City of New Orleans a Commission of Medical Experts for the diagnosis of the first reported case of cholera or yellow fever. The idea was to form a tribunal composed of gentlemen chosen from the highest rank in the medical profession.

Any two or more of the members of this commission being called in consultation are competent, with the attending physician, of rendering a diagnosis, which must be accepted; and is not to be critically traversed by the Board of Health. The Commission is a court of highest appeal whose decisions are final.

If there is unity of affirmation of a case as cholera or yellow fever, it is so reported. If there be one dissenting voice and two affirming, believing, or suspecting a case as cholera or yellow fever, the case is published by the board as *suspicious*.

This Commission of Experts, twelve in number, is so distributed as to make at least two of them quickly available in any quarter of the city.

Many times has the commission been called upon since its creation, without the slightest ripple of public excitement; and had it reported any one of these cases as yellow fever, there would have been no subsequent controversy on the ground of diagnosis.

The State is certainly indebted to the gentlemen who have accepted, without remuneration, the grave responsibilities of this commission, for public services of the highest value.

INTRODUCTION OF THE BICHLORIDE OF MERCURY.

See letters of instruction to Dr. Thomas Y. Aby, Quarantine Physician, page 43.

THE QUARANTINE METHODS OF LOUISIANA—MARITIME SANITATION.

There assembled in New Orleans, June 2, 3, and 4, 1884, a "CONFERENCE" composed of the health authorities of all the gulf States and Tennessee, invited by the Louisiana State Board of Health, to discuss the proper means of doing away with the mutual distrusts, the lack of confidence, the crimination and recrimination which had been engendered in the past, and which had so often erected shotgun quarantines, established blockades of railroad trains, created stoppages and detention of vessels and goods on the great highways of commerce, and exposed passengers, even delicate women, to cruel delays, barbarous exposure and treatment, and the thousand other evils that are the natural concomitants of insane panics.

At the very inception of that conference it devolved upon the president of the Louisiana Board to read a paper in which he proposed in detail a system of sanitation which would cure the defects of the existing methods of quaran-

tine against infected ports; which, by the use of scientific and improved appliances, would enable a ship to pass up to her destination in twenty-four or forty-eight hours, if not with perfect and absolute security to the public health, at least with a thousand-fold stronger guarantee than the then present system.

The whole conference, composed not only of theoretical scientific experts, but of men whose experience for years had been perhaps greater in the practical operation of quarantine than any on the face of the globe, solemnly and unanimously declared that the adoption and maintenance of the system and method proposed would be more than satisfactory to them; that if the State of Louisiana would adopt and put it into practical operation, they would go home to their people and their State authorities and tell them that they could rest assured in the perfect security that all that human science could do for their protection was being done; they would proclaim a truce to shotgun quarantines, the stoppage of trains, and all the other barbarous interruptions of trade, commerce and social intercourse.

The following extract from a communication to His Excellency Samuel D. McEnery, Governor of Louisiana, January 2, 1888, more fully elucidates this subject:

As the executive officer and representative of the State Board of Health, I was invited by the American Public Health Association, through its president, Dr. George M. Sternberg, then chairman of the Committee on Disinfectants, to prepare a description of the Quarantine system of Louisiana, and an explicit account of the methods of disinfection employed.

This paper, containing carefully prepared wood cuts from photographs and drawings, was presented at the meeting of the American Public Health Association, at Memphis, in November, 1887.

Inasmuch as this report constitutes a complete exhibi-

tion of the system in all of its parts, we have the honor to submit it for your consideration.

Very respectfully, your obedient servant,

JOSEPH HOLT, M. D.,

President Board of Health State of Louisiana.

Gentlemen of the Committee: In describing the methods of disinfection used in the quarantine of Louisiana, it is necessary first to examine the system itself synthetically.

There are three maritime approaches to New Orleans: the Mississippi river, which is the central and main avenue; the Rigolets, thirty miles to the eastward, a narrow strait connecting Lake Pontchartrain with Lake Borgne and the Gulf of Mexico; and the Atchafalaya river near its debouchment into the bay of that name and Mexican gulf, eighty-two miles to the westward.

On account of the character of shipping coming through the two lateral approaches, "light in tonnage and mostly from domestic ports," the Rigolets and Atchafalaya are completely closed by a proclamation of forty days' detention against all vessels from quarantined ports, compelling such to seek the Mississippi as the only available route to New Orleans. This is done in order to avoid the immense expense of keeping up three completely equipped stations, and to concentrate at a single point the fight against infection.

The quarantine in the Mississippi is a system composed of three stations, the first of which is an advanced guard inspection station, situated at Port Eads, one hundred and ten miles below New Orleans, where the waters of South Pass are jettied into the gulf. (See plate 1.)

When an inward bound vessel comes into the offing, she is immediately boarded by a thoroughly skilled medical officer, and a careful inspection is made of her sanitary record and present condition.

If from a non-quarantined port and all is well, she is given pratique and goes on to the city. If from a quarantined port,

but presenting a clean health record of voyage, and no evidence of sickness of a dangerous or doubtful character, she proceeds to the upper quarantine station, situated on the left bank of the river, seventy miles below the city, where she is subjected to a full course of sanitary treatment, and is detained such length of time (not exceeding five days, except in rare instances, where further observation may be deemed necessary), as the board of health may provide.

If, upon the inspection of a vessel entering the river, she is found to be foul—that is, showing positive or suspicious evidences of infection, either in a person then ill or in a foul health record of voyage, she is at once remanded to the Lower Station, for infected vessels only, located on Pass a L'Outre, an unused outlet of the Mississippi, one hundred and three miles below the city. The sick, if any, are at once removed to the hospital, where every provision has been made for them. The medical care and the comfort of sick passengers and sailors at the Station for Infected Vessels Only, has been made a chief consideration in the construction of the system, and should offer the tenderest ministrations of a modern hospital. The vessel, with the well on board, is dropped down stream a few hundred yards and anchored. In the meantime the quarantine tugboat with its complete disinfecting outfit (see plate 2) has been telegraphed for and speedily arrives from the upper station, when the work of disinfection begins and does not cease until the vessel has been subjected to the most vigorous application of solution of the bichloride of mercury; her atmosphere, below deck, completely replaced with one heavily charged with sulphurous oxide, and every article of baggage and ship's wardrobe has been saturated with the mercuric solution.

A ship known to be infected with one of the three great pestilential diseases—small-pox, cholera or yellow fever—can stand and must endure extraordinary treatment, even if clothing is wetted and some articles damaged. “They

who go down to the sea in ships" assume the perils of the voyage, among which is this occurrence of finding themselves on an infected vessel and being compelled to undergo cleansing, for they have no right to bring their perils ashore and endanger others. (The early invention of the steam disinfection chamber soon relieved all possibility of such damage as above mentioned in bichloride wetting.)

The immediate segregation of the sick and the well, and disinfection of the ship and all baggage (in the case of a cholera infected vessel extended to the disinfectant washing out and refilling of the water tanks, destruction of the food supply and revictualing the vessel) constitute the treatment of an infected vessel at this station. The ship, together with all on board, is held for observation a period of ten days more or less, according to circumstances, when she is released and proceeds to the Upper Station, where the processes of sanitary treatment are repeated, with the addition of the use of moist heat applied to baggage, ship's apparel, etc. (which latter process will be described hereafter), and the vessel is then allowed to proceed to the city.

This course of treatment at the Upper Station, while probably unnecessary, is enforced purely as an extraordinary precaution.

Inasmuch as infected ships are the exceptions, but inasmuch as also the Board of Health will take no risk in the case of vessels from known infected or suspected ports, regardless of bills of health, the vast majority of vessels are treated at the Upper Station.

Arriving at this station, the vessel is brought alongside the wharf, All on board—officers, crew and passengers—are at once sent ashore, where they find ample accommodation in commodious shelter, provided for their entertainment during the time occupied in the sanitary treatment of the ship and all baggage. (See plate 3).

As soon as this is completed they are permitted to return aboard ship, where they remain under observation during

the prescribed period, determined by the remoteness or nearness of the port against which these precautions are taken.

The object of this brief detention for observation, after the sanitary treatment of the vessel has been completed, is to allow for a probable outbreak of an infectious disease already incubating in the system of any one on board.

As an essential part of the service there is a tugboat of sufficient power to move a sailing vessel to or from the wharf. (See plate 2.)

In addition to this requirement, this boat is equipped with a complete outfit for generating and applying germicidal gas for displacement of the entire atmosphere within the ship, transported, perhaps, directly from some infected port. In the hold of this tug is constructed a wooden tank of 2000 gallons capacity, to hold the bichloride of mercury solution for the treatment of vessels in the Lower Quarantine, as described. This tank is furnished with a steam pump (made of iron on account of the greater resistance of that metal to amalgamation) supplied with three-quarter-inch rubber hose.

In the sanitary treatment of a vessel in quarantine, there are three processes of disinfection concurrently applied.

APPLICATION OF BICHLORIDE OF MERCURY.

The first is the wetting of all available surfaces of the vessel, excepting cargo, but including bilge, ballast, hold, saloons, forecastle, decks, etc., with a solution of the bichloride of mercury, made soluble by an equal weight of muriate of ammonia, in the proportion of one part to one thousand of water.

The idea of using this agent as a disinfectant in municipal and "maritime sanitation" suggested itself to me while reading the chapter on "Wound Disinfection Antiseptics" in the volume entitled "The Treatment of Wounds," by Lewis S. Pilcher, M. D., containing an

account of the experiments of Dr. George M. Sternberg, with a table of chemical agents and their relative germicidal strengths, at the head of which stands the bichloride of mercury, and also a table of the results obtained by Koch in Berlin, 1881, and by Schede and Kummel in the Hamburg General Hospital in the same year.

The Board of Health immediately endorsed the idea and ordered the adoption of the bichloride of mercury, as explained in the following letter:

NEW ORLEANS, July 17, 1884.

Dr. Thomas Y. Aby, Resident Physician Mississippi Quarantine Station: DEAR SIR—Because of the signal failure of carbolic acid as a disinfectant and prophylactic agent after a trial more fair and extended than has ever been allowed any other; because of its excessively offensive odor and the oppressive and sometimes mischievous effects of its fumes; because of the low order of the commercial acid as a germicide and the considerable expense involved in its use, you are hereby requested to discontinue its application.

In its stead I have ordered to your station two packages: of bichloride of mercury and muriate of ammonia, the latter to act as a solvent.

In its preparation for use, take five and a half ounces of each and dissolve in a half gallon of water; add this to forty gallons of water in a cask. I have sent three large watering pots, with a fine rose or spray. Your men can quickly wet down a ballast pile and all available surfaces of a ship, and it needs no repetition when once thoroughly applied.

The advantages of this agent are briefly these: The mercuric bichloride stands pre-eminently above all chemicals as a universal germicide. Not only are definite organisms immediately destroyed, but all protoplasm and albuminoids are devitalized by it. It is efficient to accomplish this work when applied in a solution so weak as not to be recognized except by chemical reagents. It is devoid

of color or smell. It does not poison the air by vaporizing, but adheres in an innocuous form to the surfaces upon which originally applied. Its cost is about one-eighth that of carbolic acid.

I feel that this transition is quite as much of a relief to you, my dear doctor, as to the afflicted people on shipboard, who must surely suffer severely from the stifling fumes emanating from carbolic acid applied to surfaces heated by a July sun, as the people of this city can testify to their terrible cost!

The position of persons confined on shipboard under such circumstances, particularly in the instance of women and children as passengers, as related by yourself, must at times be most distressing. The board of health heartily joins with you in the satisfaction and sense of relief afforded by this change, which is an important step in the great work of humanizing our quarantine.

I remain, with great esteem, yours very truly,

(Signed) JOSEPH HOLT, M. D.,

President Board of Health, State of Louisiana.

The bold adoption of this poisonous agent in domestic, municipal and maritime sanitation at once called forth a flood of most gloomy forebodings of fearful effects upon the human system.

Our declaration at that time is confirmed by an experience of four years' trial on an immense scale, that our standard solution, as used in sanitation, is absolutely harmless to persons unless swallowed, it matters not how extensive or constant the contact. The only objection we have yet discovered is that certain articles, particularly blankets and flannels, treated by the solution sometimes become spotted, and colors liable to "run" when wetted, suffer; but unlike all other chemical agents applied as disinfectants, the textile itself is in no wise injured.

Recapitulating its merits; being colorless, stainless (except as stated), odorless, not injurious to fabrics, perfectly safe to handle for months at a time, easily applied and

exceedingly cheap, it is impossible to imagine a substance more efficient and as free from objection in practice. It is indeed the key unlocking difficulties otherwise insurmountable, and rendering practicable in municipal and maritime sanitary work the efficient execution of scientific requirement.

The amalgamating powers of the mercuric salt presented many serious obstacles in the contrivance of an apparatus for its application, all of which have been overcome without sacrificing simplicity, efficiency or economy.

