AMERICAN ENGINEERS' ASSOCIATION.

[Reported for the Scientific American.]

On Wednesday evening, January 16th, the regular weekly meeting of this association was held at its room, No. 24 Cooper Institute, this city—Thomas B. Stillman, Esq., President; Benj. Garvey, Esq., Secretary.

REPORTS.

The Special Committee appointed by the Association to re-examine and report upon the operation of Messrs. E. H. Ashcroft & Co.'s "Low Water Detector," submitted their report at this meeting. It will be found annexed:—

The Special Committee appointed, &c., &c., to examine Messrs. E. H. Ashcroft & Co.'s Low Water Detector, respectfully report:—

That they have been provided by Mr. Ashcroft with proper means for making accurate experiments, viz.: an instrument having a thermometer attached to it on a level with the fusible plug, and a glass tube connected with the top and bottom of the air ball. The thermometer enabled them to ascertain the temperature of the water in contact with the plug, and to try whether the water circulated within the instrument. By the aid of the glass tube, they could see what became of the air which was in the instrument at the beginning of the experiment, and could observe the degrees of rapidity with which the water fell when it became low water in the boiler.

Having had this instrument attached to the boilers in the Park Hotel, the Committee observed its operation with care. At the first experiment, no sooner was the connection with the boiler opened than the temperature began to rise rapidly in the whole instrument. The water in the glass tube was violently agitated for about a minute, when it disappeared, and the alarm was given. On inquiry, it was found that the engineer had allowed the water to get low, supposing that the object was to see if the instrument would operate.

The pump having been set going and the plug replaced, the Committee commenced their observations anew. Before the connection with the boiler was opened, the mercury stood below 80°—the lowest graduation on the thermometer—and there was no water in the glass tube. When the cock was turned, the mercury rose until it reached 95°, when it became stationary. On causing a minute leak at one of the joints to test the effect of a circulation, the mercury was immediately affected, and rose to 97°; but on stopping the leak, it again sunk, and became stationary at 95½°.

The air in the instrument was forced by the ascending water into the ball and glass tube, and was there compressed until the water stood within three inches of the top of the glass. There was very little fluctuation, but the water gradually ascended until, in the space of an hour, it got to within two inches of the top, when its ascent became so slow that it could not readily be observed.

There being now thirty pounds of steam and two cocks of water, the pump was stopped, and in three minutes there was low water, and the alarm was given; and in two minutes afterward, the lower cock gave steam and water mixed. As the water left the bottom of the instrument, there was considerable agitation in the glass tube, the temperature rose rapidly, and, as soon as the water left the instrument, the plug began to fuse.

From these experiments it is clear that there is no circulation in the instrument, or so little that its heating effect is neutralized by the radiation from the surface; also, that the air which is in the instrument at first is gradually absorbed; that the water is rapidly replaced by steam when the end of the upright tube is uncovered; and that the plug fuses readily when in contact with steam. As to the liability of the plug to change or have its fusibility affected by age, the Committee have had to rely upon the testimony of Dr. Vanderweyde and other eminent chemists, who state that the alloy of which the plug is composed is not changed by age or by the action of water.

The Committee are therefore of opinion that this instrument is simple in construction, correct in principle and reliable in operation, and that it is a valuable auxiliary to an engineer; but that it cannot be employed in place of a competent man.

(Signed) BENJAMIN GARVEY, JOHN C. MERRIAM. } Committee.

After the reading of the above report, it was accepted, and adopted as the opinion of the society.

The Committee on Accidents presented, through their chairman, the subjoined report:—

A letter calling attention to the substitution of the sanitary police for a regular Board of Inspectors was placed in the hands of your Committee. In the absence of other members of this Committee, we would respectfully submit:

1. That it is not, as has been proved by the action of the present sanitary police, the state of the boilers in the metropolis that requires attention, but the kind and quality of engineers employed.

2. That it may be true that the police may do this duty more economically, inasmuch as they receive but small wages; but that they are as good is very doubtful, it being impossible to find men entirely competent for this duty who would be willing to serve at so small a salary.

