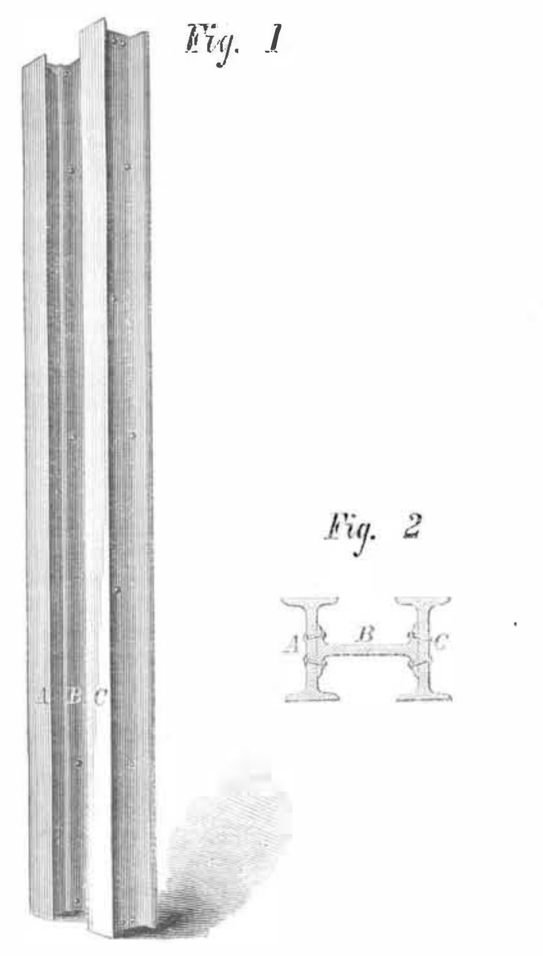
WROUGHT IRON AND STEEL POSTS.

The accompanying engravings show the construction of a wrought iron or steel post, for which a patent has just been obtained by W. A. Gunn, of Lexington, Ky., through the Scientific American Patent Agency. It is intended to take the place of cast iron columns, and box, cylindrical, and other forms of posts, chords for bridges, and columns for buildings, for which it is claimed to be a very economical device. It consists simply of three I beams united in the form of



the letter H. The inventor claims for it the following advantages: All the material is useful to sustain the weight, no loss being incurred to obtain stiffness; the component parts of the post, being among the most rigid forms of wrought iron, may be regarded as perfectly stiff for longer distances than the parts of boxes or columns, and hence less riveting is required than in others, less cutting of the material, less labor, and less weakening of the post, so that, it is claimed, one fourth the rivets used in the ordinary forms will be sufficient in this; as a post yields by flexure, it is strong in proportion to its ability to sustain a cross strain; the I beam being considered the strongest form to resist a cross strain, and this post being really an I beam in both directions, the inventor adopts it as adapted to this purpose; it will also, on this account, be useful for girders and bridge chords; the riveting, being on the interior part of the post, weakens it less than when on the exterior part; it is also adapted to the parts of bridges which may be subjected to tension as well as compression; as different sizes of beams may be used at will, the dimensions of posts may be easily graduated to any size required; the parts being quite a common form of iron, no special machinery is required for their construction; the whole surface is exposed and can be painted readily, while hollow posts are liable to be injured by rust on the inner surfaces.

In the engravings, A, B, and C represent I bars or beams of wrought iron or steel. The bars, A and C, are placed with their sides against the edges of the bar, B, and are riveted as shown, the rivets passing through the flanges of B, and through the webs or bodies of A and C. The rivets are not placed opposite each other in the different bars, and, as above stated, are placed further apart than in ordinary beams.

Patented January 2, 1872. For further particulars, address the patentee as above.

Elevators for Private Houses.

This is a small, light, cheap, and economical elevator, principally adapted for use in private houses, the "cage" or "car" of which is constructed of wire, the elliptical shape being preferred, and attached and detached at pleasure, by suitable means, to an up and down, continuously moving, endless chain.

