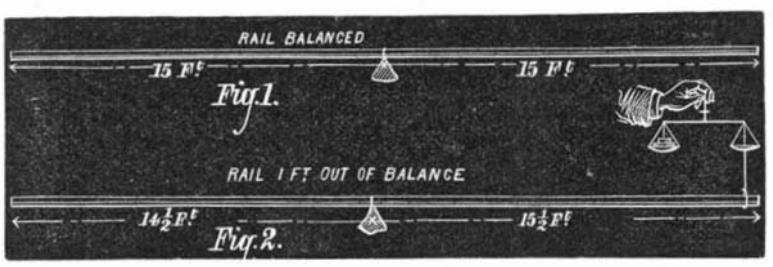
for many years British Honduras has depended wholly upon us for its breadstuffs and provisions, and of late years for most of the articles classed as "groceries." American boots and shoes, kerosene oil, axes, carpenters' tools, shovels, spades, hoes, etc., are much dealt in. The largest article, however, in which there may be an extension of commerce is cotton cloth, which the Consul thinks could be much more largely sold if the pieces were put up in eighteen, twenty-four, and thirty-six yard pieces, and folded in even yards, in the English fashion, as they would be much more convenient for the retailers, who under the present arrangement prefer English goods.

Mr. Osborn, our Minister at Buenos Ayres, writes that the chief obstacle to enlarging our commerce with the Argentine Confederation lies in the absence of direct steam communication between the United States and the ports of the river Platte. No steamers run between the two countries, except an occasional vessel from Buenos Ayres to New York under the British flag, which returns to Buenos Ayres by way of Europe. There are, on the contrary, eleven steamer lines keeping up direct and rapid communication with Europe, of which five are British, four French, two German, and one Italian. As the result of these reliable means of communication the merchants and manufacturers of Europe get nearly all the trade.

THE RAIL PUZZLE.

We have received so large a number of answers to the "practical puzzle" relative to weighing a railroad rail, which we recently published, that we cannot find space even for the initials of the respondents. The problem was as follows:

A civil engineer working on a railroad in Illinois recently had occasion to weigh one of the iron rails. The rail was 30 feet long, and was supposed to weigh about 400 pounds. His only means of weighing was a pair of balance scales capable of weighing only 25 pounds. Query: How can he weigh the rail correctly with such scales?



THE RAIL PUZZLE.

Our correspondents' letters exhibit various methods by which it is proposed to solve the question, but the number of erroneous answers is remarkable. Out of nearly a hundred replies now on our desk, not half a dozen are exactly correct. Some writers neglect the conditions of the problem, and propose to weigh the rail bodily with apparatus made out of planks, or with divisible counter weights, which are manifestly excluded. Those who propose to weigh the preponderance of an unequally balanced rail, either fail to say where the scales are to be attached, an important matter where leverage is considered, or else apply the same wrongly. A large number assert that when a rail that is balanced on its center is moved 1 foot in either direction, the preponderance will be but 1 foot, whereas it is of course 2 feet. Many evidently have the right idea, but express themselves so obscurely as to leave us in the dark as to their exact meaning. Others prefer to view the simple question as a grave mathematical problem, and send us elaborate formulæ, which, while doubtless correct enough, seem ingeniously contrived to befog the whole subject.

Our readers will excuse our failing to make individual reference to their letters, and at the same time permit us to close the discussion with the publication of two correct methods—one by the correspondent who sent us the problem, the other by an old and valued contributor to these columns.

J. T. C.'s answer: The engineer first accurately measured the length of the rail, found it to be precisely 30 feet, and then by measurement found the middle, which he marked. He next laid the iron rail across the sharp edge of an oak fence rail, so that the middle mark rested exactly on the sharp edge. He found that the iron rail exactly balanced on the edge of the fence rail. See Fig. 1. This proved that the iron rail was of equal thickness and weight throughout its entire length. He then moved the iron rail 6 inches, say to the right, of the middle, so that from the edge of the fence rail to the left end of the iron rail would be 14⅛ feet, and to the right end 15⅛ feet. Then at 6 inches from the end of the long section of the iron rail, he tied around it a small strong cord. To this cord he attached the balance scales. See Fig. 2. This gave the exact weight of one foot in length of the rail, to wit, 13⅜ pounds, or 40 pounds to the yard in length, which it was contracted to weigh.

F. G. W.'s answer: Place the rail at right angles and horizontally across a delicate support, say the sharp corner of another rail, so that the long end shall weigh just 20 pounds, or some other definite weight within the range of the scales; then divide the whole length of the rail by the difference in the length of the two sections; then multiply the quotient by this weight; the product will be the weight of the rail.

