M. PASTEUR'S AMERICAN PATIENTS.

Among the passengers on board the French steamship Canada, which left New York for Havre on the 9th inst., were four children from Newark, N. J., who were bitten by a mad dog on the 2d. The animal was foaming at the mouth, and evidently suffering from rabies. Its singular behavior attracted attention, and the alarming cry of "Mad dog!" drove all grown people from its path. The children and dogs were less fortunate. After biting several dogs, the animal attacked a number of children, knocking some of them down and biting them savagely on the arm, face, and leg. The brute was finally shot, but not until it had bitten six children in all—William Lane, thirteen years old; Hattie Frick, ten; George Childs, six; Austin Fitzgerald, ten; Edward Ryan, eight; and Patrick J. Reynolds, nine.

The injured children were all taken to the office of Dr. Osborn, where their wounds were cauterized. Dr. O'Gorman attended them, and a movement was started at once to send them to Paris. In answer to the request for treatment, M. Pasteur sent a cablegram: "If you apprehend danger, send the children immediately." As the parents are all in moderate circumstances, the expense of such a journey has been met by a most generous subscription. The Newark storekeepers have vied with each other in adding to the comfort of the little travelers during their voyage. In addition to the outfit, over a thousand dollars has been subscribed. The four children who have been sent, Wm. Lane, Austin Fitzgerald, Eddie Ryan, and Patrick Reynolds, are in charge of Dr. F. S. Billings, of the New York Polyclinic, who is an enthusiast in researches into this class of diseases. Mrs. Ryan, the mother of one of the boys, also accompanied them. As she speaks French, she promises to be a useful nurse. The children will probably reach Paris a few days before Christmas, and will remain under treatment about a fortnight. M. Pasteur expresses no apprehension of unfavorable developments during the voyage, and is very confident that he will be able to remove them from any danger of hydrophobia. It is unfortunate that all the children could not have been sent to him.

Besides the humane sympathy which their condition has excited, there is a strong scientific interest attached to these cases.

About 50 per cent of the people who are bitten by mad dogs, and whose wounds are cauterized, develop hydrophobia. The dogs bitten by the rabid beast have been secured, and their subsequent behavior will probably add another proof to a case of genuine rabies in the aggressor.

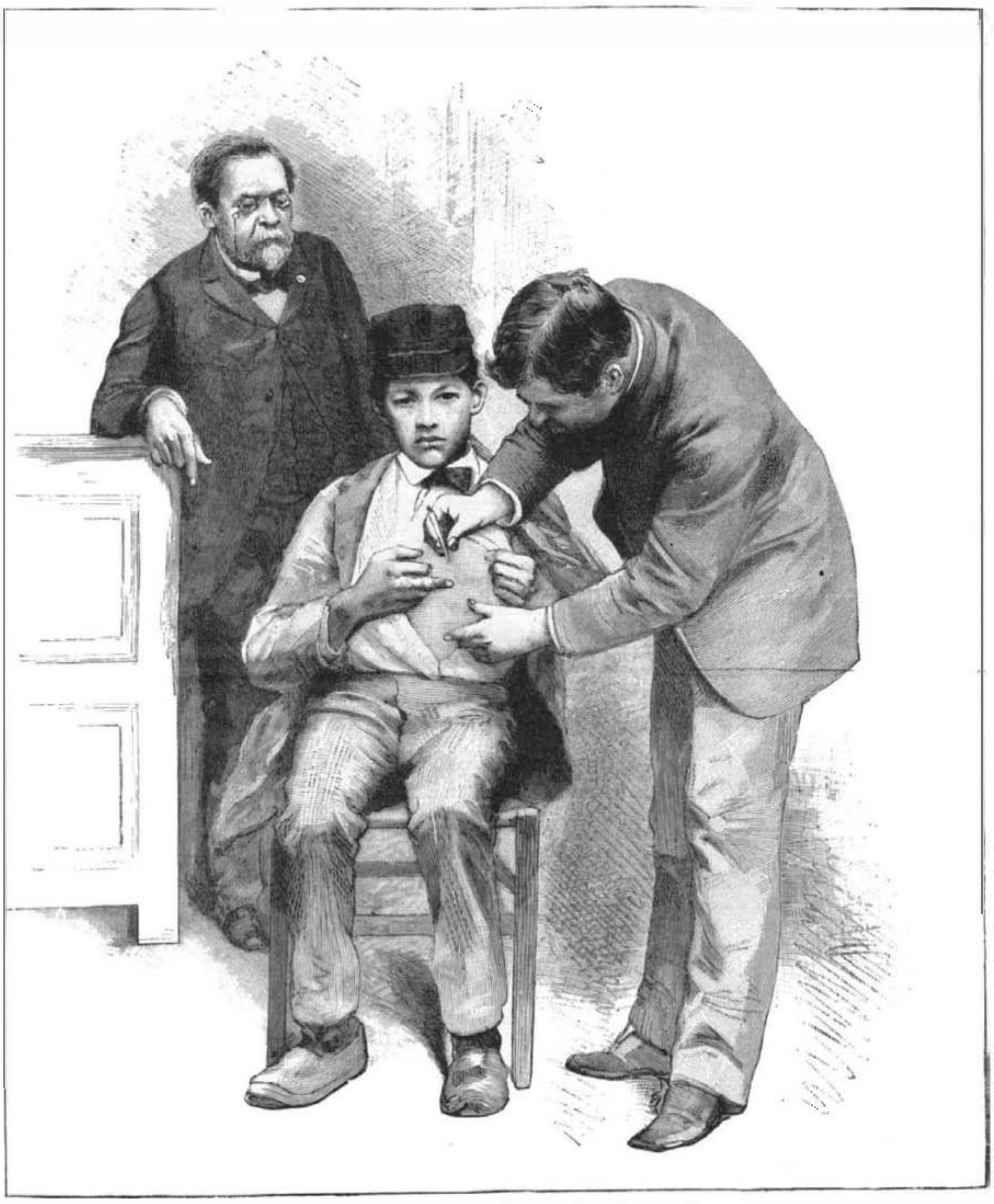
The operation of inoculation consists simply in injecting virus under the skin by means of a hypodermic syringe. Ordinarily, it produces no illness or unpleasant results of any kind. In our engraving, which is taken from *L'Illustration*, we show the process of treatment as applied in the case of a young shepherd boy who was recently treated by M. Pasteur.