3. It is very doubtful that the present course is the most economical, as, if a proper board were appointed, their fees would be paid by the owners of boilers, and thus be of no expense to the city.

4. It is possible that the present system will receive the sanction of employers, but will it receive that of engineers and the community?

In view of the above facts, your Committee would suggest that the law proposed at the last session of the Legislature was a good one, and should be sustained; and that, in order to have it receive the attention it merits, a committee should be appointed to draw up a petition to the Legislature, setting forth these views, and calling for a law that will protect engineers as well as owners.

We would further state that the said law will probably be brought forware at this session, and that quick action is imperative.

(Signed) JOHN C. MERRIAM, JOEL W. HOPPER. } For the Committee.

The consideration of this report was postponed for one week.

At this period, the report upon Messrs. Warren & Banks' "Low Water Alarm," as given in full in the last number of this journal, was then taken up, and, upon motion, unanimously accepted as the sense of the Association.

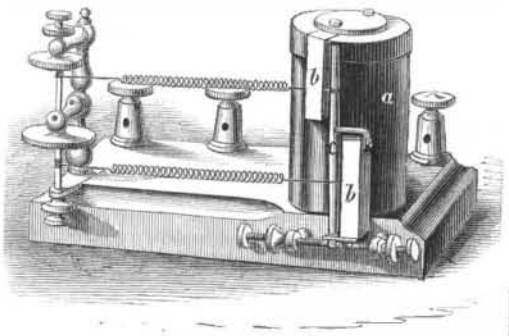
The deferred business of the evening—"The Consideration of Cut-offs"—being in order, was then taken up, and a paper, giving the results of the experiments at Erie by the Naval Commission, as far as made, was read by Mr. John C. Merriam. Upon the questions advanced in this paper, a spirited, but short discussion ensued, in which Messrs. Stillman, Roeder, Garvey, Rowell, Merrick, &c., took part. The further consideration of it was then postponed until the next meeting.

A committee of five was appointed by the president to nominate officers for the ensuing year.

The meeting then adjourned.

BRADLEY'S RELAY MAGNET.

On page 200, Vol. III. (new series) of the SCIENTIFIC AMERICAN, we gave an illustration of Dr. Bradley's improved electro-magnet arranged in connection with his improved sounding apparatus. Since the publication of that illustration, this magnet has been extensively introduced into practical use in telegraph offices, and is generally pronounced by operators to be superior to the magnets heretofore in use, in two important particulars. It is more rapid in its operation, and it can be worked by a much feebler current, several operators stating that they find that they can receive messages by it in rainy days when it is impossible to obtain communications at all by the ordinary magnet. We now present an illustration of Dr. Bradley's magnet as arranged for a relay.



By inspection of the cut it will be seen that but a single helix is employed. The soft iron core passes through the helix, *a*, and is bent at right angles over the end of the helix and down its sides, terminating in the two poles, *b*, *b*. These poles are arranged at sufficient distance apart, laterally, to permit the vibrating armature, *c*, to be suspended vertically between them. The armature is suspended at its middle upon a very delicate spring, which, without any friction, offers the least possible resistance to a vibrating motion, horizontally, of the two ends of the armature. As the upper pole of the magnet, while the current is passing through the helix, attracts the upper end of the armature to the left, and the lower pole attracts the opposite end to the right, the full power of the magnet is exerted to tip the armature from its vertical position, which position is instantly resumed on the cessation of the current. The spiral spring which draws the armature back to its vertical position is kept in a state of constant tension by a weaker counteracting spring; it having been discovered by Dr. Bradley that a spring thus arranged is more prompt in its action than one which returns in its operation to a state of relaxation. At the lower extremity of the armature is a platinum plate, which, as the armature is drawn from the perpendicular, is brought in contact with a platinum point in one of the adjusting screws, thus closing a second circuit in the usual manner.

The outer elbows of the core are, in their whole length, in close proximity to the outer surface of the helix, and are consequently directly under the influence of its magnetizing power; the arrangement embracing the principle of the helical ring.

