VOTING BY MACHINERY.

M. Martin, a noted French electrical engineer, whose numerous labors with regard to the electric light have resulted in his almost total blindness, has recently invented a curious apparatus for voting by machinery, the details and engravings of which we extract from *La Nature*.

The invention is intended to be used in legislative and similar assemblies, and it is so arranged that, on the question being put, each member has only to press a black or a white button in a box before him, according as he wishes to vote "no" or "yes," when one circle on a large indicator board appears of the corresponding color. The indicator is represented in our large engraving above each circle, on which places are prepared to receive the names of the voters. In case the member does not wish to vote, he presses both of his buttons, and the fact is noted by his circle appearing half black and half white

The interior mechanism of the indicator board is represented in Fig. 2. The electro-magnets above the circles operate so as to throw down the white screens, while similar magnets below the circle raise the black screens. Another ingenious feature is that the machine may be caused to instantly record the number of votes cast on each side. For this purpose two wheels are provided, each numbered on its sides with figures, up to the total of members of the assembly. Each wheel turns before a window in the indicator, which is just large enough to show the necessary figure. A lever moved by a weight describes a semicircle when the presiding officer touches a button placed before him, the effect of the last operation being to break a current. The lever carries a copper contact which travels over a distributor, and establishes a current whenever it passes before a circuit corresponding to a vote given. This current is transmitted to an electro-magnet, on the right for the positive and on the left for a negative vote, and the effect of the

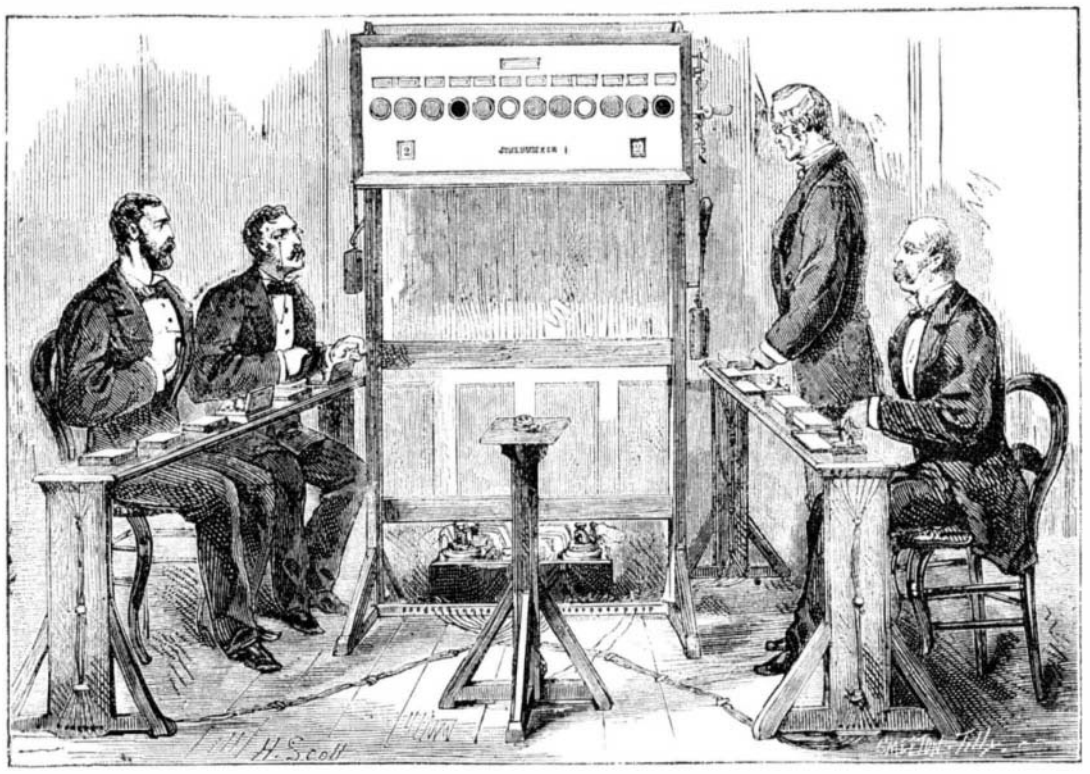
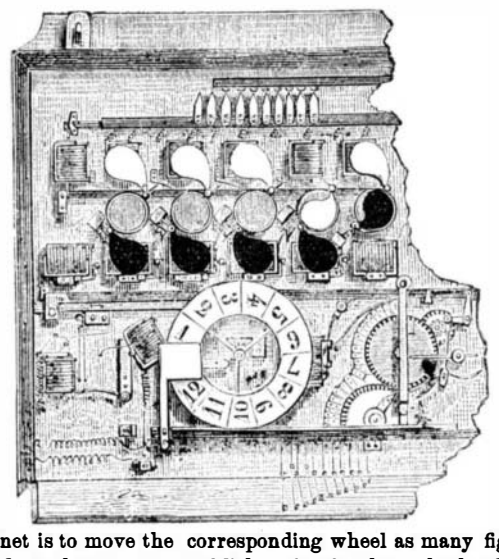