Immediately adjoining the quarantine wharf, and near its water edge, is constructed a substantial frame-work of piles each twelve inches in diameter. This structure has an ample base, is pyramidal, and forty-five feet in height above mean level of the river. On top of this is a circular wrought iron tank, capable of holding eight thousand gallons of the mercuric solution. (See plate 3.)

In order to prevent contact of the latter with the iron, the interior of the tank is painted over with three coats of red lead and two of paraffine paint. The top of the tank is closed by a secure cover to prevent access of light to the solution. This, together with the general exterior, is painted black.

On the top of this cover is placed centrally a sixty-gallon wooden cask, in which is dissolved the mercuric salt, which is then emptied into the tank through a wooden faucet. Seventy pounds are used for one charge. This is done just before filling the tank in order to insure mixing and uniform strength of solution.

In the tank near the lower edge are three heavy galvanized iron or wooden faucets, to each of which is screwed a lead of three-quarter inch, four-ply rubber hose, the farther ends of which lie on the wharf. These are lengthened by additional sections to reach any part of the vessel. To the far extremity of each hose is fitted a wide-spreading, watering spray-rose.

During disinfection, all three hose are simultaneously used, fore, aft and amidship.

For spraying, we use a perforated, heavy block-tin rose, four inches across the face, similar to an ordinary watering-pot spray and heavily coated inside and out with red lead, finished heavily with asphalt varnish. These are made with a shank about six inches long, to fit snugly into the open end of the pipe. Except the wooden faucets at the tank above, stop cocks must be dispensed with. Bending the hose upon itself near the spray-rose and securing with a string controls the stream.

On a single vessel we average fifteen hundred gallons of solution, but often use three thousand.

The process requires from thirty minutes to two hours, according to circumstances.

The decks, forecastle, saloon, bunks, ballast and all such parts as are usually treated with carbolic acid or disinfectant fluids, objectionable on account of odor, staining and inefficiency, are freely wetted with this solution (one to one thousand) of the bichloride of mercury; but never the cargo.

SULPHUROUS OXIDE FUMIGATION.

As soon as the men have completed the work of "bichloriding" below decks, the fumigating pipe is then extended from the quarantine tugboat lying alongside. (See plates 2 and 3.) It is lengthened by sections, being fitted together like stove pipe, and conducted down a convenient hatchway to the bottom of the hold or as near the keelson as possible, preparatory to the fumigation of the entire vessel (and cargo if any) with sulphurous oxide. In the case of a sailing ship, one hatchway gives access of the sulphurous gas to the entire hold; but in large steamers the hold is subdivided by bulkheads into two or more distinct compartments, which must be treated separately.

In undergoing treatment, the cargo is not disturbed, except when the removal of bags of coffee is required, to

permit the passage of the fumigating pipe, which is twelve inches in diameter, down into the dunnage at the bottom of the cargo.

I have given explicit instructions to coffee importers, whereby the expense of removing bags to make this well or shaft through the cargo may be avoided. It is necessary to have an open, frame-work shaft, allowing a clear inside space of fifteen inches, placed in the centre and down to the dunnage of the main hatch in a sailing vessel, or in the centre of each hatch in a steamship having bulkhead compartments. The frame work of this shaft is set before loading, and should be cut flush with the top of the cargo.

This simple arrangement avoids all handling and delay.

When the connections are made and the fumigating pipe is arranged the fan on the tug boat is started, and the process of displacing with sulphurous oxide the entire atmosphere within the ship begins.

The length of time required to complete the fumigation varies from thirty minutes to three hours, according to size of vessel, number of compartments, etc.

The quantity of commercial roll sulphur used varies from 200 to 700 pounds per vessel.

The apparatus invented for rapidly evolving and supplying the germicidal gas consists in a battery of eighteen furnaces, each supplied with a pan to contain the sulphur during combustion. These furnaces open into a common reservoir, to the farther end of which is connected a powerful exhaust fan (Sturtevant's No. 29). (See plates 4 and 5.)

The gas drawn by the fan is driven into a twelve-inch galvanized iron pipe, through which it is conducted over the side and down the hatchway of the vessel into the bottom of the hold.

The gas, as it is driven into the vessel, is quite hot, but would instantly extinguish rather than create fire.

The outflow should not impinge directly against bags

of coffee or bales of textiles, if it can be avoided, in order to prevent formation of sulphuric acid and some slight injury therefrom at that point.

In treating coffee, and for convenience in some other instances, the vertical lead of pipe into the hold is made of asbestos twilled cloth, closely and heavily woven for our purpose.

Every opening is closely battened during the process and remains so for at least eight hours after it is discontinued.

The apparatus throughout is made ample in size and power for rapidity of work and economy in wear and tear, by lessening velocity and friction. The fan is run by a special engine at a slow rate as compared with its capacity, but driving into the ship 180,000 cubic feet per hour of atmosphere surcharged with sulphurous oxide.

[It is evident, in doing this, that we displace the mephitic and dangerous atmosphere closed in the ship when she started from Rio, we will suppose, and which, if allowed, would have been set free at our wharves the yellow-fever infected atmosphere of Rio to commingle with the atmosphere and the other factors of spread, deadly ripe, perhaps, for its reception. We displace this not only with a non-infected atmosphere, but with one intensely germicidal—one that destroys organic elements in this, and on exposed surfaces, with instant greediness. Its use as proven in practice is perfectly compatible with the preceding bichloride wetting—the expected chemical reaction between the two not taking place at all, or too slowly to impair the virtue of either. Let this be remembered.

Incidentally to the sulphurous disinfecting process is the unsparing and complete destruction of vegetable mould, of rats, roachès and all other vermin; which is an excellent gross test of efficiency.

Captains of the great British West Indian and other tropical liners, and of long-voyaged sea-tramps, have repeatedly assured us that the instantaneous and thorough ridding of their ships of the infesting vermin, sometimes amazing in quantity and destructiveness, is alone worth double the quarantine fee.

While in quarantine, vessels and cargo are subjected to thorough disinfection without disturbing cargo. Miscellaneous freights being cased in seaworthy packages and closely stored are uninjured by the fumigation, and are in perfect position for its accomplishment. Breaking out is never called for.

The peculiar manner in which coffee is compactly stored aboard ship, almost hermetically encased in the narrowest possible compass, presents

seemingly a formidable mass of cargo in bulk to treat, while in fact it presents an opportunity for thorough disinfection, for which we can never again hope, after breaking cargo.

Besides, the fact that the sulphurous gas is heavier than air, and being piped to the kelson fills the vessel from below upward, like carbonic acid or water, it is important to remember that it is driven in under a high velocity. From all influences combined, including the law of diffusion of gases, we have indubitable evidence that it penetrates every part of the compact mass of cargo, and displaces the resident atmosphere. If the coffee is dry and merchantable, there is no trace of effect upon the grains; if, however, it is damp and sweating, and therefore more or less spoiled, there is some bleaching, determined in intensity by the degree of moisture. The effect upon the color is quite compensated in the check upon fermentation in an ill-conditioned cargo.

The amount of sulphur used varies from 200 to 700 or 1000 pounds, according to size, condition, etc., of vessel.

The present results as compared with three weeks' detention of a 32,000-bag cargo in steamer, and \$3000 as loss in quarantine and subsequent outbreak of yellow fever, as has happened, are sufficiently encouraging.

The sulphurous fumes not only displace the atmosphere of the open hold, but penetrate the interstices of cargo, and make their way freely into the bilge through the airstrakes and limbers, and displace the atmosphere between the skin and ceiling. As to a steamship, the conditions due to construction are of the simplest kind.]

APPLICATION OF DRY AND MOIST HEAT.

While these two processes of sanitary treatment of the vessel are going on, all bedding, ship's linen, cushions, mattresses, flags, mosquito nets, curtains, carpets, rugs, all personal baggage and wearing apparel of whatever description, are removed from the ship to a commodious building in close proximity in which these articles are treated by moist heat at a temperature of not less than 230 deg. Fahrenheit.

The apparatus for this work consists in a steel 40 horse-power steam boiler (see plate 8), for supplying steam to a superheating chamber a few feet distant, and which I will now describe. (See plates 6 and 7.)

The dimensions of this chamber, taken interiorly or inside measure, are 60 feet long, 11 feet wide and 7 feet high.

The frame work is composed of 3x3-inch seasoned pine lumber, joined as in the construction of a frame house. Upon the outside of this frame work (and corresponding to weatherboarding in the case of a house) is nailed tongued-and-grooved flooring material three-fourths of an inch thick by six inches wide.

The inside or interior of the ends, rear and top of the chamber is ceiled with the same material and a flooring of the same is also laid. Upon these interior surfaces is tacked heavy "Russian Hair-cloth or Felting;" and upon this, at intervals of three feet, are nailed parallel strips of wood 1½x2 inches, and, in turn, upon these strips is fastened another sheathing or ceiling of flooring plank, as already described.

This secures an air space between the hair-cloth and inner ceiling. Upon this now smooth interior surface of wood is finally tacked and held in place by very broad-headed nails, or better, by nails supplied with tin discs or washers, a double layer of "Asbestos Building Felt," well lapped and securely tacked; thus rendering the interior of the chamber fire-proof.

By the foregoing described construction it will be seen that the walls of the chamber, which are eight inches in thickness, consist of seven non-conducting media; first, the outer layer of planking; second, three inches of air space; third, an inner ceiling of planking; fourth, one inch thickness of "Russian Hair-cloth;" fifth, one and one-half inch air space; sixth, a third layer of three-fourth inch planking; seventh, a double layer, or interior lining, of heavy asbestos felting.

The front wall is divided into forty panels, eighteen inches wide each (see plates 6 and 7), which represents that number of racks contained within the chamber.

Upon the bars of these racks the clothing, etc., is hung for exposure to disinfection by moist heat. (See plate 7.)

These racks are constructed with a front and rear panel united by horizontal bars, six to each side. Each rack

is suspended overhead, on traveling rollers, upon an iron rod which extends from the rear wall of the chamber to a support ten feet in front of the chamber; the rod, therefore being twenty feet in length.

By this arrangement overhead, the racks may be drawn out and pushed in with facility, thus avoiding tracks or rods on the floor obstructing the movements of employés.

When drawn out the full length of ten feet, the rear panels of the racks securely close the chamber, as do the front panels when the racks are pushed in; thus admitting of the heating of the chamber during the time of hanging the articles of clothing, etc., on the rack bars preparatory to disinfection.

For this admirable device and, indeed, for the entire skeleton of the superheating chamber, including the dry-heat double steam coils, we are indebted to the Troy Laundry Machinery Company, Chicago, Ill. We have found the purchase of this apparatus, constructed to include certain of our specifications, to be the most economical and satisfactory we could have desired.

The interior surface of each front panel is lined with a layer of Russian hair-cloth, over which is applied a double layer of asbestos felting.

At intervals of seven and one-half feet a bulkhead of one-inch tongued and grooved flooring is constructed, subdividing the chamber into eight compartments. These bulkheads, or partitions, are made fire-proof by a covering of a double layer of asbestos felting. The object of this arrangement is to provide against the spread of fire in the event of its occurrence.

In addition to this provision there is a double lead of one-inch fire hose connected with a steam pump near the boiler, and at all times ready, within fifteen seconds' notice, to turn on two streams of water upon any rack on which fire might have originated.

These minute specifications concerning provision against fire are particularly appreciated by ourselves; it cost us

two fires and the destruction of a large amount of property to learn a lesson which experience alone could teach. Lacking experience and precedent, these accidents could not have been foreseen, and therefore could not have been provided against. They were the result of an underrating, and failure to appreciate the prodigious force which the contrivance invented placed at our will to invoke.

Under the present arrangement, including early use of free steam, fire is hardly possible; but if it should occur we are prepared to draw out instantly the burning panel, to strip it of clothing and to put out the fire.

With reasonable care and watchfulness on the part of the employés there need be absolutely no danger of loss by fire.

The superheating of this chamber is so provided as to furnish at will dry or moist heat, or both; and by a turn of the hand a temperature of 300 deg. F. can be obtained.

Within and at the end of this chamber next to and connected with the boiler are two manifolds, one above the other, to which is connected a system of forty-five three-quarter inch steam pipes (aggregating 5509 lineal feet), placed horizontally near the floor of the chamber, running its full length, and supplied with a "bleeder" for conveying off the water of condensation.

This double coil furnishes the dry heat. (See foreshortened view, plate 9.)

Above and in close proximity to this system of pipes is extended a horizontal screen of galvanized iron, one-half inch mesh, to catch and so prevent the coming in contact with the superheating pipes any article falling from the racks. (See plate 7.)

The moist heat is supplied by a one-inch steam pipe laid centrally in the midst of the above described dry heat pipes and running the entire length of the chamber, constituting a steam-main, connected with the boiler and controlled, as the others, by a ball valve on the outside.

This pipe is perforated by eighty one-twelfth-inch holes, so placed as to furnish steam to each rack.

During the time of hanging the articles of clothing, etc., on the racks, the dry heat is turned on and the temperature raised to about 190 deg. F., made known by a thermometer having a large mercurial column, and suspended near the centre of the chamber, working on a slide or traveling rod in such a manner, when it is desired to make a reading, as to allow of being drawn forward (by a cord extending outside) to a long, narrow pane of glass set in the panel. This thermometer should have a scale of at least 275 deg. F.