The first step in the preparation of the virus used in this operation is the inoculation of a rabbit with a fragment of tissue taken from the spine of a rabid dog. The hydrophobia microbes contained in this tissue, by introduction beneath the skin of the animal or preferably into its brain, penetrate the entire system, and communicate the disease. The animal becomes mad. The incubation of the poison occupies fifteen days. As soon as death occurs, a portion of the spinal marrow of this diseased rabbit is introduced into the system of a second rabbit; from the second rabbit, matter is taken with which a third rabbit is inoculated; and the process is continued until sixty animals in all have been treated. The power of the hydrophobia virus increases with each inoculation, so that the last incubation of the sixty operations occupies but seven days. On the other hand, the power of the virus is diminished by dried air, so that different degrees of strength are obtained by keeping the spinal marrow of the inoculated rabbits in bottles of dried air. In beginning his treatment, therefore, M. Pasteur inoculated the shepherd boy with old tissue, the strength of which had been attenuated by the action of the dry air.

Gradually the strength of the virus was increased, until at the last injection, at the end of about a fortnight, the tissue employed had been bottled only two days. The period of incubation of the last inoculation did not exceed a week, but the system of the patient had been brought to such a condition that it could receive such powerful virus without injury. This treatment not only prevented the development of rabies in the patient, but as M. Pasteur assured him, gave ample protection against the attacks of any other mad dogs for a year at least.

In almost all cases, M. Pasteur's treatment has so far been successful. He has recently inoculated three children who came to him from Algeria, two months after having been bitten. They have now returned to their homes, and are in perfect health, though the death of one of their comrades before they started for Paris gave unmistakable evidence that the dog was rabid. It may, of course, be possible that the virus of the mad dog did not reach the two children who are living. There are at present no less than sixty-two persons under treatment by M. Pasteur, for hydrophobia. One patient, a young girl who was bitten by a mad dog and subsequently inoculated, has died of rabies; but as thirty-six days elapsed before she was operated upon, the period of incubation had expired, and the treatment came too late. Though this case shows the necessity of prompt action, it does not detract from the value of the system; although an unbeliever might say, perhaps, it was the treatment that caused the death.

