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(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Advice to young physicians', 'Arsenic, effect of on the body', 'Astronomical notes', etc., with corresponding page numbers.

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 166.

For the Week ending March 8, 1879.

Price 10 cents. For sale by all newsdealers.

Detailed table of contents for the supplement, categorized into sections like 'ENGINEERING AND MECHANICS', 'ARCHITECTURE', 'TECHNOLOGY', 'ELECTRICITY', 'MEDICINE AND HYGIENE', 'AGRICULTURE', and 'MISCELLANEOUS'.

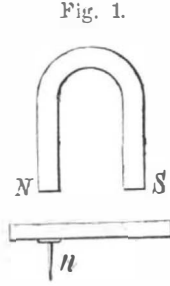
GARY'S MOTOR.

He who credits the statements concerning Gary's motor, contained in an article in the March number of Harper's Magazine, can readily believe in the wonders of that division of China where the rivers run up the mountains, the moon outshines the sun, and the cats have the power of elephants.

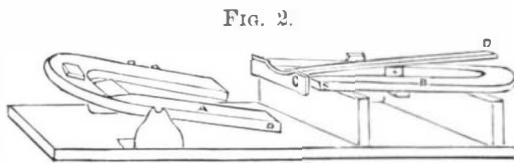
It would be difficult to find such utter ignorance of the first principles of science as is contained in this article on Gary's motor; it encourages men to spend time and money in fruitless effort, and at the same time to despise all training.

Mr. Gary's discovery of the neutral line is not a discovery. There is no neutral line in the sense that the polarity changes when Mr. Gary moves his piece of sheet iron with its attached shingle nail across the pole or near the pole of a magnet.

Hold a horseshoe magnet in a vertical position, and move a piece of sheet iron with an attached nail to and from the poles of the magnet. It will be found that there is no neutral line where the nail drops off.



In Fig. 2 the magnets are set in motion by vibrating, with the aid of a lever, a piece of sheet iron, so that it may "move



on the neutral line," as the writer in Harper expresses it. This acts as a cut-off, and one of the two opposing horseshoe magnets drops from its former position, where it was held by mutual attraction.

these well known facts; for it may be said, "Explain the neutral line as you may, there is still an important application of the force of magnetism in the invention of Mr. Gary." It is said that this little motor requires a careful adjustment of the fine pivots upon which the movable magnet turns, and particles of dust are sufficient to bring it to rest.

This is the old, old fallacy; and is always stated in this way: "A small magnetic motor will run and produce a comparatively great result, a large one will necessarily give a corresponding increase of power." This is not true; there is a limit beyond which one cannot pass.

SENATE PATENT BILL NO. 300.—SHALL IT PASS THE HOUSE OF REPRESENTATIVES?

The term of the present Congress is rapidly drawing to a close, and little time is left for the friends of industrial progress and the rights of inventors to express their disapprobation of the obnoxious clauses of the new Patent Bill (Senate Bill 300).

We are informed, by parties whose knowledge and integrity cannot be questioned, that the concerted plan of the promoters of the bill is to allow no further discussion of it, but to await a favorable moment for their scheme, and rush it through during the last days of the session in the hurry and excitement preceding adjournment—a period noted for hasty and ill-considered legislation.

We are confident that, were time enough allowed for all the members to become thoroughly informed in regard to the mischievous tendency of several of its provisions, the bill would be overwhelmingly defeated; but there would seem to be no time for that now.

But it is not too late, we trust, for an effective expression of popular disfavor—by telegraph. Disregarding the slow formalities of memorials and like communications by mail, all who regard the inventor as more worthy of encouragement and protection than the infringer, should promptly avail themselves of the means which invention has provided for such emergencies, and telegraph their disapproval of Senate Bill 300.

Hitherto the inventor has enjoyed, so far as the courts could secure it, the exclusive control of his invention which the Constitution guarantees. His patent has been regarded in the courts as presumptive evidence that his claim to the invention covered was a just claim. Under the proposed amendments of the law, all this will be reversed. The patentee's right will be burdened by needless penalties in the shape of heavy fees, and laid open to invasion by any one who chooses to infringe it. And when his case is brought into court the inventor, not the infringer, will be treated as the culprit.

