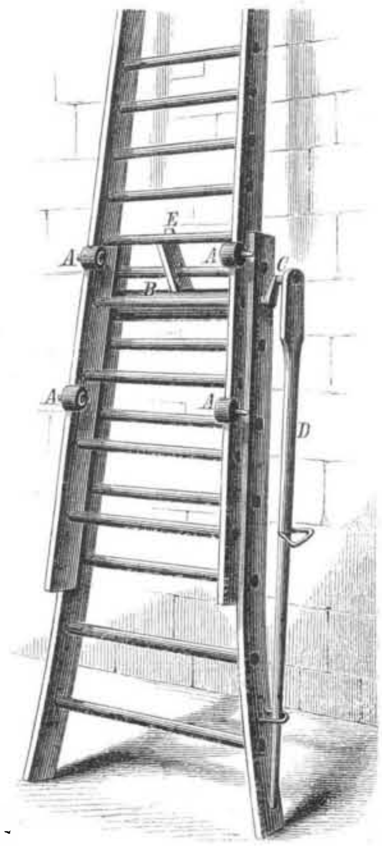
MILLENER'S EXTENSION LADDER.

The object sought in the construction of this improvement is to provide a ladder that can be used by firemen instead of two ladders hooked together. It is, so to speak, one ladder, although made in two sections, and is, it is claimed, fully as strong as an ordinary ladder of equal length. As it is capable of being made both light and strong, it will, it is claimed, be equally adapted to farmers' and mechanics' use.



In the engraving, A represents friction rollers attached to the stationary part by bolt irons. B is a roller placed between the two pairs of friction rollers, the movable part of the ladder working up or down between them, and the sides of this part being in contact with all the rollers and sliding between the side pieces of the stationary part.

The roller, B, is turned by the crank, C, either directly or by means of a rod or pitman, D, by the use of which the roller may be turned and the ladder extended by a person standing upon the ground, so that a person standing on the movable part may be raised or lowered, to the hight required, by those below. A self-acting brace, E, holds the parts extended in any required position.

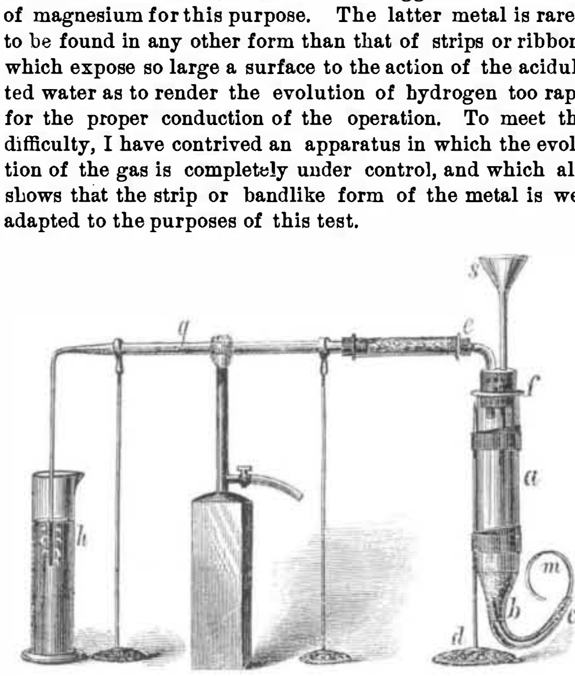
The friction roller bolts are fastened through the sides of the stationary part by screw nuts, so that there may be more or less friction on the movable part.

The invention was patented, through the Scientific American Patent Agency, Feb. 20, 1872, by Mr. Louis N. Millener, of Adams Basin, N. Y.

MAGNESIUM IN MARSH'S TEST FOR ARSENIC.

BY JOHN C. DRAPER, PROFESSOR OF CHEMISTRY, UNIVERSITY MEDICAL COLLEGE, NEW YORK.

The difficulty experienced in obtaining zinc free from arsenic, for Marsh's test, has led to the suggestion of the use of magnesium for this purpose. The latter metal is rarely to be found in any other form than that of strips or ribbons, which expose so large a surface to the action of the acidulated water as to render the evolution of hydrogen too rapid for the proper conduction of the operation. To meet this difficulty, I have contrived an apparatus in which the evolution of the gas is completely under control, and which also shows that the strip or bandlike form of the metal is well adapted to the purposes of this test.



The instrument in question consists of a stout tube, *a*, about one inch in diameter, open at both ends and six inches long, drawn down at *b c* to a caliber which will permit the free passage of an ordinary magnesium ribbon, *m*. The tube is attached by rubber bands to a paper file, *d*, with a stout iron foot or base which serves the purpose of a support admirably. At *f*, the supply tube, *s*, for the introduction of acid and other liquids, and the escape tube, *e*, pass air tight through a cork. The evolved gas is dried in a chloride of calcium tube at *e*, whence it passes through the hard glass tube, *g*, in which it may be subjected to the action of heat and finally escape through a dilute solution of nitrate of silver at *h*

When the instrument is to be used, it is dried and a column of pure mercury poured into the bend, *b c*. The cork carrying the tubes, *e* and *s*, is put in position and the reduction tube, *g*, properly supported. Pure dilute sulphuric acid (one of acid to six of water) is then introduced through the supply tube, *s*, and a strip of magnesium, *m*, being passed through the mercury into the acid, decomposition instantly takes place and hydrogen is evolved. The rate at which this goes on is indicated by the passage of the bubbles through the solution of nitrate of silver at *h*, and is completely controlled by the rate at which the magnesium is passed through the mercury.