Fig. 1.—ELECTRIC APPARATUS FOR RECORDING VOTES.

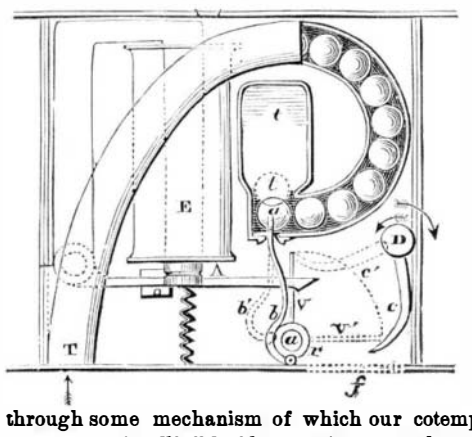
Fig. 2



magnet is to move the corresponding wheel as many figures ahead as the contact establishes circuits through the distributor. The result is shown at the windows marked 2 2 in the large illustration

There is also an arrangement whereby a record of the votes is made on paper. The electro magnets which move the screens at the same time cause points to project, and

Fig. 3.



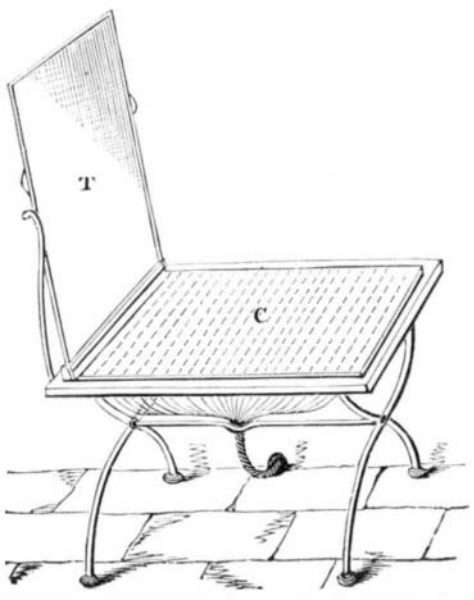
these, through some mechanism of which our cotemporary fails to convey an intelligible idea, mark upon a sheet of paper when the latter is pressed behind them. The sheet is previously prepared with the names of the voters at proper places, so that from the nature of the mark it is instantly seen how the individual voted.

By another system, invented by MM. Clérac and Guichepot, the whole assembly is enabled to see how the voting progresses, and each member can see, without leaving his seat, whether his vote has been received and registered. On each side of the tribune is placed a large slab, divided into as many compartments as there are members. One of these slabs is for the affirmative votes, and the other for the negative. On each member's desk are two knobs, one in electrical connection with the compartment on each slab which belongs to that member's seat.

Fig. 3 represents the interior of one of these divisions or compartments. It is composed (1) of an electro-magnet, E, whose armature, A, holds back a small shutter, V, of a gaudy color, and an arm, *b*, both fixed to and movable around the axis, *a*; (2) of an inclined tube, T, containing ivory balls, and whose lower end, *t*, pierced laterally, only allows one of these balls per vote to pass out; (3) of a cam, *c*, fitted into a shaft traversing all the compartments of the same vertical row; (4) a small window, *f*, looks toward the assembly.