As each rack is filled it is put back into place. By the time the last of the articles has been hung on the racks, the entire mass of the material within the chamber has attained a temperature between 190 deg. and 200 deg. F., when free steam is turned on, the thermometer speedily rises to a point varying between 230 deg. and 240 deg. F., at which it is maintained for a period of twenty minutes.

The steam pressure in the boiler, at the beginning of this process, registers between 100 and 110 pounds by the steam gauge; at the end of the process of blowing in steam the pressure will have fallen to about sixty pounds.

The steam is now entirely cut off from the chamber, the racks are drawn out and their contents removed.

During the process of steaming, every article is perceived to be saturated and intensely hot, the steam permeating to the interior of mattresses, double blankets, etc.; but so great is the heat in the texture of the fabrics as to immediately expel all moisture upon drawing the racks and exposure to the open air. Shirts, collars, etc., instantly assume the crisp dryness they possessed before exposure, losing the musty smell of long packing in a trunk. Silks, laces, the most delicate woollen goods show no signs of injury whatever from the treatment.

Of course, articles of leather, rubber, and whalebone would be injured by the heat and are therefore disinfected

with the mercuric solution and not permitted to go into the heated chamber.

Time required to charge chamber with apparel for disinfection, thirty minutes; time required for moist heat, twenty minutes; for removal of articles, fifteen minutes; a total of sixty-five minutes.

A large steamship, particularly a passenger vessel, may require two or three charges of the chamber.

Amount of coal consumed, from two to four barrels per vessel.

In the summer of 1885 we devised and put up a chamber of the above general plan, but wholly inadequate as to size for the requirements of our service. This was replaced by one operating on the same principle, but fifty feet long and supplied with a twenty horse-power boiler, which latter proved too small for rapid work. This apparatus was burned last spring.

Our present chamber and supply boiler are of the dimensions given in the appended plates.

We prepared the plans of the foregoing described apparatus during the summer of 1884. Obtaining a liberal appropriation of \$30,000 from the State Legislature for the avowed purpose of establishing a new system of quarantine through the elaborations of purely experimental work; and thoroughly endorsed and sustained in all of our efforts by the progressive spirit of the press of New Orleans and by the merchants, we put the new system into practical operation and threw open the Mississippi to commerce June 10, 1885.

As it stands to-day, we sincerely believe in a nearly perfected state, it is the consummation of experimental effort, through a long and tedious process, beset with difficulties of the most perplexing and often disheartening kind.

Without precedent; having to deal with natural forces of prodigious power; repeatedly encountering unexpected difficulties; meeting with accidents; obliged continually

to devise improvements upon our several inventions, and continually combatting a surly discontent and sometimes violent opposition from those subjected to the sanitary processes while these were still in an imperfect and unsatisfactory stage of development, the modernizing of quarantine and bringing it into line with other branches of science and art in the general progress has been an expensive and difficult task.

We submit to your Honorable Committee the foregoing plans and specifications of the "System of Quarantine" established by the State of Louisiana in order to place the results of our experience in the hands of those who, like ourselves, are compelled to resist pestilential invasion by maritime quarantine.

We do this, encouraged by the hope that others may find in these results matter worthy of consideration and beneficial in strengthening their defences against a common enemy.

The following are the requirements imposed upon all vessels arriving at the quarantine stations in the State of Louisiana during the quarantine period, beginning about May 1 and ending October 31 of each year.

ANNUAL QUARANTINE PROCLAMATION.

EXECUTIVE DEPARTMENT,
STATE OF LOUISIANA. }

WHEREAS, On the 14th day of April, 18—, the Board of Health of the State of Louisiana have adopted resolutions requesting the Governor to issue his proclamation of quarantine to take effect on the 1st day of May, 18—, at noon, in accordance with the following provisions:

All vessels arriving at the several quarantine stations in this State, together with their crews, cargoes and passengers, shall be subjected to inspection by the quarantine officers at said stations.

All vessels, together with their cargoes, crews, passengers and baggage, arriving at the Mississippi River Quarantine Station from inter-tropical American and West Indian and Brazilian ports shall be subjected to thorough sanitation according to the following schedule, to-wit:

First Class—Vessels arriving from non-infected ports.

Second Class—Vessels arriving from suspected ports.

Third Class—Vessels arriving from ports known to be infected.

Fourth Class—Vessels which, without regard to port of departure, are infected; that is to say, vessels which have yellow fever, cholera, or

other contagious or infectious disease on board at time of arrival, or have had same on voyage.

Vessels of the first class to be subjected to necessary maritime sanitation at the Mississippi River Quarantine Station, without detention of either vessel or persons longer than may be necessary to place such vessels in perfect sanitary condition.

Vessels engaged in the tropical fruit trade and coming from known non-infected ports, whose sanitary condition and health record are satisfactory, may be allowed to pass the quarantine stations after inspection, subject, however, to such regulations and sanitary treatment as the Board of Health may prescribe.

Vessels of the second and third classes to undergo the same conditions as those of the first class, together with detention for observation for a period of three full days from hour of completion of sanitation.

Vessels of the fourth class to be remanded to the lower quarantine station, there to undergo sanitation and detention of vessels and persons such length of time as the Board of Health may determine.

All vessels arriving from ports known or suspected to be infected with yellow fever, cholera or small-pox, or which may hereafter become infected, shall be subjected to maritime sanitation and such detention as the Board of Health may determine.

Vessels arriving from the above named ports and places, and belonging to the second, third and fourth classes, as set forth in the above schedule, shall not be allowed to pass the Rigolets, the Atchafalaya, the Lake Borgne Canal, or Lake Charles Quarantine Stations, or other State quarantine stations which may hereafter be established, without having undergone a period of detention of forty days and thorough cleaning and disinfection.

Now, therefore, in accordance with the laws of this State in such case made and provided, and upon the recommendation of the Board of Health of the State of Louisiana, I, _____, Governor of the State of Louisiana, have thought proper to issue this my proclamation of quarantine, directing that quarantine shall take effect from and after the 1st day of May, 189—, at 12 o'clock M., against the above named and designated ports and as contained in the above schedule.

Quarantine officers at the several stations in this State are specially charged and required to strictly enforce the execution of this proclamation, and the State Board of Health is requested to prosecute vigorously all violations of the same as well as the quarantine laws and regulations of this State.

In testimony whereof I have hereunto affixed my signature authenticated with the seal of the State of Louisiana, at the city of Baton Rouge, this _____ day of April, in the year of our Lord one thousand eight hundred and ninety— and the one hundred and _____ of the independence of the United States of America.

[SEAL]

.....
Governor of Louisiana.

By the Governor:

....., Assistant Secretary of State.

SPECIAL SUGGESTIONS TO OWNERS, AGENTS, MASTERS
OF VESSELS AND PASSENGERS.

The Louisiana State Board of Health recommends the following suggestions to agents, owners, masters of vessels and passengers for the purpose of facilitating the work of quarantine officers and reducing the period of detention to a minimum:

1. That vessels should be stripped during the quarantine season of all woollen hangings, carpets, curtains and such like materials, and upholstered furniture, as far as practicable. Hair or moss mattresses to be replaced by wire or wicker beds.

2. That as far as possible vessels trading with tropical ports should be manned with acclimated crews.

3. Masters of vessels, ship and consular agents are earnestly requested to instruct passengers from quarantinable ports to dispense, as far as possible, with baggage which may be injured by wetting, in case of pestilential outbreak on board, while undergoing disinfection. Such passengers are especially warned against bringing silks, laces, velvets and other fabrics of delicate texture, as they will be compelled to assume all risks of injury.

4. While in ports infected with yellow fever, vessels should be anchored out in the harbor when this is possible, and the crew prohibited from going ashore, especially at night.

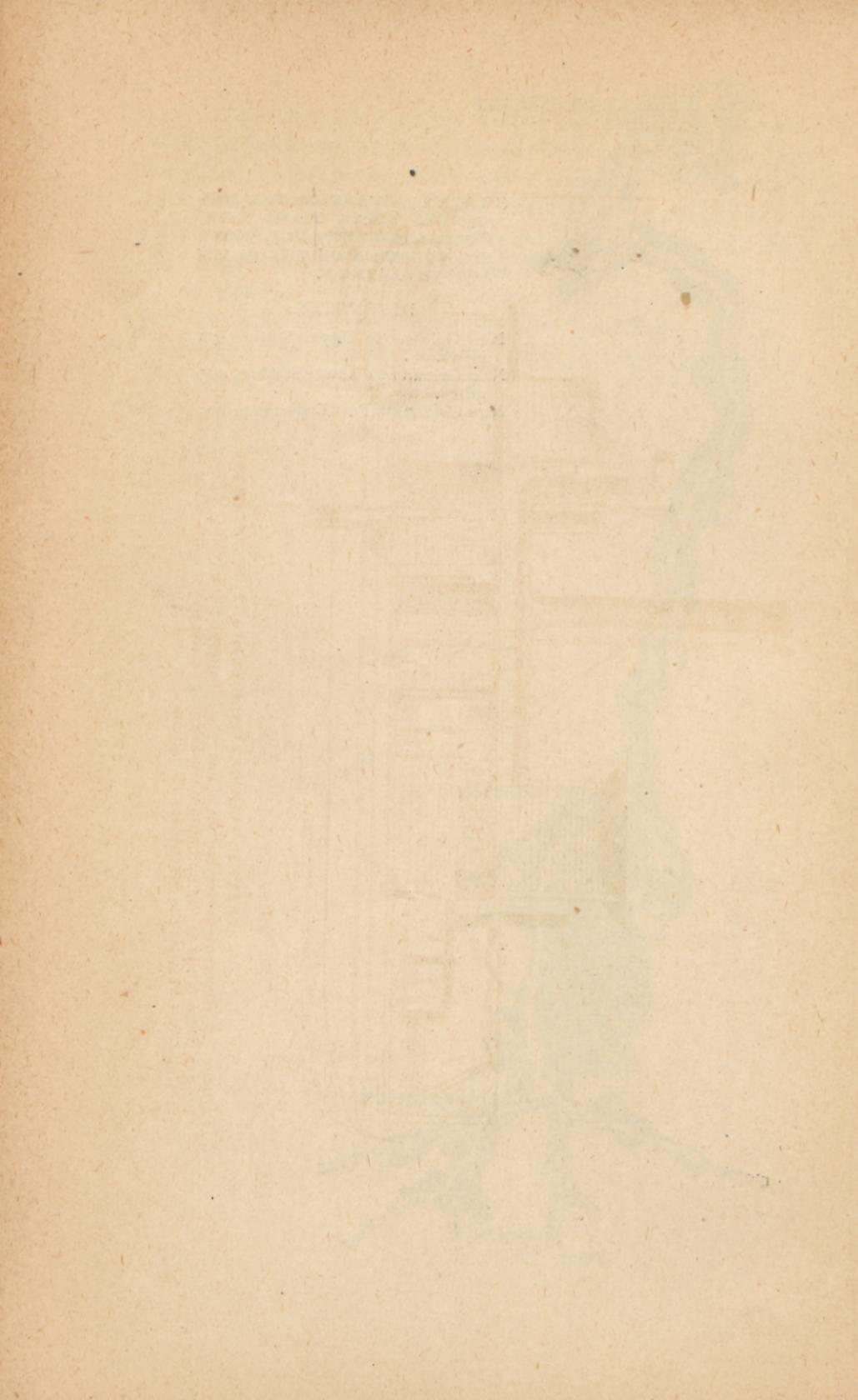
5. When practicable, cargoes should be loaded in such a manner as to allow access to the pumps, and also to enable the quarantine officials to pump out and wash the bilge.