The chain passes around pulleys at the top and bottom of the passage, and is propelled by a motive power competent to pull up and down about one half the maximum weight proposed to be elevated or lowered. The cage is guided up and down by a suitable number of wire rods or ribs, which press outward against the guides, in which are gaged suitable slots for retaining the rods.

The counterpoises are so attached as to pull against the weight, which causes the ribs of the sides to spring inward, away from the guides, so as to move freely up and down. Whenever disconnected, the ribs of the cage spring outward and bind against the guides, the friction bei g increased, if necessary, by short bends in the rims at the top, which, when not pulled by the counterpoises, will enter notches cut at the back of the slots. One of the ribs has a bend or two to catch in notches in that guide which is between the up and down running parts of the chain, and has a hook on each side, so that by springing the rib inward and sidewise a hook will catch in the chain, and the rib will be released from the guide.

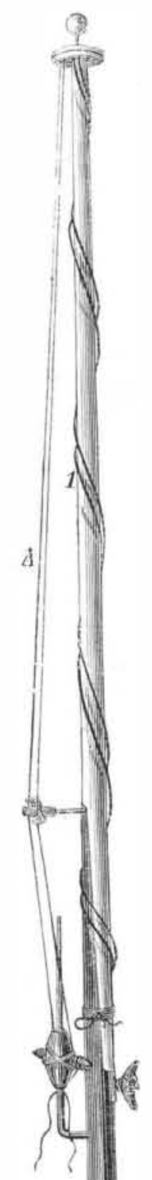
The hook on one side will, at pleasure, catch on that part of the chain running upward and thus pull the cage up; or the other hook, at pleasure, will catch on the down running part of the chain and pull against the counterpoises and lower the cage. There is on each side of the rib an eccentric button, held in one position by suitable springs; by pulling properly attached cords or wires the buttons are turned so that either one, at will, will pass behind the rib, and first press it inward and then sidewise until the hook catches the chain on the opposite side; by turning the other button, it will be released, and the rim will then fly back into position and hold the cage stationary. There are suitable projections arranged—one at the top, the other at the bottom—which will catch upon a button and release the rib which is attached to the chain, and prevent the cage from being pulled against the ends of the passage way. If the chain should break, the hook being released will allow the rib to fly back into its normal position and hold the car stationary.

Although an endless continuously moving chain is employed, the inventor does not limit himself to it, for it may, at pleasure, be varied, and the cage be moved in both directions by one part; or a chain winding on and off drums at each end of the way, and having reversible driving gear, will be applicable to the apparatus without any material change of the latter.

Mr. James D. Warner, of Brooklyn, N. Y., is the patentee of this invention.

ALBERT'S METHOD OF SECURING FLAG HALYARDS.

Flags are used in the aggregate not more than one month in twelve, yet, in the usual way of securing halyards, they are subjected to constant strains during wet weather, and are whipped by the winds in dry weather, so that they are worn fully as much when out of use as when employed. On the ferryboats, they are usually wound spirally about the pole, forming by their attrition a stripe where the paint is worn away, making the staff appear like a veritable barber's pole. When flags are used on buildings, the halyards are usually wound so tight on the cleats that when wet they are either parted, stranded, or weakened by the contraction of the rope, and are unable to support the flag when again hoisted. To repair and readjust them requires some one to climb the flagstaff, a kind of operation for which few are fitted except telegraph pole climbers, who, with their artificial spurs, mar the pole and injure its beauty. Now, by the invention illustrated in the accompanying engraving, all these evils and inconveniences may be avoided, and the halyards, which are the most expensive kind of rope of equal weight used on shipboard, may be preserved for a long time in perfect order, and at all times ready for use.