When the member presses the knob—either "yea" or "nay"—before him at his desk, the electro-magnet attracts the armature, A, which releases the shutter, V, and which at once—by means of a spring, *r*—shuts down in front of the window, *f*, so as to become visible to the member voting. At the same time the arm, *b*, obeying the impulse of the spring, *r*, pushes out a ball from the tube, T, into a vertical receiver, *t*, whence it arrives into a receptacle for all the balls from its corresponding frame. These various duties are accomplished, comparatively speaking, simultaneously in the different parts of the two frames, so that the whole of the voting is declared to the assembly by the appearance of the closed shutters, at the same time that its total value is

Fig. 4

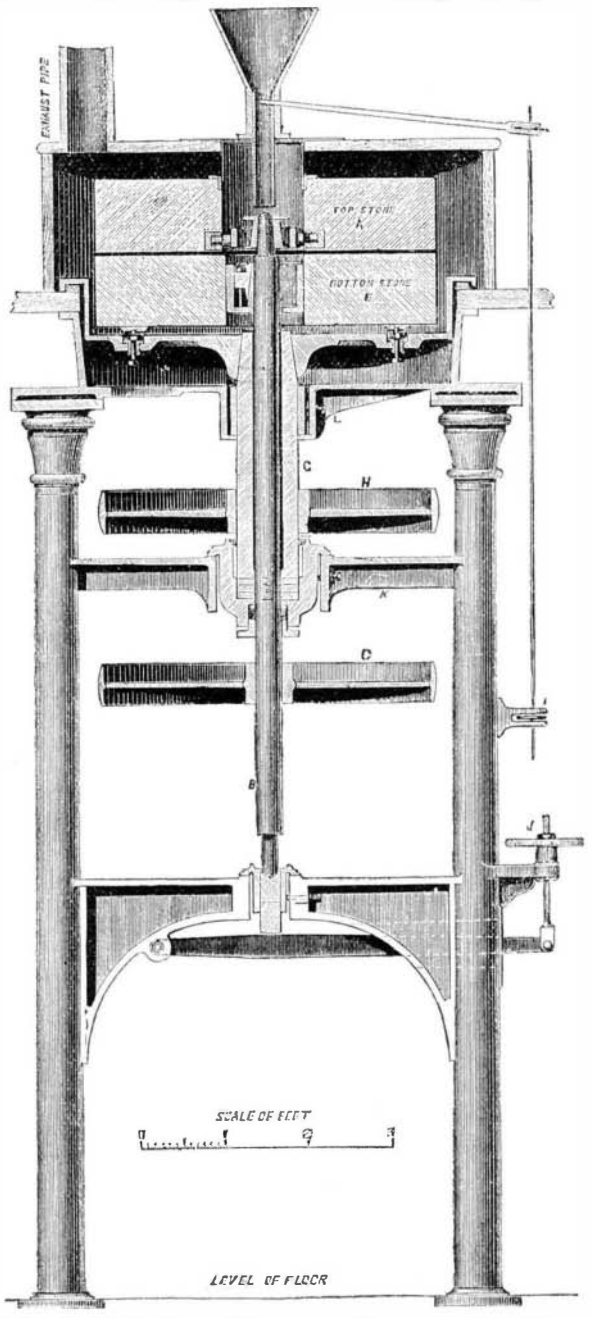


automatically declared by the final collecting tube graduated for the purpose. After the voting, the shutters and arms of all the compartments are restored by a single movement to their original position, by means of the vertical shafts, D, and the cams, *c*. The machine is then ready for a fresh vote. There are twenty ivory balls in the tube, T, which suffices for a sitting, and they are all exactly the same in size, and each bears either the name of a member or a number. When the numbering of the votes is accomplished, it merely suffices, after each ballot, to take away these balls and make up from them the list of voters. But the inventors have even done away with the necessity for this labor. The same electric current which has thus far worked the machine prints the name of the member and indicates the nature of his vote. Upon a metallic board, T, Fig. 4—prior to the voting—is a sheet of paper, sensitized by a salt easily decomposed by electricity (such as ferrocyanide of potassium); then this board is lowered upon a plate of hard caoutchouc, into which are embedded metallic pieces, each bearing the name of a deputy engraved upon it. Just as on the two frames, each member has allotted to him in this plate two metal pieces, the one in iron and the other in copper, communicating respectively with his "for" and "against" voting knobs. At the same moment, therefore, that the electric current drops a ball in either frame, it decomposes the salt on the prepared paper, and prints the member's name in red or blue, according as he votes "yea" or "nay."

IMPROVED MILL.

We illustrate herewith a novel system of grinding wheat, which deserves a good deal of attention. Very little description is necessary. It will be seen that the bed stone, instead of being fixed as usual, is set in a kind of frame or saucer, supported on a tubular shaft, and that this bed stone revolves in one direction while the runner revolves in the opposite way. At the first glance it would appear that there is very little in this. The remarkable feature is that, from evidence placed before us, we are left no room to doubt that a single pair of stones thus fitted will grind as nearly as may be three times as much wheat in a given time as a pair of millstones worked in the ordinary way. The stones are driven by two belts, one open and the other crossed. The top stone, A, is carried by the spindle, B, and driven by the pulley, C, while the bottom stone, E, is driven by the pulley, H. The hand wheel, I, regulates the feed, while J is used for adjusting the stone or tempering the grist. K is the footstep for the hollow spindle, fitted with friction plates.