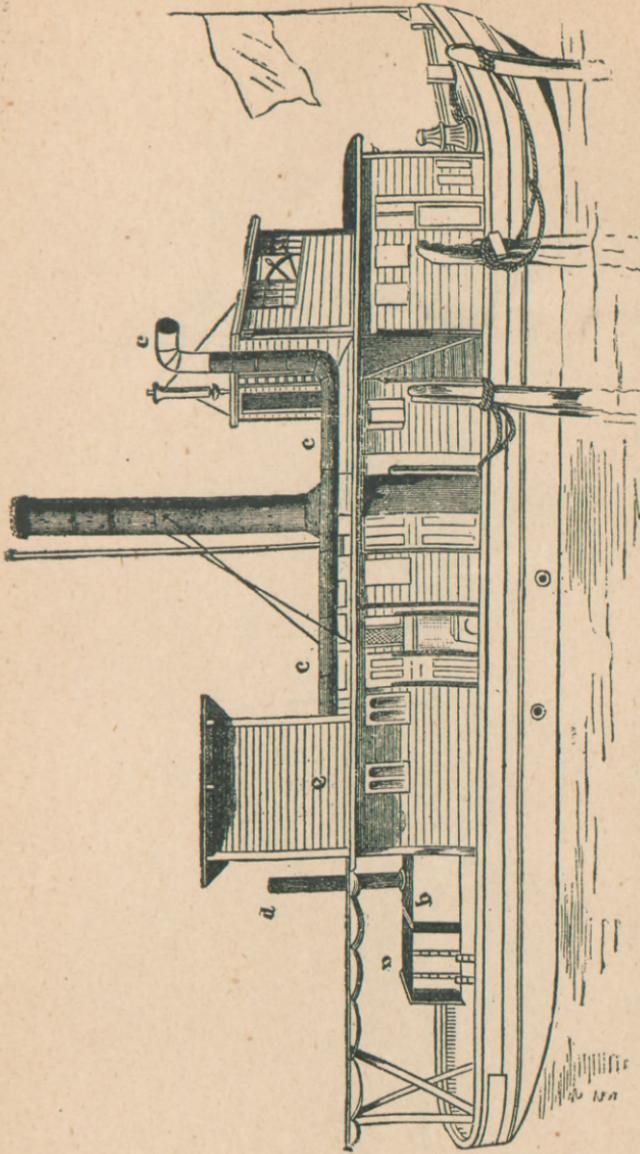
6. Special attention should be given to cleanliness of vessels and persons, and provision should be made for all possible ventilation of the entire vessel. The best disinfectants and instructions for using same can be obtained by application to the Board of Health or any of its officers.

7. Masters should, before arrival, see that the bilge is thoroughly pumped out and cleansed, and that the entire vessel be put in such good sanitary condition as to permit of the least possible detention. Fruit vessels particularly should be kept thoroughly cleansed for the purpose of avoiding delay at the Quarantine Station.

8. Vessels observing the above recommendations will receive special consideration at the Quarantine Station, detention and cost of cleaning, disinfecting, etc., being materially lessened thereby.

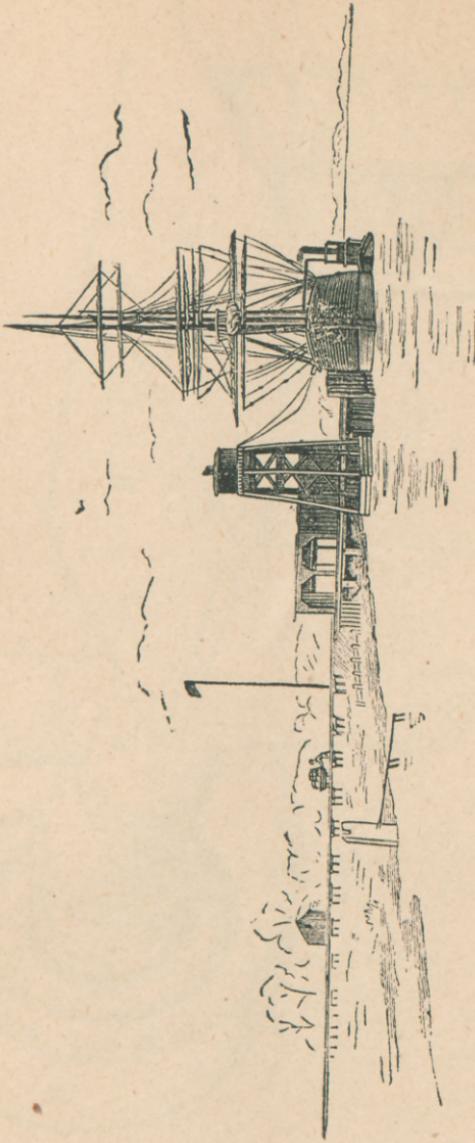






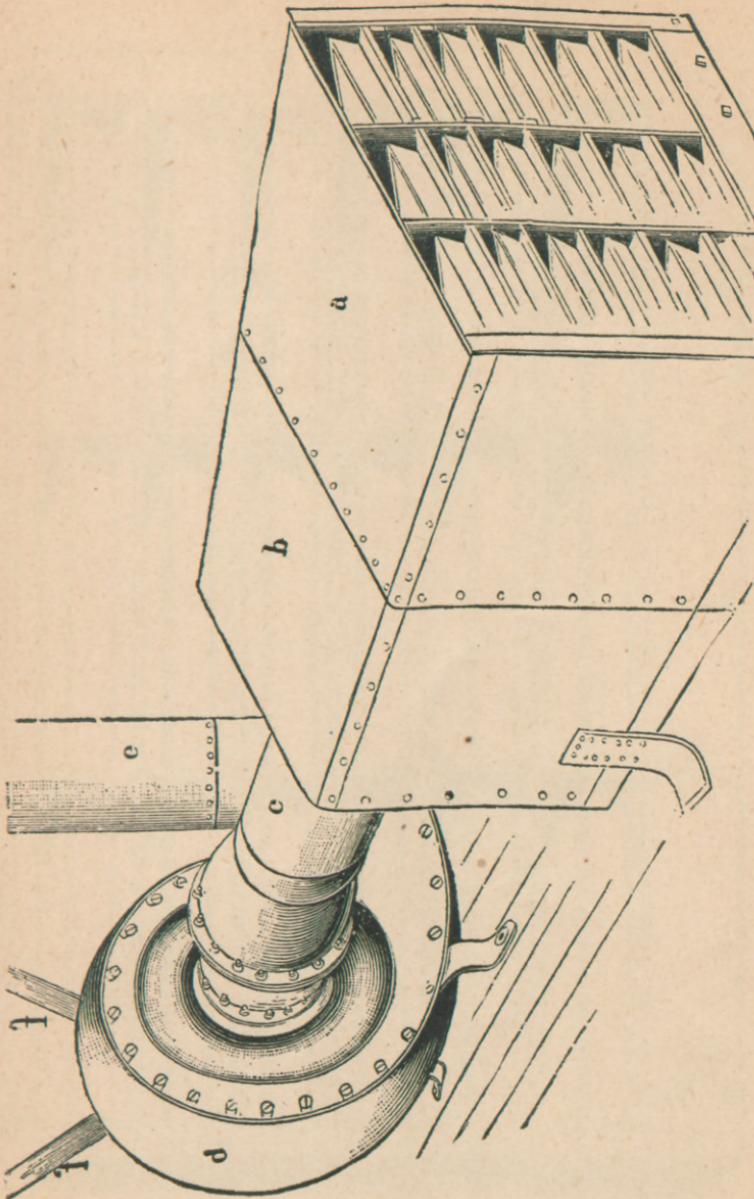
(PLATE 2.) TUGBOAT WITH FUMIGATING APPARATUS.

a. Furnace. *b.* Reservoir for reception of gas. *c.* Discharge pipe, conveying gas to ship's hold. *d.* Escape pipe for gas when fan is at rest and sulphur is burning; closed by a valve when fan is in motion. *e.* House protecting from weather the machinery for driving fan and containing accelerating gearing.



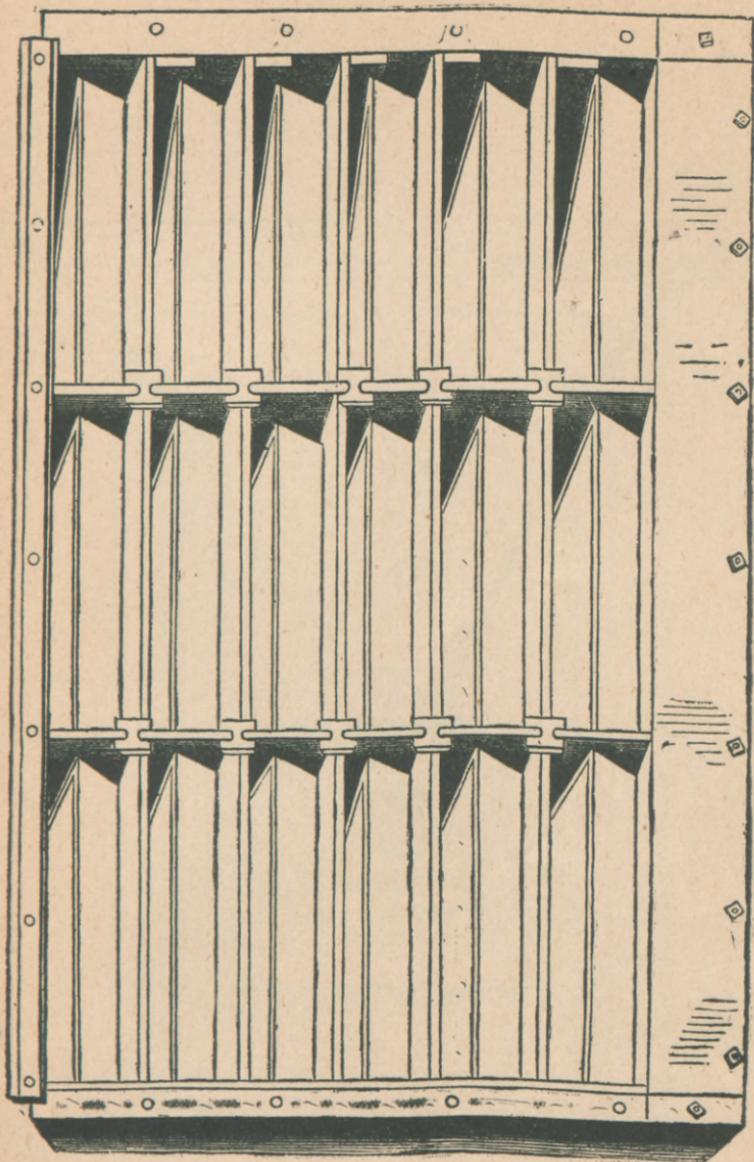
(PLATE 3.)

View of disinfecting wharf, showing tug fumigating vessel; elevated tank containing 800 gallons of bichloride of mercury solution, 3 leads of hose from tank to ship. Gangway leading to building containing super-heating chamber.



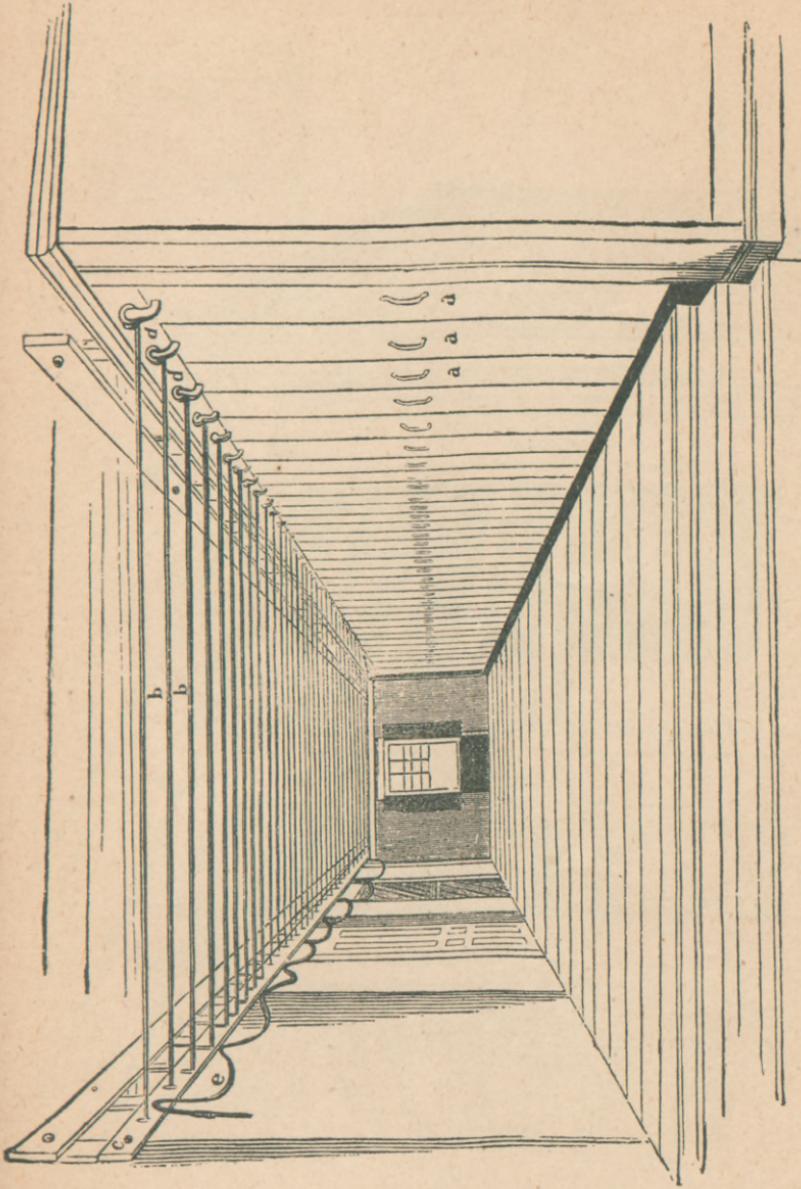
(PLATE 4.) FUMIGATING FURNACE, RESERVOIR AND EXHAUST PAN.

a. Furnace of cast iron, one half inch thick, 3 feet long, 2 feet high. Upper and lower plates grooved for reception of partition and sides shouldered for same, as shown in plate 4. *b.* Reservoir, No. 10 iron, same dimensions as furnace. *c.* Exhaust pipe connecting reservoir and fan. *d.* Exhaust fan, Sturtevant's No. 29. Medium Planing Mill Exhauster. *e.* Discharge pipe from fan made of No. 20 galvanized iron. *f.* Driving belt. Height of legs supporting furnace and reservoir, 10 inches. On reservoir at letter *b* should be shown a 12-inch opening for escape pipe as indicated (*d*) plate 2.