The invention consists of three pieces, namely, a bent bar having a footstep which is attached by three screws to the flagstaff, or having this part modified in form so as to be conveniently seized to the backstays on shipboard, a traveller or weight which slides up and down on the vertical part of the bent rod aforesaid, and, third, a fair-leader, which keeps the bite of the halyards separate in all weathers and prevents them from whipping the mast. When the flag is up, the halyard is belayed to the cleat. When the flag is down, it is belayed to the traveller.

The traveller has a belaying pin to which the halyard is belayed, as shown, the pin being wound with tarred cord to prevent wear of the rope, as is also the fair-leader. This simple and common sense invention can be applied at small expense, and would, if employed, save much money and trouble to the users of flags.

The invention was patented September 26th, 1871, by Captain William Albert, an old sea captain, who has learned by experience the value of a better method of securing halyards than existed before his ingenuity supplied the deficiency.

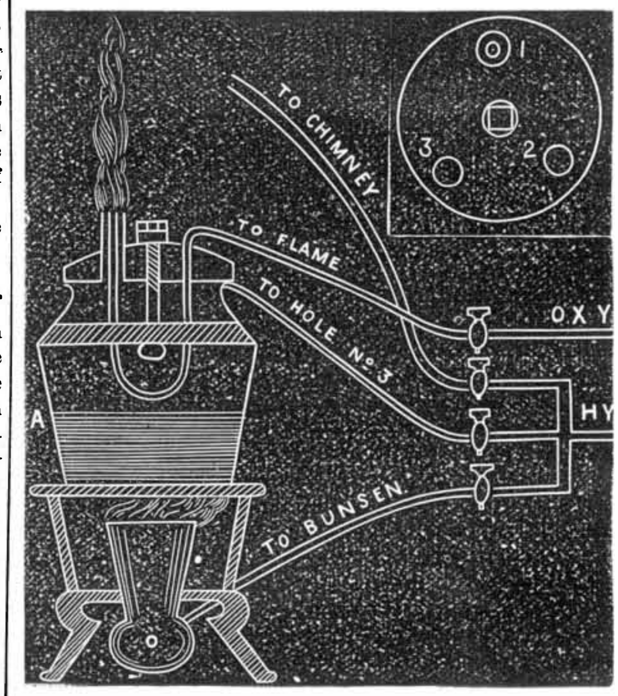
Further information may be obtained by addressing Capt. James Borland & Co., Ship Chandlery, No. 53 South street, New York.

SULPHIDE OF BISMUTH.—Bismuth, in the presence of or in combination with sulphur, yields a beautiful red coating, when passed before the blowpipe on a large piece of charcoal, upon the addition of a little pulverized iodide of potassium. A finely pulverized mixture of equal parts of sulphur and iodide of potassium is best kept for such purpose and makes an excellent test material for bismuth. In making these investigations, V. Kobell met a green mineral which occurs associated with joseite at St. José dí Madureira, Brazil, and which proved to be bismuthite, not previously noticed at that locality.

THE PHOSPHORIC LIGHT.

The apparatus consists of an iron vessel, A, into which sticks of phosphorus are introduced. That used at the Manchester Photographic Society's meeting was five inches in its largest diameter and three and a half inches in depth, having a capacity of twenty-eight fluid ounces. This vessel is fitted with an iron cover of substantial thickness, ground so as to fit air tight to it, and secured in its place, when required, by a cross bar inside, fastened with a bolt and nut. Three other holes are also bored through this cover, as seen in Fig. 2, that marked No. 1 being half an inch in diameter, and having a piece of brass tube about an inch long screwed into it, with a narrower tube inside. This is the jet through which the phosphorus vapors issue, and the smaller tube conveys the oxygen required to supply the flame, the oxygen passing through the tube, entering the hole 2, and being conveyed, as seen in Fig. 1, through the vessel, A, containing the phosphorus, up through the middle of the jet at which the phosphorus vapors are burned. It is indispensably necessary that

FIG. 1. FIG. 2.



the oxygen should not escape into the vessel, A; for, if it did combustion would take place in the vessel itself, and would probably lead to an accident. The other hole, 3, is for occasional use, and is fitted with a pipe for the introduction of common coal gas under such circumstances as will be hereafter mentioned. The vessel, A, is placed upon a stand over a large Bunsen burner, and with it is enclosed in a capacious lantern, furnished with plain glass front, and with silvered reflectors behind. The lantern is also supplied with a chimney communicating with the outer air, and having a gas burner inside it to produce a strong up draft before commencing to experiment.