The introduction of M. Pasteur's system in America would seem to be desirable. It would involve the establishment of rabbit farms in various parts of the country, where the animals would be kept constantly inoculated with the disease. It is a suggestion not unworthy the attention of the present administration that government shall lend its assistance in the matter.



M. PASTEUR'S TREATMENT FOR HYDROPHOBIA.

Jenner and Pasteur.

The case of the girl who was bitten by a mad dog and subsequently but unsuccessfully inoculated by Pasteur is fully reported in our dispatch by the Mackay-Bennett cable to-day. The failure to save this patient is no disparagement of Pasteur's treatment. He very satisfactorily explains that over six weeks had elapsed after being bitten before the girl was inoculated, and consequently the incubation of the disease had matured. There may be some delay in perfecting the new treatment of hydrophobia, but there is now every reason to be confident that it will eventually prove a great triumph of patient research.

No one who has read the history of Jenner's discovery, by which the terrors of smallpox were abated over all Europe ninety years ago, can fail to notice how it repeats itself in the work of Pasteur. The discoverer of vaccination met with opposition from those who denounced vaccination as a dangerous practice; but the severest trial he had to undergo was the advocacy of some rash men, one of whom, a doctor, before ever having even seen a case of cowpox, published a pamphlet on the subject and put himself forward as the chief leader in the cause of vaccination. The modest and real discoverer, after successfully inoculating a boy in 1796, had to wait nearly two years before he could make a second experiment. The success of his system and its general acceptance by the medical men were also imperiled at an early stage of Jenner's work by unskillful attempts to repeat his experiment. M. Pasteur has also already to bear the "faint praise" of critics, the ridicule of others, as well as the overzealous championship of ignorant friends.

These facts should be carefully noted by medical men in connection with M. Pasteur's hydrophobia researches. It is desirable ~~that his discovery and the~~ practical means of applying it should for a while be only in the hands of able professional men, who will not bring the new remedy into disrepute by unskillful practice. It is equally important that the world should suspend judgment on the merits of the discovery—avoiding both hasty criticism and over-enthusiastic advocacy of the cure—until Pasteur has had ample time and opportunity to perfect his system.—*N. Y. Herald.*

◆

Molecular Weight of Liquid Water.

Thomsen has called attention to the fact that the conclusion reached by Raoult in his researches on the freezing point of saline solutions, that water possesses, in the condition of liquid, twice the molecular weight which it has in the condition of vapor, coincides with the conclusion to which he himself had come from his investigations on the constitution of hydrated salts. In his thermo-chemical researches, Thomsen says: A glance at the table of heat of hydration of hydrated salts shows that the water molecules enter often in pairs with the same heat change; a fact explicable either by supposing that the molecules of water are symmetrically placed in the molecule of the salt, or, and perhaps more probably, that the molecular weight of liquid water is twice that of water vapor. The similarity of these conclusions, from widely different fields of investigation, is noteworthy.—*Ber. Berl. Chem. Ges.*, xviii., 1088, April, 1885; *G. F. B.*, *Amer. Jour.*

◆

Genesis of a Car Wheel.

It is estimated that there are ten million car wheels whirling over this country at the present moment, conveying millions of passengers and more millions of tons of freight to and fro across the continent at an average speed of 25 miles an hour for passengers, and often 40 miles. How many of the hurrying multitude who trust their lives on the rail pause to consider the admirable mechanism by which these great results are accomplished? How many complex problems have been solved in the gradual evolution of the old time stage coach into the modern iron horse and his train?

Take, for example, a car wheel, one of the simplest parts of a railway train; it is merely a round piece of iron, and, as we generally see it, covered with dirt and grease, having nothing attractive or ornamental in its appearance, and seemingly gross, in its construction; yet that smaller and more valuable disk, known as "Uncle Sam's" double eagle, which issues from the mint, glittering like a mirror, does not involve in its manufacture more intricate and, in some respects, more delicate manipulation than this same gross car wheel.