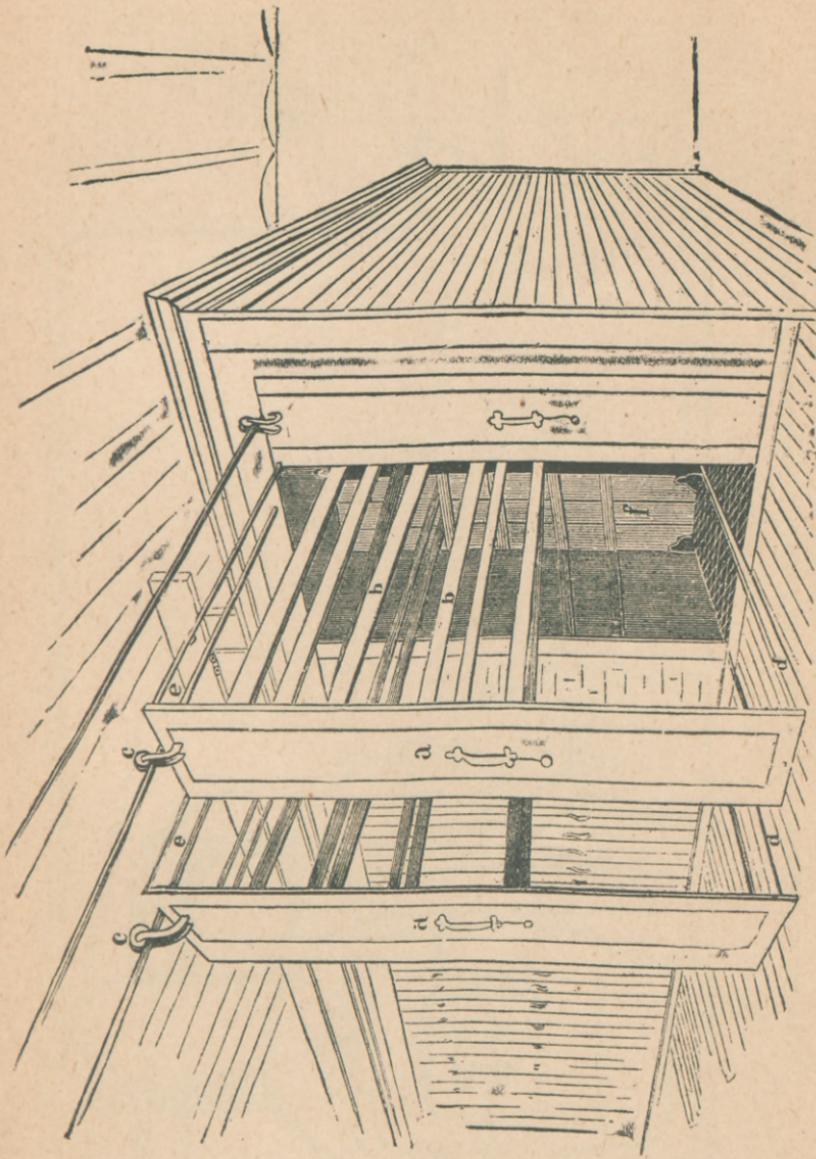
(PLATE 5.) FRONT VIEW OF FUMIGATING FURNACE.

Dimensions of each compartment $12 \times 3\frac{1}{4}$ inches. Pans of cast iron 5.6 inch thick, 11 inches wide and 2 feet 10 inches long, outside measure. Free space above pan about $1\frac{1}{2}$ inches.



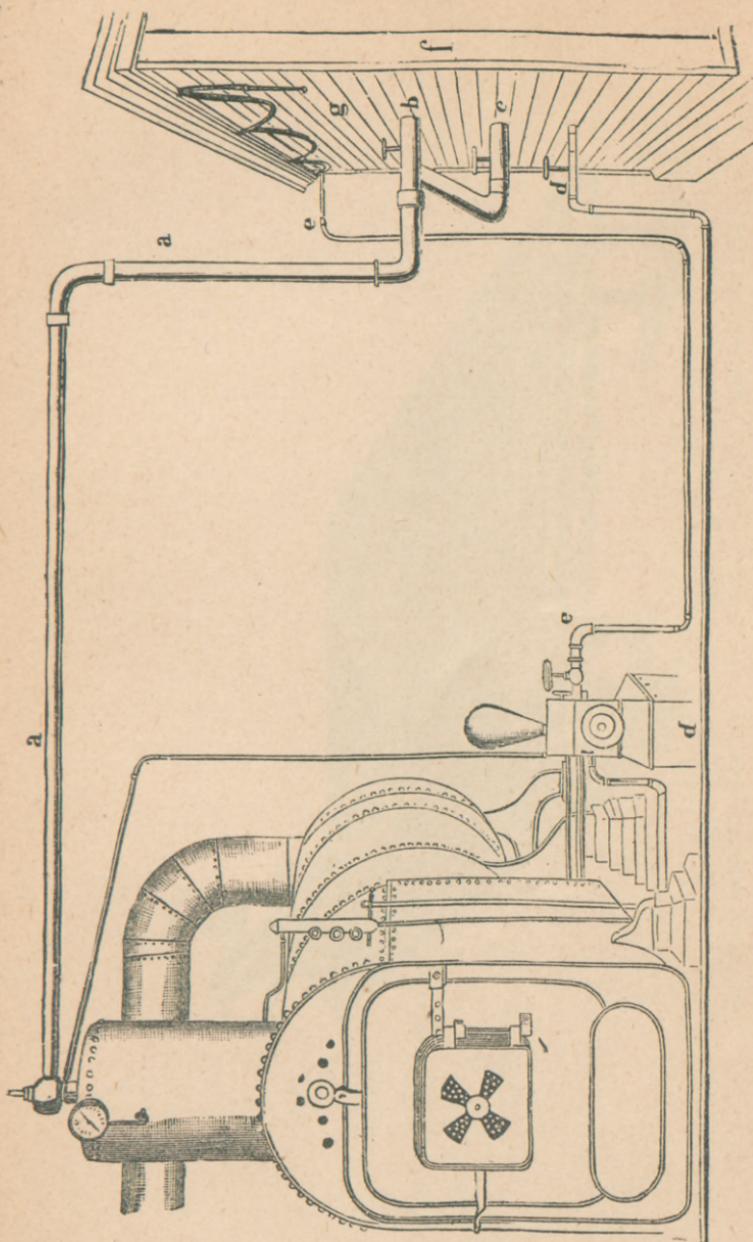
(PLATE 6.) FRONT VIEW OF CLOSED SUPERHEATING CHAMBER (60 feet long).

a. Panels, *b.* Rods upon which panels are suspended and travel, *c.* Outer support of rods, *d.* Rollers suspending panels on rods, *e.* Fire hose.



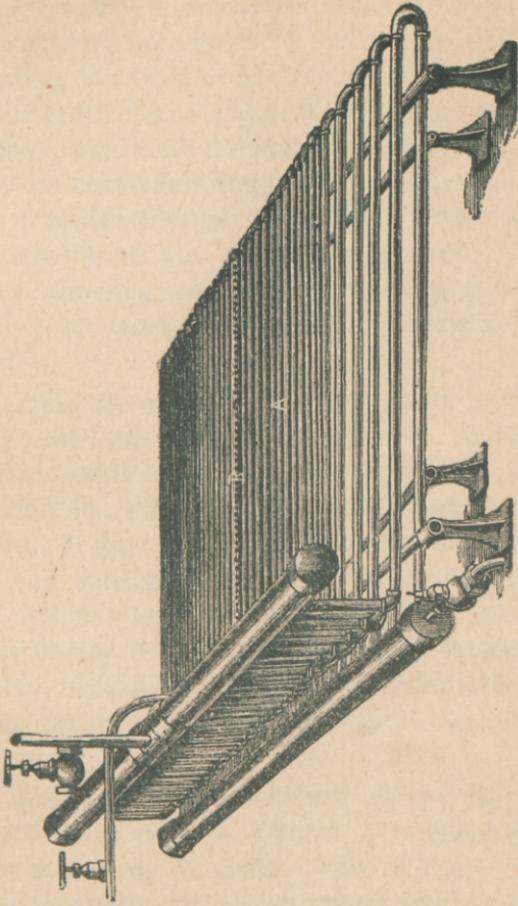
(PLATE 7.) SUPERHEATING CHAMBER; TWO PANELS DRAWN OPEN.

a. Panels, (Two lower rack bars not shown.) *b.* Rack bars, *c.* Rollers, *d.* Iron bars connecting front and rear panels, *e.* Rods upon which panels are suspended and travel, *f.* Rear panel, Galvanized iron $\frac{1}{2}$ -inch mesh screen in bottom of chamber.



(PLATE 8.) BOILER AND STEAM CONNECTION WITH SUPERHEATING CHAMBER.

a, Steam-main from boiler. *b*, Pipe supplying dry heat. *c*, Pipe supplying moist heat. *d*, Bleeder. *e*, Pipe from pump supplying fire hose. *f*, Front of chamber. *g*, End view of chamber.



(PLATE 9.)

Superheating steam coil or dry heat. *b. b.* Perforated steam pipe for moist heat, 58 x 8 feet.

REGULATION OF THE TROPICAL FRUIT TRADE AND PASSENGER TRAFFIC.

The rapid growth of the tropical fruit trade and extension of territory furnishing supply, the impossibility of obtaining prompt and reliable information concerning the health status of the numerous towns and settlements scattered along the Gulf of Mexico and Caribbean Coasts of Central America, and adjacent islands, compelled a decisive policy regulating the importation of fruit in order to prevent the coincident importation of pestilence. Even a casual consideration of the subject would suggest that which experience has abundantly proved: The impossibility of allowing passengers and baggage from these tropical ports pratique without precautionary treatment and delay.

Permitting the entry of fruit is itself a great privilege; but one which can safely and properly be allowed under the present explicit stipulations of avoidance of all infected ports, together with immediate notification of the Board of Health, of any sign or rumor of pestilence in a locality within the territorial limits of the fruit region; but to extend this privilege to the bringing of passengers and baggage during the quarantine period, without treatment and delay, would be not only hazardous, but certain to result in the introduction of pestilence, especially yellow fever.

The Board of Health will not accept the promises of good faith or in anywise assume a responsibility for the same from a body of traders, few of them native to the State, some aliens, and all bent upon making money, some of them at any price, when the interested employés of these are suddenly brought under a tremendous pressure of temptation, such as a fruiter may find itself, when approaching the Jetties, inward bound with a rapidly perishable cargo of \$30,000 or \$60,000, or more value; and having on board also a case of yellow fever or a suspicious

case. The temptation is too apparent. We will not trust them, and so lead them into temptation, but will deliver ourselves from evil.

In order to relieve, as far as possible, this source of danger, the Board has placed trustworthy and competent medical officers at each of the export stations. These keep the ports and vessels under surveillance and report to the board.

The first duty of the Board of Health is to protect the public health; its second duty is to remove from commerce every possible hindrance.

In conformity with these perfectly co-related and consistent duties the Board of Health promulgated in 1886, the following letter, sending it to all persons, at home and abroad, concerned in the tropical fruit trade:

To Whom it May Concern: The people of Louisiana, through their legally appointed Board of Health, have found it essential and imperative for self-preservation that they shall maintain a system of strict quarantine against all ports and regions in which pestilence is known to exist, or in which it possibly may exist without their knowledge.

In fulfilling the conditions of this demand it is not left to the option of the health authorities to take risks or in any manner to put in jeopardy the health of this city and State. It matters not what private interests may be involved or whose going and coming may be impeded, it is peremptory that the Board of Health shall secure to this people every protection against pestilence that human intelligence can devise, and to that end shall make every other consideration subordinate.

While the Louisiana Board of Health recognizes not only the necessity but its own duty in removing every possible obstacle from the currents of trade, it can not contemplate any measure which endangers the public safety. Ten years ago the intertropical fruit trade was limited to the small Bay Islands and a narrow strip of the adjacent

coast. Since then the area of this trade has steadily increased until it now embraces the whole Honduran and Central American gulf and Caribbean seaboard, including many ports which are in open communication with Colon and other infected or suspected ports.

Inasmuch as the bananas and other fruit constituting the export of the aforementioned fruit regions are produced on plantations isolated from the towns, and all cargoes must be lightered far out from shore on account of shoal water along the entire coast line, the Louisiana Board of Health has been able to foster this fruit trade by imposing those restrictions necessary to a guarantee of safety, namely: That the vessels engaged in this trade shall employ acclimated crews, and during the summer and early fall shall restrict themselves rigidly to the bringing only of fruit and other products of the plantations. It being distinctly stipulated and understood with them, the owners and masters of the aforementioned fruit vessels, that, if bringing passengers, the ship and all on board must undergo quarantine the same as required of all other vessels bringing passengers and cargo from intertropical American and West Indian ports.