When all is arranged, three or four ounces of the element phosphorus are thrown into the chamber, A, and the lid screwed down. The apparatus is then placed in the lantern, and the Bunsen burner beneath it is lighted. The phosphorus inside soon melts and inflames, burning until the oxygen in the chamber is consumed, and causing the emission, at the jet, of a small quantity of white smoke (phosphoric anhydride). After a while ebullition takes place, and bright flashes of flame spontaneously appear at the nozzle. If the heat be sufficiently applied, the flame becomes continuous, and extends in hight in proportion to the rapidity with which the gaseous phosphorus is evolved, burning with considerable brightness. If, however, sufficient heat be now applied to make the flame quite continuous, and a current of common coal gas be passed directly into the chamber through hole 3, this gas and the phosphorus become associated together, and burn at the jet with a brilliant flame entirely under the control of the experimenter. When the experiment was performed before the Manchester Photographic Society, this flame varied between fifteen and twenty inches in hight; and upon the introduction of the oxygen, its brightness became so greatly augmented as to render it almost unbearable to the eye. The readers of this journal may judge for themselves whether or no a room is not brilliantly illuminated by a flame eighteen inches in length, and so bright throughout the whole of that eighteen inches as to be almost unbearable to the sight. When the writer says the illumination of a room by this light is far greater than is possible by a single oxyhydrogen light as ordinarily employed, he is not making any idle boast of one inflated with his own idea, but is simply stating what was proved to be the fact at the most numerously attended ordinary meeting ever held by the Manchester Photographic Society.

In making use of the apparatus here described, the writer found it convenient to have all his taps near together, as shown in the diagram, so that, without moving about, it would be possible to increase or diminish the heat beneath the phosphorus chamber, accelerate or lessen the draft in the chimney, augment or suppress the supply of hydrogen to the chamber, and add to or take from the quantity of oxygen introduced into the flame.

What efforts have been made for the commercial introduction of the phosphoric light have, thus far, been unavailing, because of the strong prejudices which are entertained against the use of phosphorus. It is true, an accident with this substance might prove a very disastrous affair, as accidents with gunpowder and steam have proved; but gunpowder, steam, and phosphorus, may all be used, in suitable appliances and with ordinary care, with a very small amount of fear of any mischance.—*British Journal of Photography.*

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Condition of the Models at the Patent Office.

To the Editor of the Scientific American:

Permit me to call your attention to the condition of the models in the Patent Office. For want of room to properly store them, these models, in many instances, are left around on the floors, piled on the tops of the cabinets and on each other on the shelves, so that it is almost impossible to make an examination of them; many are also broken from this cause. In some cases, there are bushels of broken pieces of models, the uses of which can only be guessed at.

The present efficient head of the model room is doing all that he can in properly arranging and classifying the constantly accumulating models; but with the limited amount of space at his disposal it is impossible to do all that should be done. Some space has been made by disposing of parts of the rejected models, and also by placing small shelves between those already in the cabinets, but in many instances these shelves hide the models and interfere with their proper examination, thus necessitating a frequent handling where sight alone would be sufficient but for the second set of of shelves. Even with the most careful handling, models are frequently broken.

To remedy this, two things must be done immediately. More room must be provided, and the models dispensed with in all new applications not absolutely requiring them to explain the invention sought to be patented. To continue the present system, a new set of model halls as large as those now used would be required every seven years at the present rate of accumulation, which amounts to about twenty thousand annually. At this rate, without counting any increase in the number of patents granted, the number of models now in the office would be doubled in the period mentioned. You can thus see the necessity of some immediate change.