The stones are driven at about the usual velocity, say, 108 to 112 revolutions. Now, at first sight it would appear that precisely the same results would ensue if the top stone of an ordinary mill were driven at twice the usual velocity; but this conclusion would be erroneous. Any attempt to overdrive an ordinary mill makes



the flour too hot, and for this reason there is a certain normal velocity which cannot be exceeded. In the mill now under consideration, although the relative velocity of the two stone faces is just twice as great as the normal velocity, there is no overheating whatever. The mill runs quite cool, and as we have said, brings down about three times the ordinary quantity of flour. The result seems to be brought

about in the following way: When wheat is ground in the ordinary way, the centrifugal force and the angle of the cut in the stones forces the flour to the periphery across the face of the fixed stone; but in the improved mill, both stones being in motion, each helps the corn to the edge, and the corn consequently leaves the stones much more rapidly than it would do if one were at rest. In practice it is found that the speed of the stones may be brought up to 30 feet per second at the periphery, or say 127 revolutions per minute for a 4 feet 4 inch stone, without heating the flour.

The gear is the invention of Mr. Cullen, a British engineer, and has in practice been found thoroughly successful in every respect.

Correspondence.

The "Etheric" Force.

To the Editor of the Scientific American:

I have read with some interest the articles in the SCIENTIFIC AMERICAN on the so-called "etheric" force, in pursuit of which Mr. Edison is said to be now conducting experiments at his shop in Newark, N. J. At the same time, I cannot but believe that somebody is somewhere mistaken. Mr. Edison is perhaps sincere in his belief that he has discovered a new and valuable force, and if so he is deserving of credit for continuing his investigations; but he will soon learn, if he has not done so already, that the hopes excited are delusive and evanescent.

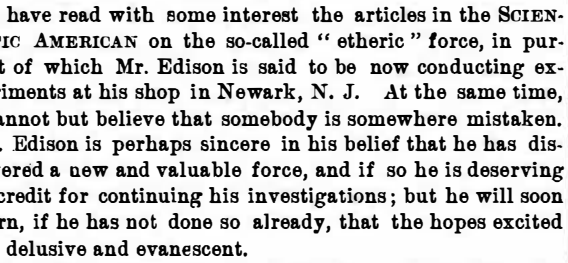
What has seemed to me most singular in the various published accounts is the statement, coupled with the fact that a spark is produced, that the force is apolic or non-polar. Inasmuch as there can be no such thing as an apolic or non-polar force, apolic meaning strictly neutral—and therefore anything that is apolic is incapable of manifestation as a force, manifestation involving force—hence anything apolic is not a force. The very fact that the force is manifested shows that it is either a positive or a negative condition at the instant of manifestation—by no means neutral; and your assumption, that one condition succeeds the other so rapidly as to prevent material manifestation in the galvanometer or other instrument, indicates to me your acceptance of this truth.

