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ing, and Boat Lowering Apparatus.—Improved Tube Stopper. 1 lilustration.

Nomenclature of Building Stones and of Stone Masonry. A paper read before the American Society of Civil Engineers. By J. JAMES R. CROES, WILLIAME. MERRILL, and EDGAR B. VAN WINKLE. 18 illustrations of Tools. with best dimensions. Squared, Quarry-faced, Pitched-faced, and Prafted Stones. Rubble. Rough and Fine Pointed Stones. Cransfalled, Axed or Pean Hammered and Patent Hammered Stones. Tooth Axed Stones; Bush Hammered; and Rubbed, Diamond Panels. Masonry. Coursed and Uncoursed Rubble; Quarry Pitch; Range; Broken Rauge; Random; and Ashlar. 16 illustrations of Methods of Dressing. An exhaustive practical description.—The Cariboo Quartz Ledges. The Bonanza and Steadman Ledges, British Columbia, with map and account of claims, and the companies engaged. Astonishing Production of Gold. Prospects, Wood, Water, etc. 3 illustrations in all.

34 illustrations in all.

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-- Hon Manure.

1V. CHEMISTRY AND MINER ALOGY.—Liquefaction of the Permanent Gases.—Iodous Acid.—Edible Clay of New Zealand.—Iridescent Glass.—Bollvite and Taznite.—New Red Coloring Matter from Peach Leaves.

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## OPPOSITION TO PATENTS NATURAL.

"Hello, Pat! what are you doing there?" cried the driver excavation for the new Elevated Railway.

grave of a car driver!"

Ever since the march of improvement began every notable since vested interests are no more willing to step down and cultural machines, mill machinery, etc. Sewing machines out than are ancient habits or over-lived individuals, it is are now largely sold there. very natural that there should prevail, especially in circles interested in and dependent upon established conditions, a large increase of our trade with the Netherlands when the more or less pronounced objection to the frequent changes incident to rapid progress in material civilization.

When stage lines, with low fares, were first placed upon our streets the prosperity of many worthy people, whose business had been to furnish other means of transit, received a severe check; and it was not surprising that they petroleum, tobacco, cotton, corn, rosin, turpentine, and should look upon the invading omnibuses as little better than stoves. The imports of Indian corn are rapidly increasing, public nuisances. But the larger part of the community and if the best modes of utilizing it were more fully known were benefited by the change, and the improvement carried it would rise to a very important branch of commerce. Our the day. The parties to the contest changed, but the princi- cottons are now competing successfully with those of Engple did not, when the street car subsequently crowded out land and France. the omnibus.

still more rapid; and to-day the contest goes on between the ware of all kinds, such as tubs, furniture, brooms, doors, interests vested in street car lines and the projectors of steam mouldings, casings, etc. He thinks that if our manufacturers roads. What was but lately an innovation, a movement of were as enterprising in pushing the sale of their goods radical progress, now becomes conservative, and its pro- abroad as they are at home, they could soon secure a practimoters lustily protest that there ought to be some limit to the cal monopoly of much of this class of manufactures. There mania for speed. Progress was good so long as it was their | is a ready and increasing sale for agricultural tools and buildprogress; it ceases to be good the moment it builds up rivals ers' hardware, especially locks and hinges. The market for and curtails their profits, the demands of the public to the American butter and cheese has fallen off, owing to the incontrary notwithstanding.

est possible improvement in the means of transmitting intel- manent feature of trade. ligence. The benefits of the electric telegraph were incalculacelerity. The business of supplying and caring for telegraphic apparatus speedily became very great and remunerainterests vested in the means and methods of transmitting inral acclamation of the community to whose immediate benefit every improvement accrues.

So it ever has been; so it ever must be to the end of time. And the more rapid the progress of any age, the more numerous must be its graves. It is not surprising, therefore, and fertile, there should be a numerous and influential class which feels that after all so much progress may be the reverse of desirable. And since our national patent system the privileges they confer. The moment an inventor ceases staple articles of manufacture. to invent and becomes a manufacturer and merchant, that his actions. They are willing that he should be encouraged be found in time for California and Pleasant Valley wines, suppress him as a nuisance, or curtail his right to the fruits that the effect of our duties on wool and dyestuffs has conof his own brain, at least so far as to prevent his keeping his inventions away from them.

But these two do not exhaust the parties to this controthe will of the people the patent system exists neither for the for luster goods. protection of manufacturers nor the rewarding of inven-The Commercial Agent at Belize writes that since the introduction into the Density of Liquid Oxygen—Oxidation of Iron in a Gas Furnace. By A. Therefore, and Acohol on the Platinon and By W. Liquid Oxygen—Oxidation of Iron in a Gas Furnace. By A. Therefore, and Acohol on the Platinon intrites. By I. The Rest and Dayung By Senguis Kern.—A New General Sylory of Charlest and Acohol on the Platinon intrites. By I. The Rest and Dayung By Senguis Kern.—A New General Sylory of Charlest and Commercial Commerci tors. It was established rather for the advantage of the the Swiss market a year ago of American canned goods the

## AMERICAN MANUFACTURES AND PRODUCE ABROAD.

Mr. Moran, of the American legation at Lisbon, Portugal, of a horse car, the other day, to an Irishman at work in an writes that our trade with Portugal could be much increased with proper exertions. There is a rich market there for "Arrah, now!" was the prompt reply, "I'm digging the cheap bleached and unbleached cotton cloth for printing, over \$3,000,000 worth being imported from England annually to be printed with designs suited to the national tastes. advance in material progress has been the occasion of much Portugal imports textile fabrics from England to the value grave digging. Materially as well as morally, we rise on of nearly \$5,000,000 annually, much the greater part being stepping stones of our dead selves to higher things. And cotton goods. There is also a good field for American agri-