Some additional space might be obtained by building more galleries on the top of the cases in the north and west halls, which could be lighted through the roof. This would help for a year or two, but sooner or later the present system will have to be abandoned—useful as it is to point out what has already been done—and so prevent inventors from wasting their time, money and talents on machines that are already patented by others.

In every case where the model is dispensed with, as proposed, the applicant should be required to furnish drawings in perspective, where the case could be properly illustrated in this manner, a copy of which, at the patentee's expense, should be mounted on card board and varnished, and placed with its appropriate class in the model cabinets. Such a drawing would last a long time, and should it be defaced or worn by handling, it could be easily replaced by one of the photo-lithographs issued with the patents. The necessity for perspective exists in the fact that a majority of non-professional people cannot readily understand a mechanical drawing.

If some such system as this is adopted at once, it will be comparatively easy to find room for the models of such applications as absolutely require them for the proper illustration of the invention; but under the present style of proceeding, the halls are being filled with a large number of models of devices that drawings would show just as well, without taking up a tithe of the room, and at the same time save inventors the difference between the cost of the drawings and models.

The present Commissioner has been too short a time in his office, or too busily employed in his other duties, to appreciate the difficulties caused by the present limited space in the model halls; and I, therefore, appeal to you, as "the power behind the throne" and the special guardian of the rights of inventors, to see that some remedy is applied immediately.

There are now about seven hundred and fifty thousand dollars in the Treasury belonging to the Patent Office, nearly all of which has been taken from poor inventors who could ill spare it; and the least that should be done is to provide sufficient room, for the models that applicants are compelled to furnish, and to so arrange them that they shall be readily accessible for examination; and if space cannot be found, then the inventor should not be required to go to the expense of a model which the Patent Office cannot find room properly to exhibit.

Washington, D. C. INVENTOR.

Expose of the Tricks of the Davenport Brothers.

To the Editor of the Scientific American:

As Dr. Vander Weyde has finished what he considers to be an expose of the Davenport Brothers, I submit for the consideration of your readers a totally different view of the matter: they can judge who is right.

The Davenport Brothers do not depend on their ability to untie the cords with which they are bound; in almost every case, this would be impossible for them to accomplish in time to satisfy the spectators. A statement of what I have witnessed will serve to illustrate and prove what I assert. I have seen the brothers tied by experts, with such a number of ropes and complexity of knots, all drawn as forcibly as a strong man could pull them, that it would have taken at least thirty minutes for the most dexterous manipulator to have loosened one hand, the knots of the ropes on the wrists and legs being sealed with wax. In five seconds by the watch, after the doors were closed, a naked arm and hand were projected from the hole in the middle door, grasping a large bell and ringing it. The doors were opened upon the indrawing of the hand, and the fastenings on both wrists and legs examined critically and found to be secure, and the seals unbroken. The fact is they perform all of their tricks with free hands and at the same time do not untie a single knot. Dr. Vander Weyde says that the smallness of their hands aids them to undo the fastenings; this is true, but not in the way the Doctor understands it. They have false hands and wrists these are made of gum, and so closely resemble nature, both in form and color, as to mislead all who are not expecting deception in that way; the feeble light in which they perform their tricks assists to secure them from detection. The wrists of these counterfeit coverings extend up the arm a sufficient distance to be covered by the sleeve of the shirt, and have flat hoops or rings of thin sheet metal embedded in the substance of which are composed, so as to keep them open and prevent a collapse under the pressure of the cords. These counterfeit hands and wrists are of ordinary size, and yet are large enough to permit of the ready insertion, or removal of the hands of the Davenports, owing to the remarkable slimness of their natural members. The position in which the hands are placed, and the tying of the ropes on the under side of the seat after they are passed through the holes made for their reception, aid greatly in keeping them in proper position for the easy insertion of the hands. The coat sleeves above the wrists are padded to make the arm of a relative size in proportion to the hands. In the trick of exhibiting five arms and hands at one time extending out of the window in the cabinet, they employ four counterfeits made of thin gum, capable of being inflated, the fifth and smaller one being one of their own arms. They do not open the door after this performance until they have had time to exhaust the air out of the frauds, and roll up and deposit them in their coat pockets. In regard to freeing themselves of the fastenings, they simply cut the cords off; others of a proper length are produced from their capacious pockets to throw on the floor; the cut fragments are put safely away in those same pockets. A moment's reflection will convince any one that it is simply impossible for the Davenports to endure, for three fourths of an hour, the torture of tightly knotted cords upon their naked wrists; try it for five minutes and see if it will not convince you of the truth of my demonstration.