The most important difference between a car wheel and an ordinary machine or apparatus made of cast iron is the fact that the "tread" of the wheel, viz., that part which runs on the rail, is quite different in character from the "plate," or main body, though cast from the same metal in one pouring. The tread or rim is actually harder than the finest steel, thus enabling it to resist not only the wear upon the steel rail, but the still more destructive grip of the brakes; and its average "life" is not far from 100,000 miles of service. The process by which the hardening of the tread is produced is called "chilling," and is somewhat analogous to the "tempering" of steel. A mould is made in sand from a wooden pattern, the moist sand is pressed by the moulder against both sides of the pattern with a hand rammer, and it is then sufficiently tenacious to enable the pattern to be carefully removed without destroying the mould. This "sand mould" is inclosed in a ring made of iron, called the "chill mould," whose internal face has been previously turned upon a lathe to form the tread and flange of the wheel, and numerous air passages, or vents, are made through the sand with a long needle to permit the gentle escape of highly explosive gases which are formed when the molten iron is running into the mould.

The stream of glowing fluid iron quickly fills the hollow space between the upper and lower sides of the sand mould, and running to the edge comes in contact with the iron ring or chill mould, and this, being a much better conductor of heat than the sand mould, chills the rim of the casting, not only congealing the iron instantly, but causing it to crystallize to a depth of about half an inch in beautiful parallel filaments, as white as silver and nearly as hard as diamond. The portion of the wheel forming the plate or sides cools more slowly, is not "chilled," and its texture is the same as that of ordinary cast iron. If the wheel is made of a mixture of iron which is too highly sensitive to the chilling influence, it will be too brittle for safety and too hard to permit of boring the hole in the hub into which the axle is to be fitted. If, on the other hand, the metal does not possess sufficient chilling property, the tread of the wheel is too soft, and soon becomes flattened, and then the wheel is useless. The margin between these extremes is very small, and it is the daily aim of the wheel maker to steer between this Scylla and Charybdis.

It must not be supposed that all irons possess this chilling property, for it is a comparatively rare one, and little is known, even among the most expert iron masters, of the causes which produce it. Very recently some light has been thrown upon the subject by the aid of chemical analysis, and scientific investigation will doubtless reveal still more clearly what is as yet but dimly seen. Pig iron is not a simple substance, but is in reality an alloy composed of at least half a dozen different elements, each one of which helps to stamp its character upon the metal. It has been found, for example, that the substance silicon, which is always present in pig iron, exerts an extraordinary influence upon its chilling power, and a variation of less than one per cent of silicon is sufficient to make or mar a car wheel; indeed, it has happened that an entire day's work of several hundred men has been spoiled by an excess of one-half of one per cent of this substance creeping undetected into the mixture. The method of analyzing the iron to ascertain the proportion of carbon, phosphorus, manganese, sulphur, and silicon which it contains is too complicated to admit of a general description; suffice it to say, that a few grains of a sample are reduced to fine powder, weighed upon an extremely sensitive balance, treated with acids and other "reagents," or tests, by which means each element is separated from its partners, and its weight ascertained. In a wheel foundry the iron is commonly melted in a large furnace called a cupola, capable of melting fifty or more tons a day. Anthracite coal is used, and a strong blast of air from a pumping engine creates an intense heat. As the iron melts, it collects in a pool at the bottom of the furnace, from which it is drawn into an immense ladle or caldron, sometimes holding fifteen or twenty tons; from this it flows into smaller ladles, holding just sufficient molten iron to make one large wheel.

Great skill is required in pouring the iron into the mould. It must be just the right temperature and it must be allowed to run into the mould with just the right force; otherwise a bad casting is the inevitable result. After the wheels are taken out from the moulds, they require to be thoroughly annealed, as they are subjected to an immense strain, due to the more rapid cooling of the chilled tread. For this purpose they are either put into pits previously heated, or buried in hot sand, where they are allowed to remain for several days. In this way the molecules of the metal gradually arrange themselves in new positions, and the strain is entirely removed. The sand which adheres to the wheels is then brushed off, and the wheel tested for strength by heavy blows with a sledge hammer, and for hardness on the tread by chipping with a highly tempered cold chisel; in this way any "soft spots" may be readily detected, and the wheel accordingly condemned. There are, in fact, no less than 27 distinct "diseases," so to speak, which a car wheel is liable to contract in the course of its manufacture, and it must pass a rigid inspection in the quarantine or "cleaning shop" before it receives the required guarantee of its maker that it is "free from all defects."

Finally, having obtained a clean bill of health from the inspector, the wheel passes to the machine shop, where the hub is bored out, the axle fitted in by hydraulic pressure (of 15 or 20 tons), and the wheel and its mate are ready to start out on their long journey. If they are well matched, they should roll along through their whole life without jarring, and, barring "accidents," will often travel 150,000 miles before becoming completely tired out.