> The American Consul at Rotterdam thinks there will be a present stagnation ends. The extreme cheapness of Dutch labor allows of the home production of many articles more cheaply than they can be offered by the United States even with the aid of machinery, yet there is already a fair trade in certain special productions of the United States, such as

From Glasgow our Consul writes that there is a growing Each advance in rapid transit only paves the way for one demand in Scotland for American machine made wooden ferior quality of some of these goods lately arrived; the su-Only the other day a new era in the progress of humanity perior qualities will always have a good demand. The imwas begun by the invention of what seemed to be the great- portation of fresh meats has become an important and per-

Mr. King, American Consul at Bremen, writes that our ble, and its cheapness seemed to be surpassed only by its manufactures are selling there quite largely. For years past two of the largest manufacturers of mowing and reaping machines have had their European headquarters in that tive. But one daya man comes along with a couple of small city, and the number of machines sold by these and other wooden boxes and a coil of wire; he talks into one box and similar houses in other German cities has been simply enorhis voice is heard miles away by whoever will place his ear mous. Several agencies for small agricultural implements at the mouth of the other box. Straightway the elaborate and tools have met with marked success; and hundreds of and costly machinery of the printing telegraph is, for many American windmills are replacing those of the ancient style. uses, antiquated, and the financial grave is dug for many A significant sale by one American house was a complete outfit of locks for the new post office, where the American telligence soon to be largely superseded. That the owners system of lock boxes is being introduced. The trade with us of the old should resent the change is natural; but cheapness in German woolen and cotton goods is much decayed; many and convenience win, and the stream of progress flows on, 'houses that had branches in America have been compelled individual protests being swallowed up and lost in the gene- to seek other markets. The Consulthinks that a great trade will eventually spring up for our manufactured articles, but these must be made so as to adapt them to German tastes.

The American Consul at Nuremberg thinks that our trade throughout Germany would be greatly increased if agencies were established for the introduction of our manufactures that at a time like the present, when inventors are so active and produce, which should be conducted by first class business men, and due care taken that the wares placed upon the market are fully up to what is claimed for them. The Consul suggests that leading manufacturers combine and form has been to so great an extent the mainspring of the rapid an association for erecting in Hamburg or Frankfort-on-thechanges of recent years, it is not surprising that it should be Main an exposition building or American bazaar, as a perthe subject of no little animosity. It is not surprising either manent depot of supply for their staples. Or, if this was that in so many cases the opposition to patent rights should found impracticable, smaller associations could be formed by come from those who have reaped the largest benefits from a dozen or so of first-class manufacturers for the sale of

The report from our Consul at Bradford states that Amerimoment his interest in patents is completely changed. So can watches are rapidly displacing the English and Swiss; far as the patent system conserves his interests and protects our agricultural implements and mechanics' tools are of achim in the enjoyment of his temporary monopolies he can knowledged superiority; our roofing slates and lumber can look upon it as a blessing; but it becomes obnoxious just be made to supplant those of Norway; the trade in pork and when and so far as it helps to raise up against him a better beef is fast growing in importance; that the sale of butter furnished and more successful competitor. So likewise with and cheese is astounding, the latter being sold as "Cheshire;" manufacturers and special users of patented articles and pro- petroleum is a necessary of life; importations of lard, tallow, cesses. From their point of view the inventor is a public and eggs are increasing; apples are largely imported, as are benefactor so long as they have the exclusive right to control also potatoes and dried and preserved fruits. A market will -until he carries his grist to another mill; then they would which have an increasing reputation. The Consul thinks siderable influence in preventing the free competition of our woolen goods in foreign markets, as American wool is lusterless, and the manufacturer must import the raw material and versy. The largest stake is held by the public at large. By pay duty on it, if he desires to compete in the foreign market

The Consul at Basle writes that since the introduction into

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, twentyfour, 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, tendency in the Patent Office to admit drawings which are would substitute for such time honored tricks as making

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?

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 ref-

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  $14\frac{1}{3}$  feet, and to the right end  $15\frac{1}{8}$  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,  $13\frac{1}{8}$  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 Con- a solar spectrum not large but quite brilliant may be ob- now laid and the stations are in progress.

gress 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 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 attornevs 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



THE RAIL PUZZLE.

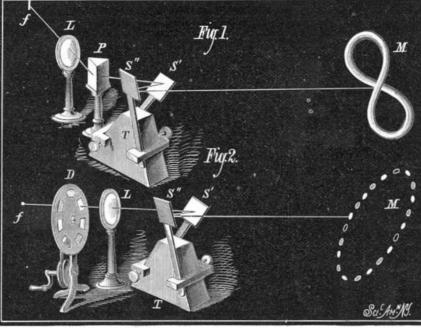
wanting in fullness and perspicuity, and which would not be from the bar, the string is burned, and plate and watches fall admitted in the absence of models, an evil resulting in the delivery of patents which cannot be easily understood without the aid of models.

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 maerence to their letters, and at the same time permit us to chines which have proved to be successful in practice.



PROFESSOR RICCO'S NEW OPTICAL EXPERIMENTS.

ors 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, 8", which, in turn, throws it upon a white

tained 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 posimanner in which he marshals his statements, with which tion 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

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

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 merc thread, but which accurately counts the number of spots on chosen cards. In electromusic 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 electromagnets 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

Tenth. That ample provision should be afforded to invent- 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 wall, M. The lens and the prism should be so adjusted that length, is to be opened for traffic March 1. The rails are