Harrisburg, Penn. WM. P. PATTON.

C. W. Williams on Coal and Smoke.

To the Editor of the Scientific American:

Is Mr. Charles Wye Williams the latest and best authority upon the consumption of coals and the prevention of smoke? I have read his book, and he seems to make these remarkable points:

1st. That the prevention of smoke is impossible. He enters into very learned statements and calculations, which, as he leaves them, condemns us poor inhabitants of bituminous regions to the unrelieved prospect of endless carbonization—in being lined inside and outside with smoke.

2d. He learnedly thinks he shows that smoke isn't worth much, and that its prevention wouldn't be much of a saving.

3d. He states that Mr. Charles Wye Williams has invented the only useful mode of approximating the prevention of smoke; and that any other invention shows either that the inventor deceived himself, or intended to deceive others, that is, is either a knave or a fool.

The arguments of the book do not seem, to the present writer, satisfactory; and its tone savors more of magisterial self conceit, than of that humility which science, like every other great subject, ought to engender in minds above mediocrity.

Is there not a better book on the subject? B. F.

[The criticisms of our correspondent upon C. W. Williams' works are not without foundation, whether relating to matter or manner. That author's views contain, in our opinion, so much admixture of error, that he is hardly entitled to be styled an authority in the strictest sense of the term. As our old readers are well aware, we have had occasion to differ from Mr. Williams in many points besides the ones enumerated.—ED.

Mississippi Bridge at Rock Island.

To the Editor of the Scientific American:

The new iron bridge over the Mississippi river, from Rock island to the city of Davenport, is being hastened to completion, and will be ready for travel in about six weeks. It is a Whipple truss bridge, and is built to accommodate wagons, with a foot way below and a railroad overhead.

The bridge consists of five spans and a draw; the spans vary from 200 to 210 feet in length, and weigh six tuns to the linear foot. The draw span is the longest on the Mississippi river, and the heaviest in America; it is 366 feet in length, and weighs 871,784 pounds. The draw is built in reverse way of the fixed spans, that is, the Whipple truss is inverted, bringing the top chord into tension, and the bottom chord into compression, and carrying the entire strain from the ends to the center or main posts. In the fixed spans, the strain is transmitted from the bottom of the posts to the top chords by means of the tie bars. This throws the top chord into compression.

The turntable, on which the draw span rests, is indeed a novel affair, and is the invention of C. Shaler Smith, President and Chief Engineer of the Baltimore Bridge Company. The bed circle, which is 32 feet in diameter, with a 12 inch upper surface, and weighs 36 tuns, rests on the pivot pier. The top surface is beveled, the inner side being the highest. The rotary table, five feet in depth, and resting on 36 cast iron wheels 30 inches in diameter, is placed on the bed circle, the 36 wheels resting on the beveled face of the circle. Each wheel, which has a 12 inch face, is beveled, the outer side having the greatest diameter. Thus each wheel, from its formation, tends to travel in a segment of a circle, and avoids the tendency, which square faced wheels have, to travel on a tangent. From the center of each of the above wheels runs a rod to the center pin, which is 32 inches high, with a base four feet in diameter, which pin is mounted on the radial center of the masonry. The rotary power is not yet finished, but will consist of an iron reservoir containing about three barrels of pure glycerin, which will flow into four hydraulic pumps worked by a steam engine. The glycerin will be forced by the pumps into two large rams on each side of the center of the draw span. An iron cable will be led from the plunger of each ram one quarter around the circle, and there made fast to an iron eye let into the masonry. The machinery is so arranged that, while one ram winds in on its cable, the other will be laying out its cable, ready to pull in, or when it is desired, to reverse the motion of the draw.