The chilled cast iron car wheel is a purely American invention, and the method of annealing, which alone made this process practicable, was devised by a manufacturer in this city as long ago as 1847, since which time between one and two million wheels have been made in the works established by him, and have been shipped to all parts of the world where the shriek of the locomotive whistle has penetrated.—*Philadelphia Public Ledger.*

An Engineer's Observations.

Some young or incompetent old engineer, bothered over the working of his engine, may derive useful hints from the experience of a writer in the *Modern Miller*, who has evidently been considerably perplexed at times, but has had the wit to divine the cause and the skill to remedy the trouble his machines were causing him.

I remember once, he says, in a new mill with a new engine and a young engineer, after running a few days there began a terrible knocking about the engine, and for some time it was hard to locate it, but we finally did, in the yoke on the eccentric which worked the steam valve. The engineer and myself squinted around that for some time, until we concluded it was caused by the yoke not being true and having too much play, and that we would have to babbitt it to a fit. We hesitated to do it, however, and got an old engineer to come and take an observation. After watching a little while, he suggested the fault might be inside the steam chest. The engineer soon opened that, and found the cause of the trouble; the jam nut being loose on the end of the valve stem and striking against the end of the steam chest, caused the chucking at the eccentric. I have always made it a rule to remember all such incidents, as it is by such experiences we learn how to care for the machines in our charge.

A few years after, I was in charge of another mill, in another part of the country, and in this case also starting with a new mill. Here we had an engineer who for the time had a steam pump boiler feeder to run, and it soon began to cause trouble, and the crank pin broke off. It fell upon me to go to the city and get a new part, and I got it at the shop where the pump was made. The maker was surprised, and said he had never had one break before, and made me promise to find out the cause and write him. So when I returned, and the pump was again at work, I took occasion to observe it. It commenced knocking, and remembering the experience before related, I suggested to the engineer that he take it apart, and look for something striking the end of the cylinder, which he did; and, sure enough, there was a nut that needed turning up, which, being done, there was no more trouble with that pump. In the best and most careful shops there is liable to occur an oversight that may cause trouble. Every man in charge of machinery should use great care. Do not be too hasty in condemning machines; locate and remedy defects if possible; have patience and judgment. That's the way to be a good engineer.

It is often a very trivial thing which affects the working of a machine. An employer of mine once had an opportunity to buy a wheat cleaning machine at less than one-third the original cost, it having been used but a short time. We needed a new machine, and this was a good kind, of well known manufacture, and I advised him to buy it. He did so, and we soon had it in operation, and behold! it wasted wheat very much, and no adjustment of draught would remedy it. That revealed why it was disposed of so cheaply. As the adjusting of draught did not affect the waste of whole wheat, I decided at once that I must have a leak in the scouring case, a very simple matter to reason out. I took it apart, and found a place at the end of the scouring case where the leak occurred. This I remedied in a few minutes, and we then had a machine doing perfect work, and I felt as though I had enabled my employer to save over $200.

I remember where, in another mill, we set up on trial a new wheat cleaning machine, to which the manufacturer had but lately added a separator having a large vibrating sieve, which was attached by single nuts. These nuts kept getting loose and allowing things to come apart. It was a fault of construction which could be easily overcome by the manufacturers, and I wrote them describing explicitly the trouble, suggesting how to better construct the part, and offering to hold machine and apply any remedy they might provide. They replied that their machines had a wonderful reputation, and insinuated that we must be ignoramuses, and had insulted them. Of course that machine went back, and to-day they are heard of no more in the land. I observe that the machines that are put together in the strongest and most durable manner are the ones that stay the longest and win a profitable trade for the manufacturers. The phenomenal success of some machines is largely due to this fact.

The wood called "osage orange" in the North, and "bogart" in Texas, where it is indigenous, is hard, like lignum vitæ. It does not swell or shrink, is wonderfully durable, and would be an excellent wood for waterwheel steps, boxes for journals on slow shafts, keys, or for any use where a hard, nice finish is required. It lasts a lifetime in the form of shingles, posts, etc., in Texas.

I noticed an engineer the other day doctoring a belt to prevent its slipping by pouring grease on it and then fine resin to cover it all. If I had been his employer, I would have told him how to do better, and a repetition would have brought his walking papers. It costs a good deal to buy belts to be used that way, for they would be short lived. Good neatsfoot or castor oil applied to belts occasionally Saturday nights is good treatment, but such treatment as the above is very injurious to a belt.