Every inventor feels that the bill is aimed against him; and should it become a law, we fear that there will result a disastrous fulfillment of the prediction of a hard-working and hitherto successful inventor, who says:

"One thing I have decided upon. If the law is changed, so as to lessen my rights as an inventor, I am through, I quit the field, and thousands of others will be compelled to do the same."

The country cannot afford to have such men quit the field. Policy, as well as justice, forbids any measure tending to compel them to quit the field; and the members of the lower house should not be left to enact the proposed wrong unwarmed.

Let every citizen, who has the great question of justice and wise policy at heart, use the telegraph freely, and encourage his friends to do likewise. The cost will not be great, while the good that may be done in preventing hasty or underhanded action may be enormous.

In case our suggestion arrives too late, or the telegraphed advice fails to stay the passage of the bill, then by the same means the popular will might be brought to bear directly and successfully upon the President. In either case use the telegraph.

THE SAWYER-MAN ELECTRIC LIGHT.

It will be remembered that in our issue of December 7th, 1878, we gave illustrations of this novel and promising form of electrical apparatus. Since that date the inventors have been busy with endeavors to perfect the invention, and on the evening of February 20 a public exhibition of the light was given in this city by the Dynamo-Electric Light Co. Several improvements in details of construction have been made, but no radical changes. The chief improvement is in the bearing of the upper carbon holder, to allow for expansion; the lamp has also been made slightly taller. The light exhibited was soft, pure, and steady, and susceptible of perfect regulation. Any lamp in the circuit could be turned up or down, from a dull glow to brilliant incandescence without affecting the rest. An important improvement has also been made in the switch.

The dynamo machine used was about half the size of the one previously employed; there were more lights in the circuit, and the illumination was more brilliant and satisfactory. Comparison was made with gas light, and also with the voltaic arc, clearly demonstrating the superiority of light by electric incandescence for ordinary uses. The carbons used in the Sawyer-Man lamp are now proved to be comparatively indestructible. If, however, the lamp should be broken or otherwise injured by accident, it can be as easily and cheaply removed and repaired as an ordinary gas-burner. As regards economy, tests upon a large scale have not yet been feasible. With the power at command the indications are that the production of light by this system will range between one-fifth and one-half the cost of gas.

A NEW FORM OF CARBON.

In describing the Sawyer-Man electric light, last December, mention was made of the peculiar carbons employed, the manner of their production being a secret which Mr. Sawyer did not choose at that time to disclose.

We have now been favored with an exhibition of the process, and a very pretty experiment it makes. The carbons in question are about half an inch long, with the diameter of one-sixteenth of an inch. Their color is steel-gray, and the surface is hard as steel; within the carbon is tolerably soft.

In his earlier experiments Mr. Sawyer employed as the source of incandescence slender pencils of gas retort carbon in an atmosphere of illuminating gas. The carbons were slowly destroyed, but at the same time they took on a superficial deposit, evidently of carbon, but unlike in luster and hardness any carbon that Mr. Sawyer had seen. Inferring that a more rapid deposit would be made in a denser hydrocarbon, Mr. Sawyer experimented with a great variety of such liquids, finding olive oil most satisfactory. His method is simply to heat the carbon to an extremely high temperature, by passing through it an electric current, while it is immersed in the oil. The best results are obtained by the use of a pencil of willow charcoal, upon which an intensely hard deposit of carbon rapidly forms as the hydrocarbon is decomposed by the heated pencil.

Life Saving Mattresses.

The Navy Department has been experimenting with a mattress designed for use on vessels at sea, with results said to be favorable. The mattress is filled with cotton, but the process of preparation to which the cotton has been subjected makes it impervious to water for many hours, and renders it capable of sustaining a heavy weight—that of a man without any difficulty. It possesses other properties which, it is claimed, make it a most comfortable bed; the cotton being free from all oils and impurities, not liable to knot or pack, and proof against vermin of every kind.

THE GARY MAGNETIC-MOTOR DECEPTION.

In the latter part of November last the *New York Times* printed a column letter from Boston describing, as a fact accomplished, a magnetic motor which was to supersede steam; a contrivance which produced motion "by no external agency, simply from the magnetic power of the machine." It was a great discovery, sure to revolutionize the world. There was a lot of talk about polarity, magnetism, "the neutral line," and the usual story of humble genius upsetting all the established laws of science. The inventor had not been a student; knew nothing of philosophy from the books; "had I studied or read books," he said, "I should never have experimented, as the books told that what I was after was an impossibility, that there was no such thing;" but he kept on—and got it!