The fruit importers claim that the detention in quarantine is destructive to the perishable fruits which almost exclusively constitute the cargo of their vessels.

Under the provisions already mentioned, the Board of Health has been enabled to extend a special privilege to the fruit trade.

So long as these conditions are complied with and maintained by the latter, just so long will the Louisiana Board of Health be enabled to continue its assistance; but the moment that a violation of any principle of quarantine is insisted upon or in any manner practised or attempted to be practised by those engaged in the tropical fruit trade, by combining with it the bringing of passengers with their baggage, etc., from ports in regard to which we have no reliable assurances as to their absolute ex-

emption from pestilential infection, the Board of Health is then compelled to declare a violation of agreement, and to withdraw from the fruiterers all special privileges, and to make them undergo full quarantine as provided by law in the case of vessels from quarantined ports.

The Louisiana State Board of Health has given the matter most profound consideration, and after having regarded the question from every point of view, has found itself forced to the conclusion that there can be no further compromise; that there can be no combination of the fruit trade and passenger traffic on the same vessel during the summer and early fall; that the carrying of passengers during that time must be by vessels specially intended for that purpose and which can fulfil, in detention and in every other requirement, the quarantine regulations of the State.

The Board of Health does not object, nor has it objected, to passengers from intertropical ports coming to Louisiana on any vessel, provided said vessel, together with all persons and things on board, undergoes the prescribed quarantine treatment and detention required of such vessels.

By order of the Board of Health, State of Louisiana,
JOSEPH HOLT, M. D., *President*.

IMPROVEMENT IN APPARATUS.

When compelled to withdraw for a considerable season from the field of his labors, on account of impaired health due to unceasing work and a continual strain of harassments and anxiety in the public behalf, during the long period of creative and experimental effort in effecting the change from a six months' interdiction of commercial intercourse with the most promising field of adventure to the proclamation throwing open the port of New Orleans to the maritime world, and permanently establishing the same, the inventor, reserving to himself no privilege of patent, but earnestly hoping that his successors would

steadfastly maintain a zeal in perfecting the details of the system, urged this course upon them as the highest official duty.

Fortunately for the realization of these hopes, the Board of Health shortly came into possession of \$36,000, secured by the decision of the United States Supreme Court, before mentioned, which enabled it to pursue a course of bold, experimental evolution on the largest scale. As a result, very important changes were made in the permanence of construction and higher efficiency of the moist steam disinfecting chamber and in the sulphur-oxide generator.

In this connection it is with extremest regret we are compelled to forego the reproduction of the very lucid and in every respect admirable paper of President R. S. Olliphant, M. D., contained in the biennial report of the Board of Health to the General Assembly of Louisiana, 1890-1891. This report, however, being widely distributed, relieves a necessity otherwise imperative.

Special mention, just here, is due the name of Dr L. F. Salomon, the secretary of the board, whose rare ability, energy and conscientious performance of every duty have so largely contributed to the success and prestige of the Louisiana Board of Health.

To test the efficiency of the apparatus, Dr. J. J. Kinyoun, the eminent bacteriologist of the United States Marine Hospital Service, in response to a request by the board, was commissioned by Surgeon General John B. Hamilton to apply to the germicidal methods of the new system the exacting tests of the highest requirement.

There was no one a more interested observer of the growth, or who recognized in the new system greater possibilities, than did Surgeon General Hamilton himself.

The labors of Dr. Kinyoun at the Louisiana quarantine led him to point out the direction of needed higher operative efficiency in apparatus, and to suggest the possible methods of accomplishing it by the use of the moist

steam heat *under a few pounds pressure*, for greater permeating power, and also the need of a higher percentage of the sulphur dioxide.

His views concerning disinfection by moist steam under pressure were adopted and applied, the board being aided by Mr. Edgar L. Stream, a thoroughly trained mechanical engineer of this city, whose professional inventive acumen and technical skill enabled the board to realize in practice the steel steam disinfecting cylinders for the reception of baggage and all ship's textiles, such as bedding, curtains, etc., which has proved an efficient invention. (See plates 10 and 11.)

The improvement in the sulphur apparatus consists in adapting to quarantine use a sulphurous gas generator, after the plan of the Bonnabel Bisulphite of Lime Co.'s generator. This was done by the present administration under the skilful guidance of Dr. Joseph Allbrecht, chemist of the United States Mint.

A novelty connected with its use is the supplying to the burning sulphur air drawn from the ship's hold, thus rapidly intensifying the sulphurous percentage. (See plates Nos. 12 and 13.)

The development of maritime sanitation has been greatly facilitated from the period of inception to its perfection by the singular accuracy of observation and sound judgment of Dr. Thomas Y. Aby, a master in the science and art of quarantine. His equal in such a work is scarcely possible.

During the last four years, and until recently, the system has been most successfully administered by Dr. Wm. G. Austin, Quarantine Physician, and a veteran expert in the diagnosis and management of yellow fever.

The Louisiana quarantine as it now stands, tried and approved by tests and time, has attained, we believe, a degree of efficiency closely approximating perfection, as generally conceded, and is established beyond the experimental stage.

This important incident of completed growth, in addition to the highest attainment of its purpose, also relieves further expenditure in apparatus improvement; a matter of great importance to its value and the reputation of the service.

Being now sufficient in all requirement, and so acknowledged by all, it is earnestly to be hoped that this fact, as much a physical fact now as it can or will ever be, shall be peremptorily insisted upon, and future interference firmly repressed, except when indicated by long experience, trustworthy in motive and with special consent of the board.

If this is not done and with a firm hand, each incoming accession of medical theoretical experts, perhaps failures in practice, will deem it a duty they owe themselves and families to endeavor to achieve some reputation, otherwise impossible, by attempting to set aside the work of their predecessors by a systematic belittling and resorting to any and every process of eliminating them and substitution in order to leave their own private mark on the system.

Such vulgar pandering to one's own littleness must necessarily result in an over-refinement and excess of evolution, failing presently to kill rats and roaches, while hypothetically *double-killing* pathogenic germs; at enormous expense to the shipping and the State, invoking dangerous risks to the city and entire country, and all for the personal gratification, perhaps, of some person whose overweening vanity and inordinate lust for a little notoriety checks at no impulse. Against all such an absolute interdiction should save the people, and save also the State's quarantine plant from becoming an experimental station and a school for professional tinkerers. *Years of intelligent labor in applied maritime sanitation can alone make an expert.*

CONCLUSION.

Maritime Sanitation is a complete, practical acknowledgment and a declaration of allegiance to the germ

theory of the great pestilential infections, just as the word quarantine carries within itself the inborn idea of prolonged detention; a virtual acknowledgment of utter ignorance of all the conclusions established by modern observation of the phenomena of these diseases, confirmed by microscopic research and experimental tests in the announcements of Pasteur, Koch, Klein, Pettenkofer, Sternberg, Reeves, and a host of able coadjutors.

Scientific research has but confirmed the inevitable conclusions deduced from the observed epidemiological and clinical conduct of these diseases, which had already compelled a belief in the substantive nature, or so-called germ theory, of their origin.

This sometime hypothesis, is no ingenious figure of the imagination, but a doctrine hammered into shape by sheer force of logic and necessity, and is now a demonstrated fact. Every phenomenon of measles, scarlatina, diphtheria, small-pox, cholera, yellow fever, and septic infection of wounds, gives a sledge-hammer blow, driving into us the idea of a living organism, a definite entity, as the essential cause of each, differing in kind according to the disease, and all pointing to their destruction as the only rational remedy.

Laying aside certain hypercritical sophistries and the off-hand denunciations of constitutional objectors, even against Jenner himself, we now declare the germ theory of those diseases no longer hypothetical, but a crystallized verity; so that in contending against the introduction of pestilence along the highways of commerce we no longer oppose mysterious phantoms with the suggestions of superstition, but fight a real and defined enemy in a ship's hold, baggage, clothing, infected house or traumatic lesion, with substantial shot and shell, so to speak, potent to destroy.

Even in our municipal management bonfires of tar-barrels, religious processions and long-drawn invocations, or even relics, no longer count as disinfectants. These

methods have swamped us invariably. Their failure has compelled us to change the personality of our enemy.

We no longer fight the machinations of the devil, the devil himself or an angel brooding destruction, but an infinitesimal thing—a living ferment—a little leaven which touches corruptibly the whole blood, and, if not promptly destroyed, speedily “leaveneth the whole lump.”

If the essential or originating principle of small-pox, yellow fever and cholera can be demonstrated to exist within a finite and circumscribed limit, as in the field of a microscope, on the point of a scalpel, within the compass of a hypodermic syringe, house or the hull of a ship, and is capable of indefinite extension beyond that limit, it is conclusive that the essential cause or virus, having power of extension can only do so by reproduction. It is, therefore, a living entity, and being definable *in loco*, it can be destroyed *in loco*.

This is the sum of all the law governing maritime sanitation. The hypodermic syringe or the infected ship we may destroy by fire; the pestilential infection within will likewise be destroyed.

The same line of reasoning extends to other agents than fire. If every known disease-producing form of life can be destroyed with the bichloride of mercury, the concentrated fumes of sulphurous gas and exposure in the superheated moist steam chamber, the conclusion is inevitable that hypothetical organic forms can also be destroyed. Seeing the germ satisfies the intelligence, and confirms belief, but is not essential to the validity of disinfection; neither the pathogenic primary of small-pox or of yellow fever have been reliably exhibited.

If there is any truth in the germ theory—and no proposition admits of clearer proof in demonstration and inference—then may we confidently declare that “Maritime Sanitation,” as conducted in the stations of Louisiana, is worthy of acceptance as offering the highest attainable

guaranty against pestilence importation. It is the transposition or transference bodily of the Listerian principles and precautionary exactions from the field of surgery to the municipal and maritime domain of preventive or State Medicine. Aseptic and antiseptic surgery applies to the individual as affecting his body; the other applies to the human mass as affecting not only the issues of bodily suffering, life and death, but in addition all that concerns human society in the aggregate, involving great questions of international and interstate relations, industrial production and commercial movement, the social fellowship of communities and families. As the one, in saving the individual, is great, just by so much more the other, in saving the social mass, is greater in the scope of its beneficent results. The comparative magnitude of their importance is commensurate with the relative values of an individual and the commonwealth. This is a logical conclusion as just as it is apparent.

OPINIONS ABROAD AND AT HOME.

From the considerable mass of literature, such as reports of investigating commissions, editorials, published letters, etc., relating to the sanitary system of Louisiana, it is but just to the history of the work and its author to make some mention here indicating the general tone of these published criticisms, which is fairly set forth in the following:

Extract from Report on Inspection of Quarantines of the Atlantic and Gulf, by John H. Rauch, M. D., Secretary Illinois State Board of Health, contained in the Eighth Annual Report of the Board, 1885, page 50:

Accompanied by Dr. Joseph Holt, president of the State Board, and to whose indefatigable energy the recent practical improvements are mainly due, I made a personal inspection of the Mississippi river stations on the 15th, 16th and 17th of July last, and witnessed the inspection of vessels, the disinfection and treatment of an arrival from an infected port—a 2000-ton

steamer; inspected another which had been treated two days before my arrival and was not yet released; examined the appliances for disinfection, etc., and the buildings, hospitals and other items of the quarantine plant. I am therefore enabled to endorse from personal observation the claim made that this is the most thorough and vigorous system of sanitary quarantine which has ever yet been enforced for the protection of a port from the introduction of foreign contagion into this country—if not in the world.”

In the Tenth Annual Report of the State Board of Health of Illinois Dr. Rauch repeats his approval:

“With regard to New Orleans, I still endorse the claim made that ‘it is the most thorough and vigorous system of sanitary quarantine which has ever been enforced.’” * * *

Acting for the California State Board of Health. Walfred Nelson, C. M., M. D. (member College of Physicians and Surgeons, province of Quebec, Canada; late member State Board of Health, Panama, South America, etc.), visited the quarantine station on the Mississippi, in August, 1886, and after having made a critical examination of “the exact working of that most admirable system,” he presented an elaborate report of the same to the California Board, which is contained in the Tenth Biennial Report of that organization, 1886-1888.

After fully describing the bichloriding process, he says: “It will be but just to state that this excellent application of mercuric bichloride was first thought out and applied by Dr. Joseph Holt.” Again, he says: “As Dr. Holt stands *in loco parentis* to this system, I have taken the liberty of dubbing it ‘the Holt System.’ His it is, and his should the honor.”

“The exact beauty of the Holt system, briefly stated, is this: All germ life and spores are first and finally disposed of; secondly, cargoes are handled expeditiously at minimum expense; thirdly, absolute protection is granted the city of New Orleans; and ship masters and passengers suffer but small delay, six to eighteen hours being ample for this purpose; and after the vessel clears from the upper quarantine for the Crescent City, she is sweet, safe and healthy, and the State authorities know that vessels that have undergone this most crucial of treatments are not carriers of disease; they can not be.