Some two years ago, I was considerably interested in this subject, and conducted a series of experiments at my laboratory, then in Washington, for the purpose of ascertaining whether the current could be utilized so as to effect a record or actuate a receiving instrument. So far was I from having discovered the force that I had learned its existence from others; and it seemed to me that, if it consisted purely of the molecular magnetic vibration, it might follow a metallic conductor in preference to running to earth, just as the magnetic force will extend from one end of an iron bar to the other, with equal facility, whether the bar is insulated or surrounded by other conductors, such as liquids. I soon became convinced of three things:

1. That the current can be made to produce a record.
2. That it is not purely the magnetic force, but what might be understood as the magneto-dynamic current.
3. That it is practically of no value.

I had in my possession a rather powerful magneto-electric machine, on the same principle as Ladd's machine. The revolving Siemens armature was wound with wire, which, starting with the slight resident magnetism in the electro-magnet between the poles of which the armature revolved, returned the induced current to the helices of the electro-magnet, thus building up the magnetic force in the electro-magnet, so that the induced current might be increased indefinitely. The machine produced the magneto-dynamic spark in great brilliancy. I witnessed, at times when the armature was revolving very rapidly, sparks of from ⅛ to ½ an inch in length between the poles of the magnet, although a carbon battery of 100 cups failed to indicate the least connection between the helices and the metal of the electro-magnet. When a piece of metal or a plate was interposed, it apparently became charged with electricity. The accumulation seemed to be in principle something akin to that of a Leyden jar, but it did not continue a sufficient length of time to produce a direct electric record. The manner in which I operated will be understood from the following:

Fig. 1.

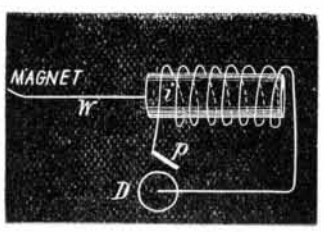


In the engraving is shown a plate electro-magnet, of which *m m* are the poles, curved inside for the revolving Siemens armature, which, however, is not shown. The iron projecting pieces, *h h*, were fastened to the ends of the cores in order to bring two points, *a* and *b*, near together, and thus afford a ready passage for the magneto-dynamic current. Between these, but not touching them, was a metallic plate, *c*, from which led a short conducting wire. At each half revolution of the armature, the piece or plate, *c*, became charged, and the charge extended to the second plate, *f*. Upon the plate, *f*, was a point, *d*, and whenever another plate, *g*, with a point, *e*, was brought in close proximity to the point, *d*, the third plate, *g*, also became charged; but here the spark was much weaker than at *c*. As near as I can understand it, this is practically what Mr. Edison has accomplished; and it really amounts to nothing at all. Nor did it seem to make any difference with the charging of the plate, *f*, when I placed the conducting wire in water; but it was observable that the plate, *g*, would also become charged from the water, although there the spark was very faint indeed, owing probably to the poorer conducting power of the water.

I of course tried all the suggestive experiments for producing a record, but could not do so directly. By placing moist litmus paper between the points, *a* and *b*, and covering the points with a thin, close chemical mixture affecting the litmus, it is true a mark was produced upon the litmus paper at every spark; but this was owing merely to the projection (by the discharge) of atoms of the chemical upon the litmus paper; and a spark of sufficient intensity would be impossible with a long distance between the poles of the magnet, even were this distance artificial and formed by means of a metallic conductor. In the same manner, paper saturated with a solution of ferrocyanide of potassium showed a faint mark, an atom of the points, *a* or *b*, being projected upon it by the discharge producing the spark. Both these experiments were naturally suggestive to me, I having many years ago discovered, or rather learned, that electric disruption, or the electric discharge, is the projection of an atom of the metallic or other conductor, and that, if the distance between the discharging and collecting points be not sufficient to allow of consumption or volatilization of the metal in its passage across, a portion of the metal will reach the opposite point in its natural state, and thus, by reason of chemical combination or decomposition, produce a record.