The following explanation of the prompt action of this magnet, as compared with those heretofore in use, is offered by the inventor. It is plausible, and will be found to suggest a new idea in the science of electro-magnetism:—

"By careful observation, in a long series of experiments, I have discovered and satisfactorily demonstrated that, in this form of magnet, the magnetic force developed in the soft iron is more instantaneously and fully established and discharged, and consequently capable of producing more instantaneous and rapid movements of the armature, than it is possible to obtain by the form of magnet in which two helices are employed. The *rationale* of this interesting and important phenomenon, aside from the arrangement of the parts, by which all friction is avoided, the inertia to be overcome reduced to the lowest point, and the poles brought so near together as mutually to react upon each other, I conceive may be found in an explanation of the two principal modes in which magnetism is induced, and the operation of the laws under which it is developed.

"If we place a bar of soft iron in the interior of a helix, and a current of electricity be made to traverse the helical wire, the iron becomes magnetized. If the length of the bar coincide with that of the helix, the modification in its molecular construction attending magnetization is wrought, upon each and every one of the particles composing it at the same instant of time; and, if the current be intermitting, the demagnetizations are equally instantaneous. If the bar be placed along the outside of the helix, the same effects are produced, though in a degree less marked. If we now take the bar from the helix, and apply to one of its extremities a pole of either an electro-magnet or of a permanent one of steel, magnetization is effected as before; but the order in which the molecular derangement takes place among its particles, is essentially different. In this case, the particles constituting the first layer at the end touched are first magnetized; these induce magnetism in the particles of the next layer, and these in the next, and so on until the opposite end is reached. This consecutive induction along the inner movable particles, of which the bar is composed, requires appreciable time for its full development—a time somewhat dependent upon the power of the inducing magnet, as well as on the softness and purity of the iron.

"By a moment's inspection of the cut, it will be seen that in this form the mode of magnetization first described prevails throughout; whereas, in the magnet with two helices, the portion of iron that serves to connect the two cores, as well as the armature itself, are magnetized by the latter or consecutive process."

The patent for this invention was granted August 28th, 1860, and further information in relation to it may be obtained by addressing the inventer, Dr. L. Bradley, New York City.

The Sea Qualities of Iron-cased Ships.

In the voluminous discussions of the qualities of iron-cased vessels of war which have occupied so large a portion of space in the English journals, the most important doubt that we have seen expressed is in regard to their probable behavior in a heavy sea. If the following statement by a Paris correspondent of the *Scotsman* is to be relied upon, it would seem that there will probably be no difficulty in this respect. The *Gloire* is a wooden ship, and would be less light on the waves than an iron one:—

But, while giving these facts, your readers may suppose that I have entirely overlooked that gem of the French marine, the iron-plated, invulnerable *Gloire*, about which all the scientific minds of Britain have been hazarding all sorts of opinions. Whatever notions may exist in England regarding the strength or sea-going qualities of this vessel, people in this quarter of the globe have no misgivings on the subject. The *Gloire* was admirably tested in the recent Algerian trip of Napoleon III. I have spoken with men who assisted in the working of that ship to the African coast, and they declared that not even the imperial yacht itself, light and trim cut as she is, behaved so well during the heavy gales which the squadron encountered as soon as it had left the French coast. I know that, during those gales, the steamers from Cette were unable to leave the port in consequence of the frightful state of the sea, and that no fishing squadron in any of the Mediterranean ports durst attempt to leave its moorings. The *Gloire*, heavily charged with her full amount of ammunition, with all her guns, with provisions for some months, with her tremendous engines, and her 4½-inch coat of mail; the *Gloire* cut through those giant billows with a steadiness little less than the *Great Eastern* herself, when she breasted the gale in the English channel during her first sea vorage.

Application has been made to the Massachusetts Legislature, by Charles S. Storrows and others, of Lawrence, for an act of incorporation as a manufacturing company, with a capital not to exceed $1,000,000. It is their intention to erect the mill between the Atlantic and Washington Mills in Lawrence, and to start with a capital of $750,000.