“With the best of knowledge, born of experience, Dr.

Holt years ago refused to recognize even the so-called clean bills of health from infected ports. I refer to the disease-producing and distributing centres of Colon, on the Isthmus of Panama, and Vera Cruz, on the Gulf coast of Mexico, the Caribbean, and the various ports of Cuba. All of them are constant sources of danger to ports trading with them, particularly southern ports. Previous to 1884, when Dr. Joseph Holt was elected president of the Board of Health of the State of Louisiana, old-time methods prevailed on the Mississippi, and owing to those old-time, unenlightened practices, commerce on the Mississippi during the summer was practically killed. The detentions were lengthy, and the charges so heavy that commerce by way of the Mississippi during the summer, or fever months, was almost out of the question. Trade by the Mississippi goes on now in summer the same as in winter, it being practically unhampered, a result that could be obtained, and obtained only, by the most elaborate methods instituted by Dr. Holt. Unimportant branches of trade that hitherto were practically unconsidered, such as the tropical fruit trade, have taken on the handsome proportions of many millions per annum. For one consignment of coffee that was received under the old system, it will be safe to say that hundreds are received to-day; in short, that the old-time method of quarantine, which debarred Louisiana of her just maritime trade, is now of the past.

“In concluding this report, it is but just to Dr. Holt to state that he is the father of this most admirable of methods of maritime sanitation, and that to-day in Central and South America, in Mexico and the West Indies, all health authorities speak of the Holt system with admiration.

“Quite recently, when in Port of Spain, Trinidad, one of the British West Indies, I learned from Dr. Leonard Crane, C. M. G., the Surgeon General of the Island, and Dr. C. Burgoyne Paisley, its ever vigilant health officer, that a system similar to the Holt system is about to be adopted there. I simply cite this to show how the good work done by Dr. Holt is bearing fruit, and how science, thanks to the conscientious and indefatigable workers of his type, is making constant strides.

“In conclusion, it will be safe to say that, knowing what we do of germs, germ life, and germicides, disinfectants and the like, Dr. Holt has combined all of the best methods for destroying germs, and the result is “AN IDEAL QUARANTINE.”

From the proceedings of the National Conference of the State Boards of Health, held at Cincinnati, Ohio, May 4, 1888, and incorporated in the Fourth Annual Report of the Pennsylvania State Board of Health, 1888, we make the following extract from the paper of Dr. Benjamin Lee, of Philadelphia, Secretary of the State Board, entitled: "SHOULD THE NATIONAL GOVERNMENT ASSUME THE CONTROL OF QUARANTINE AT PORTS OF ENTRY?" In the course of his argument in favor of "putting quarantine into the hands of the national government," Dr. Lee says:

"Yet even if it (quarantine) be conceded to be a police regulation, its scope is not local, but extends over the whole country, and it would seem in justice that it should be exercised and paid for by the whole country. * * * * The great burden of protecting the nation should be borne by the nation. I am well aware that there is one brilliant and conspicuous exception to the general rule of inadequate provision for, and inefficient administration of, local quarantine, that of the State Board of Health of Louisiana; but even there the resources of the entire State, and that a rich State, are at its back, and the result, moreover, has been attained only by the persistent energy and magnetic powers of a single individual, and may not long survive him."

Before the same conference of State Boards of Health, and contained also in the Fourth Annual Report of the Pennsylvania Board, page 249, *et seq.*, Dr. J. F. Kennedy, Secretary of the State Board of Health of Iowa, in a paper entitled "Inland Quarantine as Against Cholera and Yellow Fever" said:

"So I might say in reply to the first question that the value of internal quarantine as against cholera and yellow fever is practically *nil*, owing to the numerous and gigantic difficulties in the way of its proper enforcement, * * * * *

"In a general way I may say that all, at least all important ports of entry, should be, as they are supposed to be, quarantine stations. All large cities on the coast and inland should be prepared to promptly recognize and as promptly isolate and

take care of any case of cholera or yellow fever occurring within their respective limits. Should either disease break out in the largest or the smallest hamlet, the strictest measures should be instituted at once to isolate all infected or exposed persons so far as known; to quarantine the places of infection; to disinfect thoroughly, or destroy everything, including excreta, in, and especially everything liable to go out from, such foci of infection. * * * With such prompt isolation, quarantine and disinfection, I can see no practical benefits to be derived from local quarantine stations inland.

“It occurs to me that we must look largely, and justly, too, to such stations and quarantine regulations as exist in the Mississippi river below New Orleans, as so graphically described by our able colleague, Dr. Joseph Holt. Such stations located, managed and equipped as this has been, under the efficient directions of the Louisiana State Board of Health, if located at all our ports of entry, would afford the greatest, if not the only reliable, safeguard to our homes.”

From proceedings of the National Conference of State Boards of Health at the seventh annual meeting, held at Nashville, Tenn., May 19 and 20, 1890, the following is extracted from the address of the president, Dr. J. N. McCormack, of Bowling Green, Ky.

“Indeed the quarantine system at New Orleans, devised by our distinguished colleague, Dr. Joseph Holt, seems now to reach almost to perfection in that particular branch of our health service, giving the greatest immunity from contagion furnished by present scientific knowledge, and at the same time interfering to the least possible degree with commerce and trade.”

The *New York Evening Telegram*, May 19, 1891, says in a lengthy article under the caption “Scientific Quarantine, Old-Time Theories Condemned, New Orleans’ Perfected Process, How the Holt System is Worked.” * * * * *

“The subject of maritime sanitation or quarantine was enveloped in Egyptian darkness, and it remained for Dr. Joseph Holt to perfect a system, conferring safety to the port and city

of New Orleans, combined with a minimum of detention to cargoes and passengers. Years of study and close observation and trials without number resulted in what his brother sanitarians deem a perfected quarantine system, generally known among them as the Holt system, one that has been critically studied by sanitarians from many foreign countries and sister States, and has received their unqualified endorsement."

The Marine Journal, New York, June 25, 1892, says editorially:

"During Dr. Holt's term of office he invented and established what is known as the Holt system of maritime sanitation, a system of fumigation of ships against infectious diseases, that has, so far as known, been unequalled in this or any other country.

"*The Marine Journal* watched with a great deal of interest the work of Dr. Holt, and as it developed into unqualified success, we gave our readers the benefit of a full explanation of it, and personally congratulated Dr. Holt upon the great service he had done the port of New Orleans and the inhabitants of the Mississippi valley in inventing a process by which they have been kept free from yellow fever up to the present time.

"Dr. Holt was not only an expert in quarantine matters, but he took a lively interest in the American Shipping League's work in the cause of the American ship, and attended one of its conventions held at Pensacola, and while there gave valuable aid to the meeting."

From the New Orleans *Times-Democrat*, June 17, 1892, we extract as follows:

"The system of maritime sanitation which Dr. Holt conceived, elaborated and established at the quarantine station on the Mississippi river is practically the same to-day as it was the day he stepped down from the presidency of the Board of Health. A few improvements in matters of detail have been introduced into its working here and there, where actual experience showed that there was room for improvement; but it is only in details, whose technicality forbids our dwelling upon them here, that any change has been made. The system, in its warp and its woof, in its fabric and its texture, stands precisely

where it stood when it had the finishing touch put upon it by its author's hand.

"This system, to which humanity owes so much, to which the material interests and the health and the happiness of New Orleans and the whole Mississippi Valley are under everlasting obligations, is known from one end of this western hemisphere to the other, and cordially recognized, as the 'Holt system.' It has been adopted at all seaports of the American continent which have Southern traffic connections, from the harbors on the Gulf and Charleston, S. C., to the St. Lawrence and Quebec, and at San Francisco. There is not a board of health in a maritime district of the United States which has not sent to examine the working of this our quarantine system, and there is not a board of health which, after close and scientific examination, has not adopted it, either in its totality or in all of its essential and distinctive features.

"And these various boards of health have, without exception, candidly acknowledged the source of their indebtedness. They have made their reports ring with the name and fame of the illustrious author of the system to which in common with ourselves they are under the heaviest obligations. It is, with each and every one of them, 'the Holt System of Maritime Sanitation,' and it is pronounced by more than 'one of them after experiment to be 'an ideal quarantine.' We have at our elbows, as we write these lines, many reports of boards of health, North, South, East and West, as well as much other documentary matter, referring to this subject; and we might cite from them scores of pages in which the New Orleans system of quarantine is held up as a model, and in which Dr. Holt receives by name unstinted and grateful recognition of his work as being the true solution of the quarantine commerce difficulty. But our readers, we presume, will take these outside tributes to the efficacy of the system and to the genius and ability of its author for granted, without the citations. They are ready, if called for."

From the same of the 19th June:

* * * "Dr. Holt never claimed the authorship of sulphurous acid or bichloride of mercury or heat as germicides, nor of yellow fever germs to be killed by them; but while the representative scientists of thirty-two of the powers of the world were

in congress assembled at Rome, in 1885, to solve the one question of effecting a reconciliation between the necessities of commerce and the greater necessity of protection against pestilence, which they utterly failed to accomplish, Dr. Holt, here in New Orleans, reached out and, by one mighty effort, grasped the entire field of sanitary science, and gathered into co-operative unity the several elements contributory to the modern system of maritime sanitation. He did not create any one of those elements, but he combined them and invented the machinery necessary for their practical employment. The proof of all this is stereotyped upon the scientific and commercial pages of the world."

We also quote from the afternoon's *States* of June 18th :

"To focus the questions: What is the system conceived, invented and established as the interdependent maritime and municipal sanitary system? We merely state by title the several elements of our new sanitary system, of which Dr. Holt and his coadjutors stand truly as creators." * * * *

In addition to the general criticisms, all of like character with the foregoing, including the testimony of ships' officers and passengers, the actual adoption and enforcement of the "New System" by the Dominion of Canada for the port of Quebec, by the States of California and South Carolina for San Francisco and Charleston, by the ports of Mobile, and at this moment of Savannah (now introducing it), and in the British West Indies, as cited, together with the acceptance of its methods by the United States Treasury Department, and their application through the United States Marine Hospital Service, abundantly and sufficiently testify of the importance and completeness of the work of the Louisiana State Board of Health in reconciling the industrial and trade factors of civilization with the paramount necessity of public health protection, by harmoniously associating

QUARANTINE AND COMMERCE.

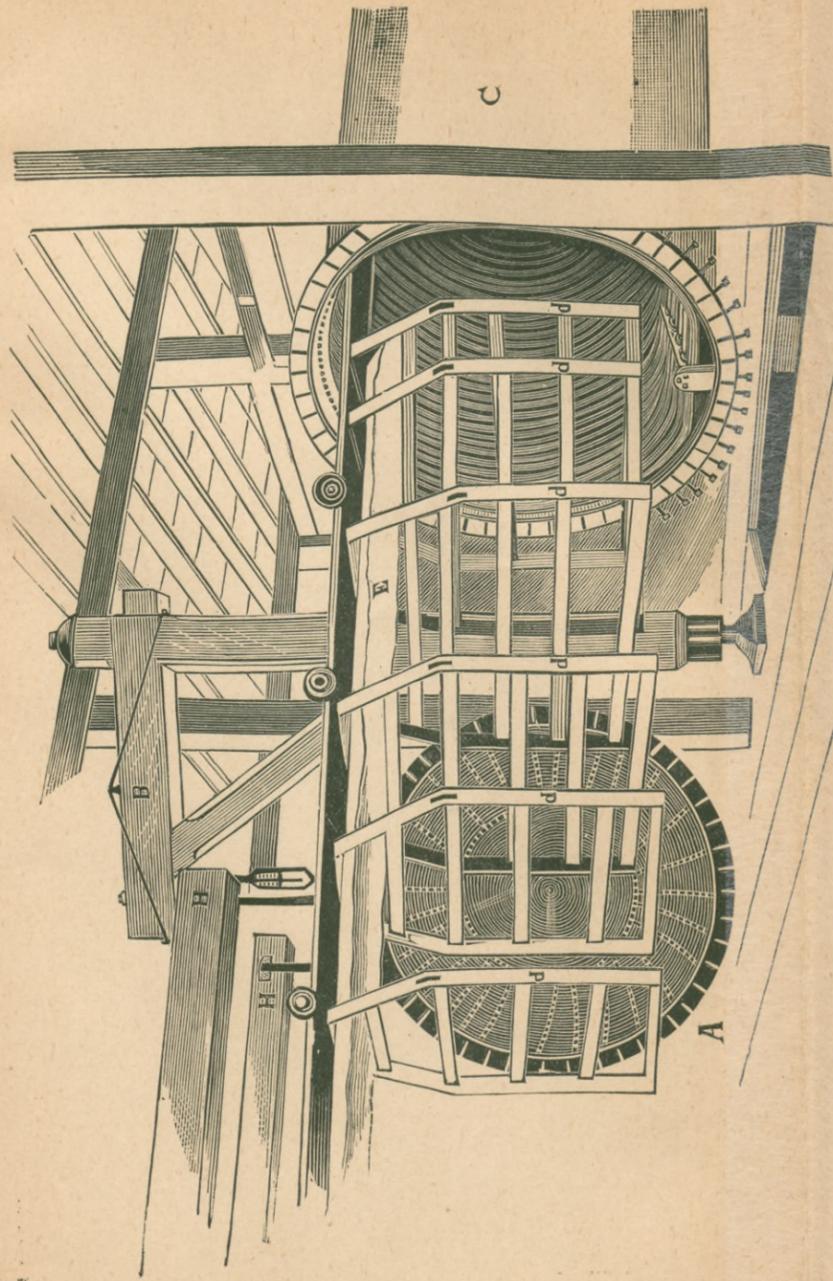


PLATE NO. 10.—END VIEW OF OPEN HEATING CHAMBERS, WITH RACKS DRAWN OUT.
 A—Spherical head and Heating Cylinder swung back.
 B—Turning Crane from which Cylinder head is suspended.
 C—Heating Cylinder.
 D—Traveling racks on which the material to be disinfected is hung.
 E—Canvases over racks to prevent water dripping on racks.
 H—Beams in shed from which tracks are suspended.