The apparatus having been filled with hydrogen, a Bunsen flame is applied to the hard glass tube at *g*, and a measured length of the magnesium band slowly passed into the acid. The purity of the materials is thus tested as in the case of the ordinary Marsh apparatus, with the great advantage that the length of the strip consumed is known; and the quantity used in the test for purity of materials may be proportioned to that employed in the final examination. Freedom of the materials from arsenic and antimony being thus established, by the failure to produce any metallic stain in the reduction tube *g*, the solution supposed to contain arsenic is introduced through the supply tube, *s*, and the magnesium leisurely passed into the mixture. A few moments are required to expel the pure hydrogen from the apparatus, but the newly evolved gas finally reaching the heated portion of the reduction tube, metallic arsenic is deposited in its characteristic form and manner, and any portions of the arsenide of hydrogen that are not acted on by the heat pass into the solution of nitrate of silver at *h* and produce a dark brown precipitate.

The contact of the magnesium and the mercury with the acid causes the formation of an alloy or amalgam of the two metals, which, since it does not interfere with the detection of very minute traces of arsenic, is not of any moment and may therefore be ignored.

Correspondence.

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

Observed Changes in a Solar Prominence.

To the Editor of the Scientific American:

While observing the sun on the sixteenth of February, I saw a prominence which, in the many changes it underwent, will illustrate the formation of the hydrogen clouds often seen floating above the sun. This prominence was situated on the western limb of the sun, five degrees north of west, and was first seen at 11:20 A. M. At this time, it presented the appearance of two prominences, which had shot up independently, and finally joined themselves together by the interlacing of the filaments of which their summits were composed. Its greatest hight was 40,500 miles; its breadth equaled about two thirds the length of the slit of the spectroscope, or about 108,000 miles. The two stems of the prominence joined each other about 13,500 miles above the chromosphere. The size and form of the prominence were not remarkable, but the changes which it subsequently underwent were various. The accompanying engraving represents the prominence as first seen.

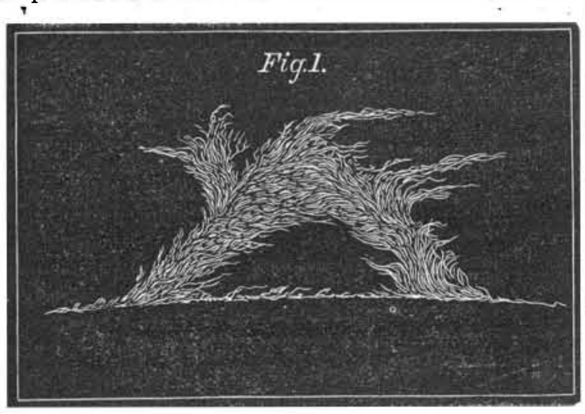


Fig. 1.

At 11:40, signs of separation began to appear where, a few moments before, all seemed a compact cloud mass; and at 11:50 the two stems were only joined by thin thread-like branches. The northern stem had begun to separate itself from the chromosphere, and was only held here and there by straggling filaments; in a moment it cut itself entirely loose from the sun at its base, but was not as yet free from the

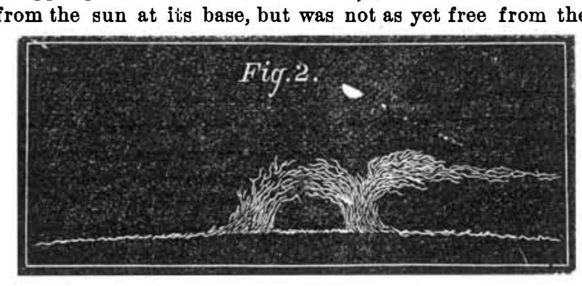


Fig. 2.

other stem. At 2:20 P. M., when again seen, great changes had taken place; the top of the northern stem had been blown towards the pole, and strikingly resembled the long streamers of smoke often seen issuing from the smokestack of a steamer at sea. The length of this streamer was nearly

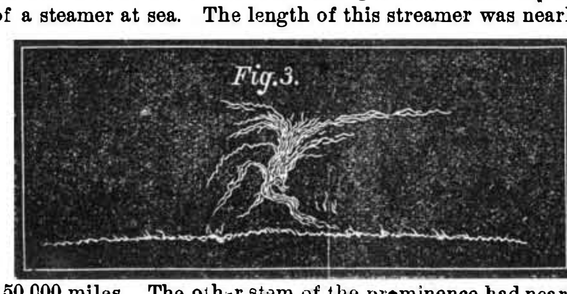


Fig. 3.