I once observed, in a new mill nearing completion, a pair of gears in the upper story, where nothing but elevators and, perhaps, a wheat cleaner would ever be driven, that were heavier than the gears in the basement, that drove all the machinery except the burrs. I asked the superintending millwright the philosophy of that, and he said heavy gears ran steadier and easier than light gears. I do not believe this. While I believe gearing should be heavy enough to do its work without strain or unnecessary wear upon cogs, too heavy gearing is a detriment, and to have the heaviest gears in the upper story of the mill is reversing all the mechanical laws as applied to the transmission of power, and displays a millwright's ignorance.

Invest Wisely.

The remittance of $3 20 for one year's subscription to the Scientific American for the coming year will be a good investment; but there is one that will pay better, and that is to send $7 and receive both the Scientific American and Scientific American Supplement during 1886. With the weekly receipt of the two papers, the subscriber will have placed before him all the scientific, engineering, and mechanical news of the day.

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The Modern Foot.

In Greek statues, as is well known, the second toe of the foot is represented as longer than the great toe, while in the modern European foot the great toe is usually the longer. Albrecht states that in this respect the Greek foot is more quadrumanous than the modern. The second toe is also represented in antique statues as being further separated from the great toe than is seen at the present time. This might be regarded as another evidence of quadrumanous character, but it has also been suggested, and not without reason, that it is simply the result of wearing the sandal strap. In the modern foot, on the other hand, the reduction in the size of the smaller toe is ascribed to the influence of shoes.

A Suggestion to Subscribers.

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Disinfectants.

The annual meeting of the Public Health Association was opened in Washington, Dec. 8th. President, Dr. James E. Reeves, of Wheeling, W. Va. Various addresses were made and papers read. The Committee on Disinfectants consisted of Drs. George M. Sternberg, U. S. A., Joseph H. Raymond, Brooklyn, Charles Smart, U. S. A., Victor C. Vaughn, Michigan, A. R. Leeds, New Jersey, W. H. Watkins, New Orleans, and George H. Rohe, Baltimore. Their report was presented. The following are their conclusions:

The most useful agents for the destruction of spore-containing infectious material are:

1. *Fire.* Complete destruction by burning.
2. *Steam under pressure.* 110° C. (230° F.) for ten minutes.
3. *Boiling in water* for one hour.*
4. *Chloride of lime.*† A 4% solution.
5. *Mercuric chloride.* A solution of 1 : 500.

For the destruction of infectious material which owes its infecting power to the presence of micro-organisms *not containing spores,* the committee recommends:

1. *Fire.* Complete destruction by burning.
2. *Boiling water* half an hour.
3. *Dry heat.* 110° C. (230° Fahr.) for two hours.
4. *Chloride of lime.*† 1 to 4% solution.
5. *Solution of chlorinated soda.*‡ 5 to 20% solution.
6. *Mercuric chloride.* A solution of 1 : 1,000 to 1 : 4,000.
7. *Sulphur dioxide.* Exposure for 12 hours to an atmosphere containing at least 4 volumes per cent of this gas, preferably in presence of moisture.§
8. *Carbolic acid.* 2 to 5% solution.
9. *Sulphate of copper.* 2 to 5% solution.
10. *Chloride of zinc.* 4 to 10% solution.

The committee would make the following recommendations with reference to the practical application of these agents for disinfecting purposes:

FOR EXCRETA.

(*a.*) In the sick room:

For spore-containing material:

1. Chloride of lime in solution, 4%.
2. Mercuric chloride in solution, 1 : 500. ‖

In the absence of spores:

3. Carbolic acid in solution, 5%.
4. Sulphate of copper in solution, 5%.
5. Chloride of zinc in solution, 10 %.

(*b.*) In privy vaults:

Mercuric chloride in solution, 1 : 500.*

(*c.*) For the disinfection and deodorization of the surface of masses of organic material in privy vaults, etc.:

Chloride of lime in powder.†

FOR CLOTHING, BEDDING, ETC.

(*a.*) Soiled underclothing, bed linen, etc.:

1. Destruction by fire, if of little value.
2. Boiling for at least half an hour.
3. Immersion in a solution of mercuric chloride of the strength of 1 : 2,000 for four hours.‡
4. Immersion in a two per cent solution of carbolic acid for four hours.