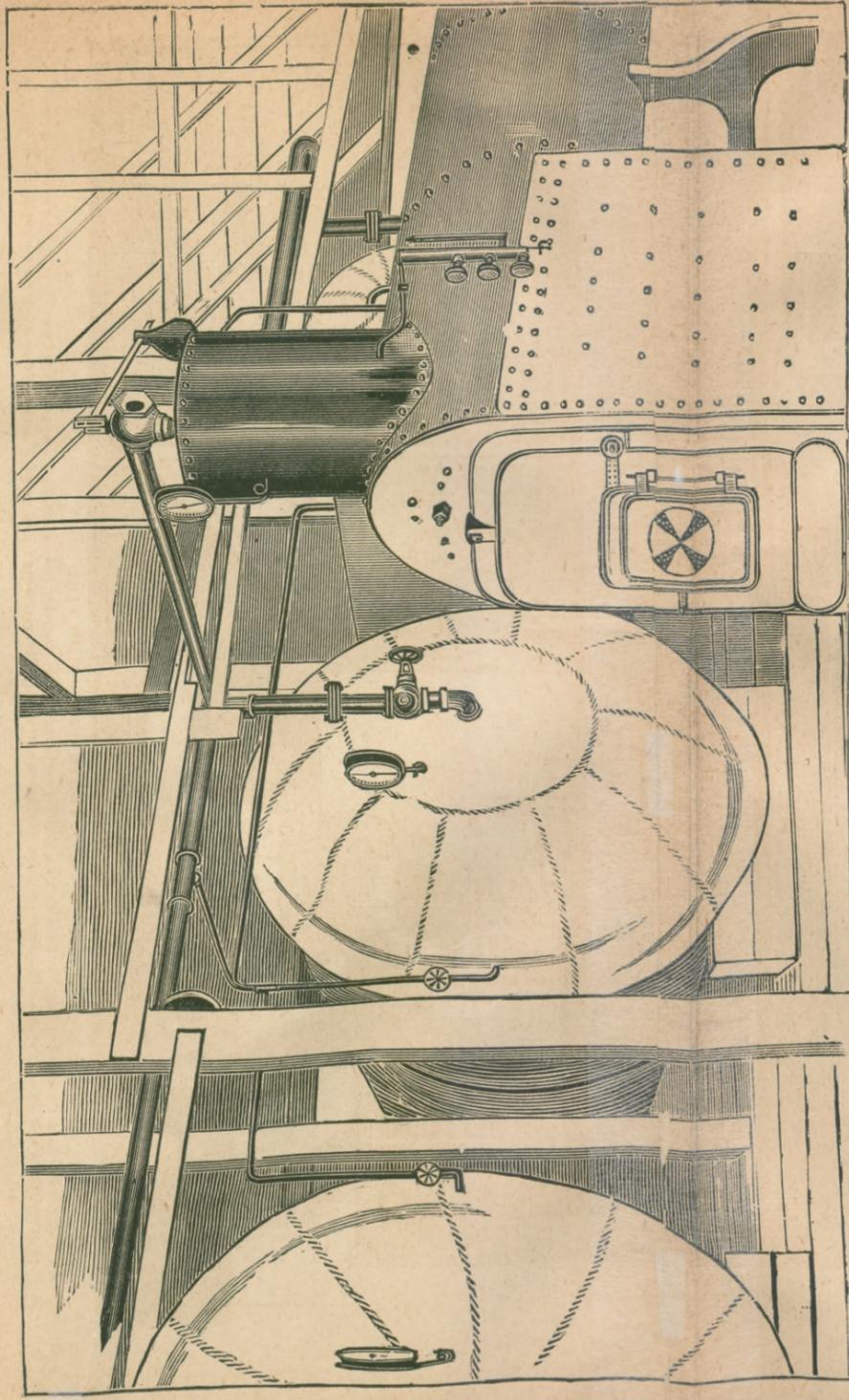


PLATE II.—REAR END OF HEATING CHAMBERS, SHOWING STEAM CONNECTIONS.

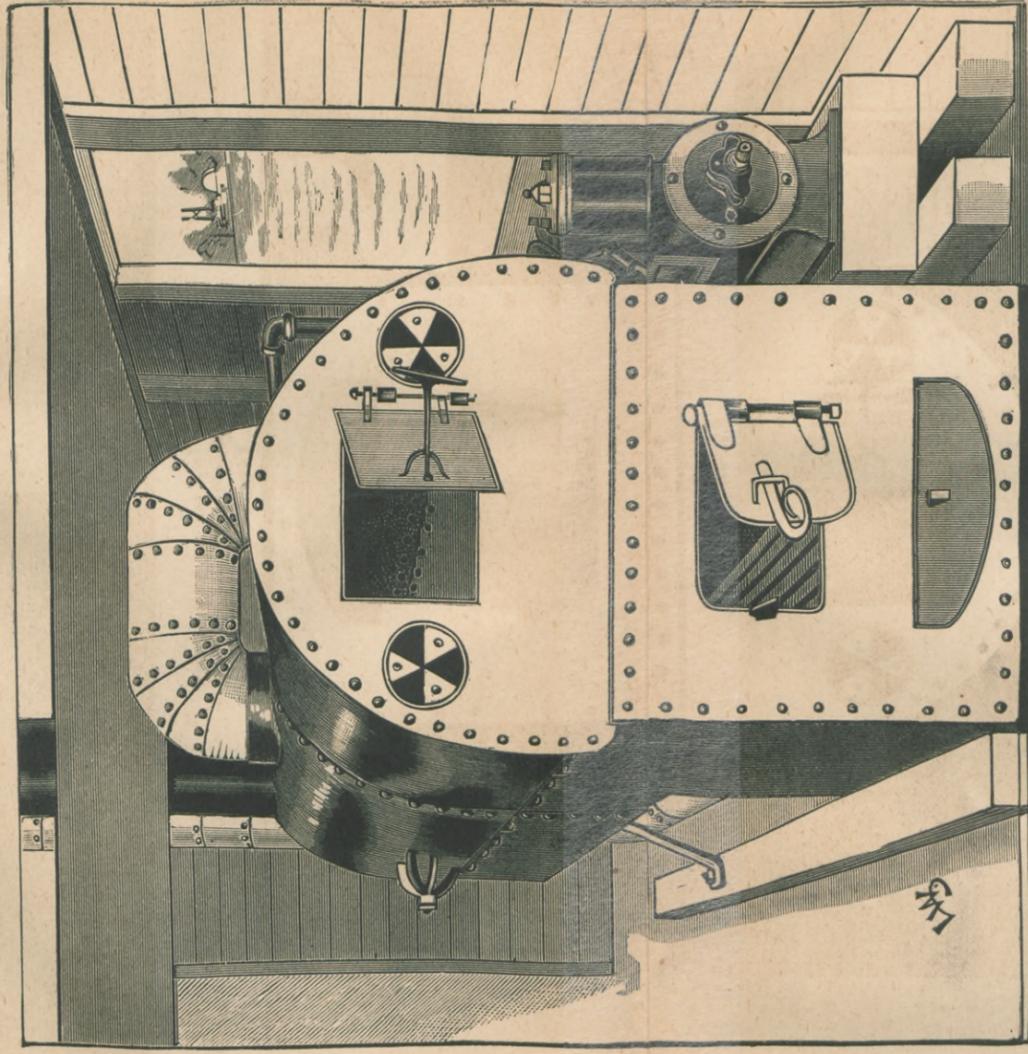


PLATE NO. 12.—FRONT VIEW.
 Of Improved Furnace for the production of Sulphur Dioxide Gas, showing sulphur furnace with fire box underneath, and curved pipe carrying the gas into reservoir.

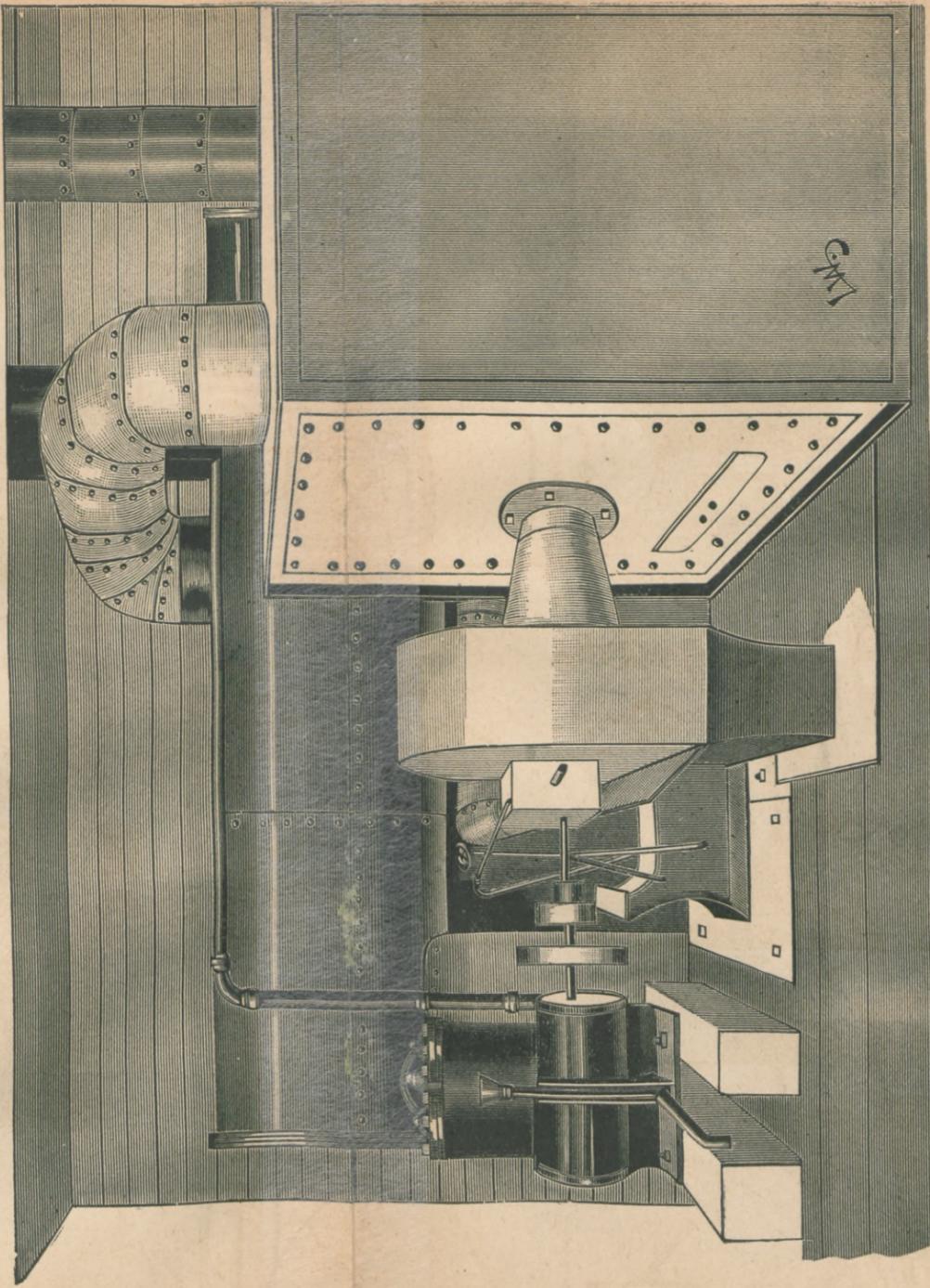


PLATE NO 13.—SIDE VIEW
 Of Improved Furnace for the production of Sulphur Dioxide Gas, showing sulphur furnace, reservoir and exhaust fan. Curved pipe carrying sulphur gas into reservoir continues on the inside to within six inches of bottom. Section of pipe connecting fan with reservoir curves upward inside of reservoir to within six inches of top.

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