PATENT OFFICE MODELS.

We have before us an argument in favor of the abolition or modification of the patent office model system, prepared by Mr. H. Howson, of Philadelphia, to support a petition in that behalf, which has been signed and forwarded to Congress by numerous patentees and others interested in patents. Mr. Howson is himself a patent solicitor of long experience. That he has carefully studied the question he discusses is evident from the exceedingly able and exhaustive manner in which he marshals his statements, with which probably a majority of our readers will fully concur.

The principal points of Mr. Howson's argument—to which we shall have further reference hereafter—are summed up in the following ten sentences:

First. That it has hitherto been the practice of the Commissioner of Patents, under the law, to demand a model with every application for a patent in which the character of the invention admits of one.

Second. That the making of these models is a serious tax on inventors, involves the premature exposure of inventions, and needless delay in making up applications for patents, and detracts from the revenue of the Patent Office, because the demand for models frequently deters inventors from making applications.

Third. That models are not as a rule necessary for attorneys in preparing applications for patents, or for Examiners of the Patent Office in the performance of their duties.

Fourth. That with rare exceptions complete well executed drawings afford more ready means of determining the character of an invention, and should be, in any case admitting of them, sufficient for the interpretation of the specifications forming part of the patent.

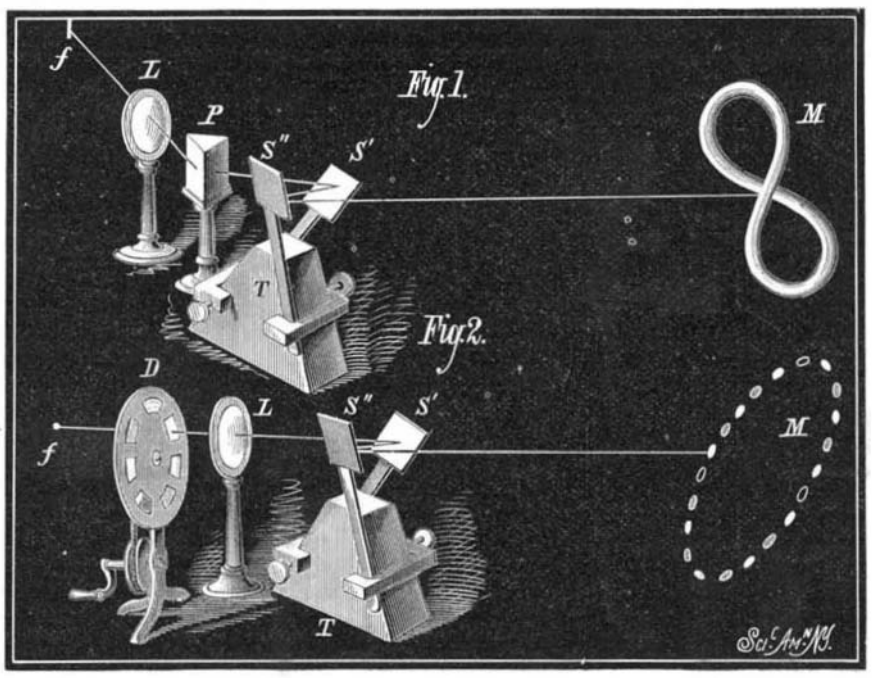
Fifth. That owing to the furnishing of models, there is a tendency in the Patent Office to admit drawings which are wanting in fullness and perspicuity, and which would not be admitted in the absence of models, an evil resulting in the delivery of patents which cannot be easily understood without the aid of models.

Sixth. That the models deposited in the Patent Office occupy a large amount of space which could be devoted to much more useful purposes.

Seventh. That the increase of models must eventually involve the necessity of either disposing of many of them to make room for the rest, or of finding room for the rapidly growing collection in places outside of the Patent Office.

Eighth. That the models deposited in the Patent Office are rarely working models, but generally fragmentary, and in many cases distorted representations of the machines they are intended to represent, and are consequently unfit for an industrial museum.

Ninth. That an industrial museum worthy of the name can be best established by permitting patentees and manufacturers to deposit at their option and at their own cost properly proportioned and working models of patented machines which have proved to be successful in practice.



PROFESSOR RICCO'S NEW OPTICAL EXPERIMENTS.

Tenth. That ample provision should be afforded to inventors and the public for the examination of drawings of patented inventions.

[For the Scientific American.]

TWO BEAUTIFUL OPTICAL EXPERIMENTS.