(*b.*) Outer garments of wool or silk, and similar articles, which would be injured by immersion in boiling water or in a disinfecting solution:

1. Exposure to dry heat at a temperature of 110° C. (230° Fahr.) for two hours.
2. Fumigation with sulphurous acid gas for at least twelve hours, the clothing being freely exposed, and the gas present in the disinfection chamber in the proportion of four volumes per cent.

(*c.*) Mattresses and blankets soiled by the discharges of the sick:

1. Destruction by fire.
2. Exposure to superheated steam—25 pounds pressure—for one hour. (Mattresses to have the cover removed or freely opened.)
3. Immersion in boiling water for one hour.
4. Immersion in the blue solution (mercuric chloride and sulphate of copper), two fluid ounces to the gallon of water.

FURNITURE AND ARTICLES OF WOOD, LEATHER, AND PORCELAIN.§

Washing several times repeated with:

1. Solution of mercuric chloride 1: 1000. (The blue solution, four ounces to the gallon of water, may be used.)
2. Solution of chloride of lime 1 per cent.
3. Solution of carbolic acid, 2 per cent.

FOR THE PERSON.

The hands and general surface of the body of attendants, of the sick, and of convalescents at the time of their discharge from hospital:

1. Solution of chlorinated soda diluted with nine parts of water (1 : 10).
2. Carbolic acid, 2 per cent solution.
3. Mercuric chloride, 1 : 1,000; recommended only for the hands, or for washing away infectious material from a limited area, not as a bath for the entire surface of the body.

FOR THE DEAD.

Envelop the body in a sheet thoroughly saturated with:

1. Chloride of lime in solution, 4 per cent.
2. Mercuric chloride in solution, 1 : 500.
3. Carbolic acid in solution, 5 per cent.

FOR THE SICK ROOM AND HOSPITAL WARDS.

(*a.*) While occupied, wash all surfaces with:

1. Mercuric chloride in solution, 1 : 1000. (The blue solution containing sulphate of copper may be used.)
2. Chloride of lime in solution, 1 per cent.
3. Carbolic acid in solution, 2 per cent.

(*b.*) When vacated:

Fumigate with sulphur dioxide for 12 hours, burning 3 pounds of sulphur for every 1,000 cubic feet of air space in the room; then wash all surfaces with one of the above mentioned disinfecting solutions, and afterward with soap and hot water; finally throw open doors and windows, and ventilate freely.

FOR MERCHANDISE AND THE MAILS. ‖

The disinfection of merchandise and of the mails will only be required under exceptional circumstances; free aeration will usually be sufficient. If disinfection seems necessary, fumigation with sulphur dioxide, as recommended for woolen clothing, etc., will be the only practicable method of accomplishing it.

RAGS.

(*a.*) Rags which have been used for wiping away infectious discharges should at once be burned.

(*b.*) Rags collected for the paper makers during the prevalence of an epidemic should be disinfected before they are compressed in bales, by:

1. Exposure to superheated steam (25 pounds pressure) for ten minutes.
2. Immersion in boiling water for half an hour.

(*c.*) Rags in bales can only be disinfected by injecting superheated steam (50 pounds pressure) into the interior of the bale. The apparatus used must insure the penetration of the steam to every portion of the bale.

SHIPS.

(*a.*) Infected ships at sea should be washed in every accessible place, and especially the localities occupied by the sick, with:

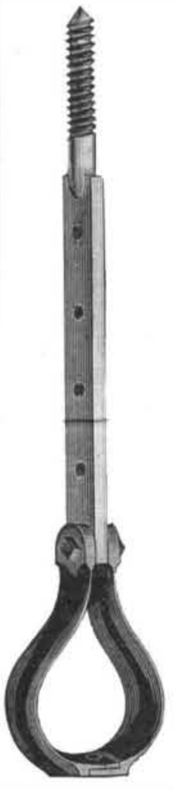
1. Solution of mercuric chloride 1 : 1,000 (the blue solution heretofore recommended may be used).
2. Solution of chloride of lime, 1 per cent.
3. Solution of carbolic acid, 2 per cent.

The bilge should be disinfected by the liberal use of a strong solution of mercuric chloride (the concentrated solution—"blue solution"—of this salt with cupric sulphate may be used).