Entertaining at the outset the mistaken notion that the electricity thus developed is purely magnetic, or the magnetic circuit, or the molecular motion in which magnetism consists, I conceived the idea that, although itself incapable of producing a record when apart from the magnet, it could be converted, just as at the magnet itself, into dynamic electricity, and thus be brought under control. I carried the conducting wire to an iron plate in place of the plate, *f*, and wound the plate with very fine wire.

Fig. 2.



In the engraving (Fig. 2) I have omitted the electro-magnetic connections, *i* being the iron plate to which the magneto-dynamic current is conducted. This is wound with insulated wire, forming a closed circuit through the stylus, *p*, and drum, D. Over the drum runs chemically prepared paper. I may remark that, although I succeeded at times in producing a record, my tests were far from satisfactory, and many things combined to prevent my proceeding with the experiments at that time, the chief of which was my conviction that, even if carried to a successful conclusion, the results would be utterly valueless practically. Many other experiments, however, had been tried by me, involving convolvular wires, etc.; but they all came under the general rule of rejection. During my course of experiments, I tried electro-magnetic vibrators, similar to those in use on electric bells, and attached mechanical vibrators to the shaft of the magneto-electric machine, for the purpose of preventing the neutralization of the positive spark force by a succeeding negative, and with some success; but everything pointed to the conclusion set forth above.

Without criticizing Mr. Edison's taste, as an electrician, in selecting the name "etheric force" to designate the observed electric current (I think Mr. Keely calls his tremendous and unapproachable force by the same name), I wish to point out some features in the published accounts which may lead to serious errors of judgment.

Primarily, it was stated that Mr. Edison was led, from the unusual brilliancy of the spark he accidentally observed, to suspect that it was due to something more than induction This cannot be as stated. Mr. Edison could not have suspected such a thing from the phenomena observed, or for the reason alleged, for he could not have witnessed in any of his experiments a more brilliant spark than that of the inductive or static discharge.

Secondly, the spark has no lack of polarity.

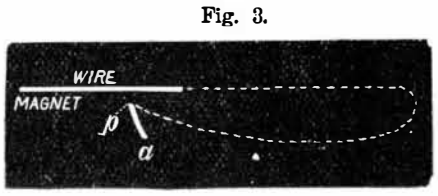
Thirdly, it is not indifferent to the earth.

Fourthly, it is practically incapable of transmission through any considerable length of uninsulated wire.

Fifthly, it is practically incapable of transmission through a city by means of gas or water pipes.*

The fact that a spark is obtained when the wire is turned back upon itself proves nothing beyond the general law that electricity prefers the shortest circuit.

Fig. 3.



This will be understood from the above engraving (Fig. 3), in which the wire coming from the magnet is shown turned back upon itself at *p*. Being static, dynamic, or magneto-dynamic, the current would naturally cross the space by the metal or person, *a*, from the point, *p*, to the wire instead of traversing the larger circuit of the dotted loop. This may be tested by any person having a good induction coil, when, if rightly connected, he will observe a spark pass from the point, *p*, to the wire, or *vice versâ*, although there is a good metallic connection by the dotted loop. In this respect, clearly nothing whatever has been shown.

The seeming lack, in the "etheric" force, of physiological effects, is really of no more moment than the seeming lack of physiological effects when a person, upon holding a finger in proximity to one of the ends of the secondary wire of a low induction coil, witnesses the passage of sparks without experiencing physical sensations. I have often stood with a constant stream of sparks passing between my hand and a piece of metal and an electrode, the whole passing through my person, without the least physical knowledge of the fact.

Permit me to conclude with the following statement and propositions:

When I first saw in the press the accounts of Mr. Edison's experiments, two questions naturally arose:

Will an inventor, really believing that he has discovered something of value, give the public the advantage of his researches until such time as he shall have secured himself by letters patent?

Does Mr. Edison declare, over his signature, that he considers the "etheric" force to be of any value?