BY PROFESSOR A. RICCO, OF NAPLES.

A ray of sunlight entering a dark room horizontally through a little vertical slot, *f* (Fig. 1), passes through a converging lens, L, and then through a prism, P, after which it falls upon a little mirror, S', whence it is reflected to a second mirror, S'', which, in turn, throws it upon a white wall, M. The lens and the prism should be so adjusted that a solar spectrum not large but quite brilliant may be obtained upon the wall, M. The two little mirrors are fastened to two vibrating springs inclined 90° to each other, and each 45° from the vertical. These springs are secured to a firm support by means of screw clamps. By changing the position of the clamps, the rate of vibration of the two springs may be varied at will.

If the springs vibrate almost in unison, there will appear on the wall a magnificent ring composed of the colors of the spectrum, which will seem to rotate about its axis and about its diameters, assuming successively the forms of an ellipse, of a circle, and of a right line.

If the springs vibrate as octaves, we shall have upon the wall, or screen, an oscillating variegated figure 8. If the ratio of their vibrations is less simple, we shall obtain a great variety of complex curves resembling the intertwining of variegated ribbons; in a word, the beauty of the well known curves of Lissagous is here enhanced by the splendor of the rainbow colors.

If, instead of using the prism, we substitute a revolving disk, D (Fig. 2), containing little windows made of colored glass, the above curves are broken up into a series of elegant little disks of various colors, resembling necklaces of brightly colored gems intertwining with rapidity.

The same effect is produced by looking through this revolving disk at the colorless curves of Lissagous.

SCIENTIFIC JUGGLERY.

We have often thought that if professional conjurers would substitute for such time honored tricks as making omelettes in hats, and causing cards to appear and disappear, some of the wonder working performances of the electric current, they would succeed much better in mystifying, amusing, and perhaps instructing their audiences.

Mr. Heller, a clever magician now performing in this city, has a neat way of bringing the electric current to his aid where it would hardly be expected. For example, after borrowing a few watches he places them on a plate which he suspends by a bit of string to a little bar between two cords from the ceiling. Suddenly a flash comes from the bar, the string is burned, and plate and watches fall with a crash. The broken plate and ruined watches are restored by shooting them out of a gun, against a framed black square, also suspended by cords from the ceiling, and here again the electric current actuates mechanism which causes the lightning-like disappearance of an interposing screen. The current again works the hammer of a glass bell apparently suspended by a mere thread, but which accurately counts the number of spots on chosen cards. In electro-music Mr. Heller is an adept. He has a dozen or more drums which he heaps up on a kind of barrow in the middle of his stage. Then seating himself at his piano, at some distance away, he plays a lively air, to which the mysterious drums at first beat time, and then play a deafening accompaniment. Of course, concealed hammers operated by electro-magnets are at the bottom of the puzzle. The Heller orchestrion is a much more elaborate contrivance. It is a good sized parlor organ, provided with a supplemental keyboard, and surmounted with a bewildering mass of brass tubes and apparatus. An air played by the performer is suddenly accompanied by a chime of large bells at the further end of the hall, then by small bells near by, then another organ near the ceiling issues notes like a flute, a chorus of sleigh bells in still another part of the hall joins in; the music imitates a storm, and a huge iron plate in another quarter rattles itself, while from a box near the ceiling issues the sound of falling rain. Finally two sharp explosions from miniature guns near the roof are heard, the lights are turned down, and on the organ appear revolving Geissler tubes, flashing out green and blue light in the weirdest manner, as the curtain shuts the magician and his instrument from view.

He also shows a number of other ingenious illusions, some of which depend upon remarkable automata and many upon electrical action. Upon a simple trapeze suspended from a bar over his stage, he seats a doll dressed as a gymnast. The trapeze is set oscillating, and thereupon for some ten minutes the doll goes through a series of performances, the very variety of which baffles all theories as to how the figure is worked. The hands alone touch the trapeze bar, and the mechanism in the body is necessarily governed through the ropes and cross piece; but it is not so easy to explain how, in concluding, the figure lets go with its hands, throws a somersault, and catches on its toes, continuing the swinging in that position. Another automaton is a peacock, which cries, moves its head, eats, and spreads its tail at the order of the conjurer. Still another is a doll which emerges from a box, seats itself on the edge, goes through many laughable antics, and ends by smoking a pipe, puffing forth the smoke in the most natural manner.

ONE portion of the Gilbert Elevated Railway, between Worth street and 42d street, New York city, 3 miles in length, is to be opened for traffic March 1. The rails are now laid and the stations are in progress.