(*b.*) Upon arrival at a quarantine station, an infected ship should at once be fumigated with sulphurous acid gas, using three pounds of sulphur for every 1,000 cubic feet of air space; the cargo should then be discharged on lighters; a liberal supply of the concentrated solution of mercuric chloride (4 ounces to the gallon) should be thrown into the bilge, and at the end of twenty-four hours the bilge water should be pumped out and replaced with pure sea water; this should be repeated. A second fumigation after the removal of the cargo is to be recommended; all accessible surfaces should be washed with one of the disinfecting solutions heretofore recommended, and subsequently with soap and hot water.

BLAKE'S "IMPROVED 1884" PIPE HANGER.

The annexed engraving presents a new and novel invention in the line of an adjustable pipe hanger. The stirrup or ring is made in two parts, the lower end of one half having a pin fitting a corresponding hole in other half of ring. This is one of the essential features of the hanger, as it may be placed on or removed from the pipe when in position; the upper parts of each half of stirrup are held together by a bolt passing through and holding in position the lag screw, which is 13 inches long, and has on its flat portion a number of holes punched to allow for adjustment of pitch lines. To meet the many requirements of the trade, the manufacturers have added a number of combinations, including adjustable pieces and clamps for iron beams, also improved link pieces and lag screws, to suit cases where hangers are required of an extra length, the addition being made by ordinary gas pipe.



The use of this hanger, in place of the many crude and expensive blacksmith jobs and chain attachments so often resorted to, will prevent disastrous breakages of steam and water pipes, and will obviate the disagreeable knocking in steam pipes caused often by improper hanging and pitch lines.

Further information may be obtained from Messrs. Jenkins Bros., of 71 John Street, New York city, and 79 Kilby Street, Boston, Mass.

Floating Suits.

Buoyant clothing has been devised by a Londoner, and seems to be attracting some attention in that metropolis. Threads of cork are interwoven with cotton, silk, or woolen, machinery which slices the cork to the required thinness forming part of the invention. From these new materials clothes of ordinary appearance are constructed which bear up the wearer when committed unexpectedly to the water. The worth of the new fabrics was thoroughly tested by throwing three persons clothed in them from the end of a pier. They floated as easily as if incased in cork jackets. It is said that they remained in the water over an hour without discomfort. The possibilities of fireproof apparel are next in order.

Mechanical Glass Blowing.

Messrs. Appert have devised a process, in their factory at Clichy, in which they use air stored under great pressure, so as to dispense altogether with the necessity of blowing by the mouth. Glass blowers are peculiarly susceptible to various disorders, such as diseases of the lips and cheeks, and predisposition to tumors and rupture. These affections are the more serious because boys are often employed when the system is weakened by rapid growth. The high temperature and dry atmosphere increase the unfavorable hygienic conditions. The new process entirely suppresses blowing by boys, and, with rare exceptions, by adults also. The manufacture of glassware is thus ameliorated by rapidity of execution, as well as by the perfection and the large size of the pieces which are produced.

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* This temperature does not destroy the spores of *B. subtilis* in the time mentioned, but is effective for the destruction of the spores of the anthrax bacillus and of all known pathogenic organisms.

† Should contain at least 25 per cent of available chlorine.

‡ Should contain at least 3 per cent of available chlorine.

§ This will require the combustion of between 3 and 4 pounds of sulphur for every 1,000 cubic feet of air space.

‖ The addition of an equal quantity of potassium permanganate as a deodorant, and to give color to the solution, is to be recommended (*Standard Solution* No. 2).

* A concentrated solution containing four ounces of mercuric chloride and one pound of cupric sulphate to the gallon of water is recommended as a *standard solution.* Eight ounces of this solution to the gallon of water will give a diluted solution for the disinfection of excreta, containing about 1: 500 of mercuric chloride and 1 : 125 of cupric sulphate.

† For this purpose the chloride of lime may be diluted with plaster of Paris or with clean, well dried sand, in the proportion of one part to nine.

‡ The blue solution containing sulphate of copper, diluted by adding two ounces of the concentrated solution to a gallon of water, may be used for this purpose.

§ For articles of metal use Solution No. 3.

‖ In order to secure penetration of the envelope by the sulphur dioxide, all mail matter should be perforated by a cutting stamp before fumigating.