New York city. W. E. SAWYER.

* There is no adequate evidence, as yet, that the force has ever in any degee been so transmitted.

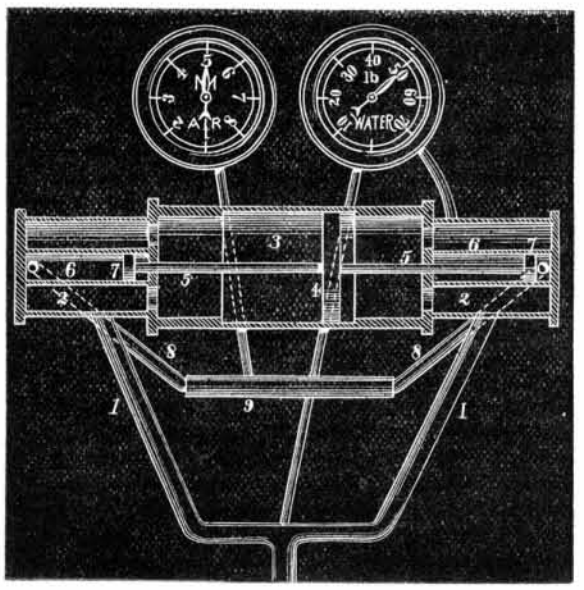
The Hydro-Pneumatic Puzzle.

To the Editor of the Scientific American:

In No. 23 of your last volume, I find an article headed "Keely out-Keelied, or the Hydro-Pneumatic Puzzle," with a challenge to your readers to solve the mystery. I offer, therefore, the following as a possible solution:

In the accompanying drawing I have confined myself to the solution of the problem, and I have left out several parts which appear on the original engraving, as I desire to show only the arrangement necessary to create the necessary pressure to act on the gage.

It seems that some parts of the original were put in by the maker to complicate the problem.



No. 1 is a water supply pipe. 2, a fore chamber to 3, the cylinder (of 20 square inches cross section); 4, piston; 5, piston rod, with 7, a small piston (1 inch cross section) connected to it. No. 6 is an air cylinder; 8, air pipe; 9, prolongation of air pipe, or if necessary, a cylinder for converting the power produced into motion.

This arrangement might be called a hydro-pneumatic lever, as it is but a translation of power, and so, I believe, is the "Hydro-Pneumatic Puzzle."

If a stream of water of 50 lbs. pressure is let into pipe No. 1, the full pressure, bearing on the piston, the piston rod, and the small 1 inch piston in the air cylinder, 6, would be 50 × 20 = 1,000 lbs.; and (allowing for the elasticity of air) that amount, more or less, will be indicated, through the connecting pipes.

I have left out the waste exhaust pipes, and the valves, as they are unnecessary to explain my idea.

Syracuse, N. Y. CHARLES KRONMEYER.

Through the Hoosac Tunnel.

To the Editor of the Scientific American:

A late train landed myself and a friend about dusk, at North Adams, a few days since, for a brief pastime in the region of the great tunnel.

The village of North Adams is situated, apparently, at the extreme northerly angle of a vast recess or niche in the Hoosac mountain, through the easterly side of which the tunnel runs. There are now two trains daily through the tunnel, one at 6 A. M. from the west and one at 6.30 P. M. from the east. We had resolved to foot it through the tunnel, following the six o'clock train, provided we found it safe to do so, knowing that the work of blasting and arching was still going on inside. After an early breakfast next morning, we proceeded directly up the track towards the mouth of the tunnel, inquiring, of the first man we met, whether it was customary for visitors to walk through the tunnel? He said that parties of a dozen or more sometimes went through, but that it was not exactly safe for one or two, as there were some hard customers at work in there. Surely there was a scare for us, of a quite different nature from what we had anticipated. Instead of nitroglycerin, falling rocks, midnight darkness, perennial showers, it was highway robbery; but thinking the scare might have been intended for our personal benefit, and not being very richly endowed with gold watches and greenbacks, we did not turn back, but bent our steps towards a primitive grocery store on the bluff ahe, da