The world is too full of perpetual motion mongers to justify the *SCIENTIFIC AMERICAN* in noticing them until they become obtrusive. Toward the middle of December, the *Times* gave another lift to the deception. This time the Gary Magnetic-Motor was about to startle the world by producing the electric light out of—nothing. In the words of the writer: "By the simplest of devices, which he exhibited to me to-day, Mr. Gary utilizes his own newly discovered principle in such a way as to generate electricity for the light at absolutely no expense beyond the cost of the machine, which itself is automatic." After listening to a pretended description of the working of the machine, the *Times* writer remarked to Mr. Gary: "Your new invention, then, is simply a practical application of the principle, which you have discovered, of the existence of the neutral line, at the point of the magnetic field where the polarity changes, and which is antagonistic to the heretofore universally accepted theory that magnetism is a static force?"

"Precisely," was the reply. "It is only on this principle that the thing is possible."

In its March issue, *Harper's Monthly Magazine* comes to the aid of the *Times*, by printing without comment, as a regular article, a long and cleverly written account of "Gary's Magnetic Motor," with several illustrations, which will be found on another page in this issue of the *SCIENTIFIC AMERICAN*.

We may be mistaken, but the internal evidence is extremely strong that the same hand that wrote the first (possibly also the second) *Times* article, also wrote the account in *Harper's*. It was shrewdly done; and the manifest attempt to insinuate more than his words really implied, in regard to the quasi-indorsement of the machine by scientific men, raises the suspicion that the writer may not have been so thoroughly deluded as he seems. Be that as it may, THE *SCIENTIFIC AMERICAN* is in position to say that the assertions in regard to the exhibition of the Gary motor in motion by self-generated force are not true; that the assertion that "professors from Harvard and from the Massachusetts Institute of Technology called, examined, and were impressed" is not true; that apparatus constructed according to the drawings in *Harper's* will not do what the writer says they will do; in short, that the pretended motor is a deception, to be classed with the Keeley motor and like contrivances.

It is very much to be regretted that the editors of periodicals so worthy of esteem as the *New York Times* and *Harper's Magazine* should give place to such assertions, unsupported by the most positive, competent, and conclusive evidence.

The world is full of snares for capitalists, always prompt to snatch at delusive promises of sudden profit; and the fact that the pretensions of the Gary motor have been accepted without a question by a magazine like *Harper's* may be the means of inducing many to put money into projects that are sure to result in disappointment and loss.

THE PRESERVATION OF FORESTS.

In an article with the above title in the *North American Review*, Felix L. Oswald, after reviewing the disastrous effects which have followed the wholesale destruction of forests in various countries of the world, remarks that since the year 1835 the forest area of the western hemisphere has decreased at the average yearly rate of 7,600,000 acres, or about 11,400 square miles; in the United States alone this rate has advanced from 1,600 square miles in 1835 to 7,000 in 1855, and 8,400 in 1876. Between 1750 and 1835 the total aggregate of forests felled in South and Central America (especially in Southeastern Mexico), and in the Eastern, South-eastern, and Southwestern States of our republic, may be estimated at from 45,000,000 to 50,000,000 acres. In other words, we have been wasting the moisture supply of the American soil at the average ratio of seven per cent for each quarter of a century during the last one hundred and twenty-five years, and are now fast approaching the limit beyond which any further decrease will affect the climatic phenomena of the entire continent.

If we consider how the agricultural products of the eastern continents become from year to year more inadequate to the wants of their still growing population, we may foresee the time when the hope of the world will depend on the productiveness of the American soil; but that productiveness depends on the fertilizing influence of the American forests. If they are gone we shall have on earth no newer world to hope for—no future Columbus can alleviate the struggle for existence. To stay such a catastrophe the author suggests that in every township, where the disappearance of arboreal vegetation begins to affect the perennial springs and water courses or the fertility of the fields, a space of say 50 acres should be appropriated for a "township grove," an oasis to