150,000 miles. The other stem of the prominence had nearly faded out, leaving only a low stump slightly joined to the northern stem, which had sunk back again to the chromosphere. Increasing cloudiness rendered further observation impossible. The morning of the next day being clear, I again turned my attention to the spot, not expecting to find any traces of the prominence; but in this I was happily disappointed, for the northern stem still remained, torn, shattered, and bound to the chromosphere by one thin thread. Faint traces were left of its former attachments in the form of light thin shreds. The hight had not visibly increased; the breadth had, however, somewhat lessened. It was now 9:20 A. M., and the changes which occurred in its form were too rapid to sketch. Here and there a thread of cloud was seen to form, and as quickly disappear.

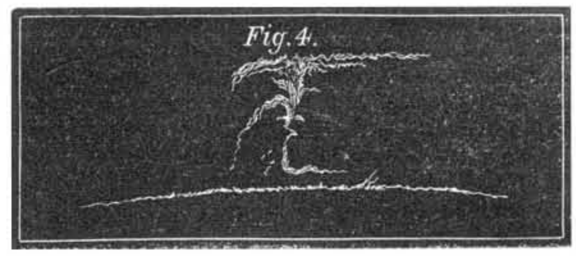


Fig. 4.

At 10:30 A. M., it announced its determination of leaving the chromosphere for good and all by a gradual twisting off of the only thread which held it captive to the sun. This it accomplished about 12 M.; I watched it for some time, until its increasing faintness rendered it a difficult object to make out.

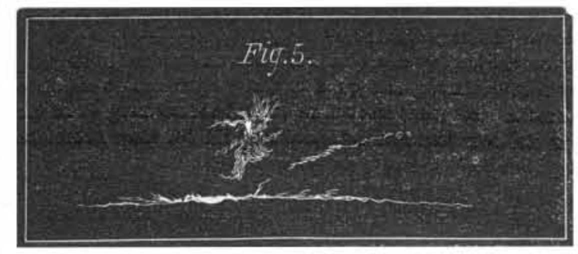


Fig. 5.

This prominence was seen through the C hydrogen line in the telespectroscope used by Professor Young in the Dartmouth College Observatory. The prism train consists of five whole prisms and two half prisms, the light being sent twice through the train by a prism of total reflection at the end of the train, thus making the dispersive power equal to that of 12 prisms. The cloud prominences are often seen floating above the chromosphere, but generally have their origin in the chromosphere, and are the result of the ejection of matter therefrom. Father Secchi states that he has observed the formation of these clouds in the coronal atmosphere. I have many times observed these clouds, but have, without exception, been unable to discover any increase in their size; but, on the contrary, I have met with a gradual fading out and an ultimate disappearance of the cloud mass. This fact, as has already been suggested, may point to one of the sources from which the coronal atmosphere may draw its supplies of the matter whose spectrum of bright lines was first seen in 1869 and 1870, and which the observations made during the last solar eclipse so fully confirm. JOHN H. LEACH.

Dartmouth College.

The Abolition of Models.

To the Editor of the Scientific American:

Your correspondent "B" objects to the proposal of dispensing with the models on account of their supposed superiority for investigating as to the novelty of inventions. I fully acknowledge their usefulness, but contend that the drawings are much better for this purpose in most cases, especially as the models are very far from being complete, and thousands of them are so broken up that it is impossible to tell what particular patents they belong to; and in many instances it would puzzle an expert to state what class of machinery these fragmentary models are intended to represent. Of these broken and separate pieces of models, there are cartloads stowed away up in the room over the portico, which not one person in twenty frequenting the Patent Office for the purpose of examination knows anything about, to say nothing of those fragments which lie in their appropriate cases, as mentioned in my last letter.

Besides this trouble of broken models, there is another reason, that makes the drawings more reliable, which arises from the fact that the models frequently show only the bare outline of the frame or casing of the machine—the details of construction and the smaller parts, in which may consist the essence of the invention as patented, being entirely omitted and only shown in the drawing and specification. In many cases the drawing shows several modifications of the idea embodied in the model, some of them so radically different that no one would suspect that they had any relation to it, except that they belonged to the same class of machinery. I remember an instance of an excavator patent, having only a very simple model, of which the drawings show seventy-five figures, embracing twenty-six different machines for various purposes. How much could our friend "B." tell about the novelty of an invention from an inspection of that model?

That drawings are the readiest means of making an examination is shown by the practice of the examiners, who always use them in making searches and very rarely look at the models. Speaking for myself as an inventor who has had considerable experience, I know that an examination of the drawings, in nine cases out of ten, can be made in less than half the time necessary for viewing the models. That this is so is rather amusingly shown by the experience of one of our ex-commissioners, who, when in office, issued a very stringent order that no one should be allowed access to the portfolios of drawings without a special permit, which was only to be granted for infringement searches, etc. After this gentleman resigned his position, and had resumed his prac-