This huge draw was recently swung into position for the first time, the united muscular power of twelve or fifteen men being amply sufficient therefor. Three persons only had the honor of being on the draw while it was making its first swing, one of whom was your correspondent,

Davenport, Iowa. LUKE COPPERTON.

[For the Scientific American.]

VARIANCE BETWEEN HYDROSTATIC AND STEAM PRESSURE IN BOILERS.

The hydrostatic force is the only force present in applying the water test to ascertain the strength of steam boilers. But, if heat be applied to a boiler to generate steam, two constant forces are present:

1st, the expansive force of steam, and 2d, differential expansion.

Besides these, two inconstant forces: 1st, repulsion of the water from the metal, and 2d, dissociation of the water arising from expulsion of the air by continual ebullition, sometimes make their appearance.

If the drift pin has been used, the damage it has done will be increased by heat.

One or more of these forces, combined with the expansive force of steam, becomes irresistible; and when in operation to that extent detracts from the possibility of working steam at the pressure of the previous hydrostatic test. The presence of these additional forces in a steam boiler is clearly attributable to extraneous causes, and not to any destructive but hidden agency inherent in steam. For, while no force will rebel at a violation of its laws sooner than steam, yet its controllability in conformity with its laws is not exceeded by that of any other active force. In proof of this, we find that when steam has been generated in one boiler and forced into a second one, it requires a greater steam pressure than water pressure to rupture the one containing steam only, owing to its greater fluidity and elasticity.

Further proof, of its controllability and even harmlessness when isolated, is seen in its easy confinement in every variety of vessel and under varying circumstances, extending even to rubber hose at high pressure. The thinness of a plate capable of confining isolated steam is surprising.

On comparison of two boilers tested, the one by water pressure and the other by steam forced into it, their conditions will be found to be the same in kind, and different only in degree of temperature. Every part of each being of uniform temperature, the force of differential expansion is absent from both. The plates not being heated above 600°, the point of maximum vaporization, the force of repulsion is absent from both; therefore the only remaining force left is the steam pressure in the one case and the water pressure in the other. The behavior of steam, isolated in one boiler, being identical, then, with that of water isolated in another, and the two being convertible, the one into the other, according to temperature, it is presumable that there can be no antagonisms due to their contact and union in the same boiler engendering other and additional forces besides those above enumerated.

This inference is fortified by the fact that there is not known an instance where the forms, in which the elements of water present themselves, whether in that of gas, vapor, liquid or solid, manifest any antagonisms, the one to the other, in any possible combination. To assume therefore that the contact and union of steam and water in the same boiler can possibly engender a dangerous force, is not only an assumption without foundation, but is contrary both to reason and analogy. It appears, therefore, that there are known to exist in some boilers, besides the expansive force of steam, other illegitimate forces which are not resistible by any strength of material, and are consequently capable of producing all the phenomena of explosions; and it further appears that these illegitimate forces cannot be present in those boilers possessing uniformity of temperature not exceeding 600°, and containing water from which the air has not been expelled.

The question now arises: Can these conditions be permanently maintained in boilers generating steam?

No problem in mechanics is more simple. By an application of the law of gravity, the water will flow from the cold end of a boiler (in a properly adjusted pipe) to the hot end, and the water in the hot end will flow in the barrel of the boiler to the cold end, thus interchanging places with such rapidity as to insure a temperature substantially, if not theo