be consecrated for ever to shade trees, birds' nests, picnics, and playing children. In all new settlements, where a remnant of the primeval forests has survived, let the woods on the upper ridges or on the summit of isolated hills be spared by mutual agreement of the proprietors. In the treeless regions of the great West not only amateur societies, but every grange and farmers' union of every county, should devote themselves to the work of tree culture; and every landed proprietor should see to it that the boundaries of his estates be set with shade trees, and that wooden fences be supplanted by quickset hedges. Let fruit trees be planted wherever there is a piece of ground neither otherwise occupied nor absolutely barren; and be sure that their influence on the atmosphere in summer and their fertilizing leaves in fall will more than indemnify the adjoining fields for the modicum of sunlight they may intercept. Any State where these precautions should be generally adopted, would soon be so unmistakably distinguished by the unfailling humidity and freshness of its fields and the abundance of its crops, that the sheer necessity of competition would induce backward neighbors to try the same experiment; and before long the maxim would not only be generally recognized, but generally acted upon, that husbandry and tree culture are inseparable.

THE TROUBLE WITH WIRE BINDERS.

So far as their utility at harvest time is concerned the self-binding machines cover one of the greatest improvements of the time. Their immediate money advantage is estimated as high as 20 cents on each bushel of wheat grown. The presence of bits of wire in the wheat when it reaches the mill is, however, a serious offset to the gain by automatic binding. The wire injures the stones, is liable to strike fire and explode the mill, cuts the bolting cloths, and is otherwise so mischievous that many millers have protested against wire bindings, and threaten to retaliate with special charges for grinding wire bound wheat.

It has been the practice of farmers to run wire and all through the thrashing machines. So long as the wire is bright and tough no harm is done; but if the wire is rusted and brittle, fragments remain with the grain, and serious trouble may result.

The conditions seem to call for a new invention, an attachment to the thrashing machine which shall cut the wire binding and remove it while the straw passes on to the thrasher. The work of removing the wire would seem to be nowhere near so difficult as the original task of putting it on the sheaf. If rusted wire cannot be entirely removed before thrashing, it would seem to be quite feasible to separate the bits of iron that remain in the wheat by a train of magnets in the cleaner. In either case we are sure that our inventors can overcome the difficulty by some cheaper means than the abandonment of automatic binders.

THE WASTE OF FIRE.

During the past year, without the occurrence of any remarkable fires, it has cost the United States about \$200,000 a day to furnish employment to our town and city fire departments. What the fire departments cost we do not know; it is a good round sum at the least calculation. Architects say that 10 or 15 per cent of the cost of any building, properly expended, will make it practically fireproof. Our daily fire losses would therefore fireproof from \$1,000,000 to \$2,000,000 worth of new structures a day, or upwards of \$300,000,000 worth a year. At this rate it would not take many years to reduce the daily fire losses to comparative insignificance.

It might not be a bad thing to forbid in towns and cities the erection of houses upon which less than 5 per cent of the total cost should be devoted to approved plans for preventing the spread of fire. In view also of the increased indifference to fire risks incident to fire insurance, it might be good policy to require that, for every dollar spent for insurance, a proportional sum should be expended upon means for preventing fires, or upon appliances for securing the prompt extinction of such as might be started. If preventive measures were thus made imperative for a decade or so, the country would soon be able to save a considerable portion of the \$100,000,000 a year now directly or indirectly sacrificed to the "fire fiend"—an item certainly worth taking account of.

Neptune Favors Eads.

The opponents of Capt. Eads' jetty system at the mouth of the Mississippi used to threaten all sorts of disaster to that work by storms. There are indications now that storms may in reality act as an efficient co-operator and ally to Eads. During the severe storms of January a ridge of sand was raised some feet above high water mark, and half a mile long, across the jetties at an angle of 45°, about 100 yards back of the wing dams. Though broken in two by the jetties the ridge continues throughout of the same height and thickness. Captain Brown, who has charge of the works at Eadsport, says if the ridge remains as at present the triangles formed by it on either side of the jetties—the one being acute and the other obtuse—will eventually fill up with sand, and thus the jetties be greatly strengthened.

A correspondent, writing from Guilford, Conn., protests against the classification of the oriole among mischievous birds. He says that he has frequently seen them tear open the nests of apple worms and devour them, and thinks that birds with pluck enough to destroy such disagreeable pests ought to be fostered rather than destroyed.