

when it had been shrunk on to its fellows. The whole of the muzzle, together with the trunnions and the coils immediately behind the trunnions, even including the inner one which surrounds the steel tube, remained fixed by the trunnions to the carriage. The only movement of this mass had been the depression of the muzzle. The rest of the gun, including the whole of the breech, containing the rear part of the steel tube, from the shoulder of the powder chamber backwards, had separated itself from the muzzle portion, and, being unsupported, had yielded to the force of the discharged powder and been dashed backwards against the wall of the turret, displacing two of the plates, cracking the steel lining like a mirror, and crushing the heavy wooden backing through the gap made between the two plates.

The gun had been loaded by hand with a battering charge of 550 pounds of Fossano powder and a 2,000 pound projectile. It is claimed in favor of the gun that it was not originally designed to be chambered, nor to fire charges of 550 lb. with a velocity of 1,700 feet. The contract was fulfilled when 440 lb. of English pebble powder gave an initial velocity of 1,585 feet, with a total energy to shot of 34,840 tons, which gives 627 foot tons per inch of circumference, with a pressure upon the interior of the gun not exceeding 17 tons per square inch. The charge which created the destructive effect almost entirely filled the chamber and left practically no air space. Besides it developed a total energy of 40,000 foot tons, an energy of 720 foot tons per inch of circumference, and an interior strain of 20 tons per square inch. This the gun proved unable to withstand. The friends of the gun claim that its failure under these conditions argues no inherent defect in the system, and that there will be no difficulty in adding to the longitudinal strength of the guns to any extent that may be desired. Nevertheless public confidence in the system has been seriously broken, and the indications are that this most popular British mode of building great guns will have to be entirely reconsidered.

A REMARKABLE OIL COMPANY.

In many respects the Columbia Oil Company of Pittsburgh is unique, and its career a remarkable one. The common lot of oil (petroleum) companies is to "bust," to involve stockholders in ruin, and to go into dividendless oblivion. To these rules the Columbia is a marked exception. For nearly twenty years it has produced petroleum, and today its territory adds over 400 barrels to the daily yield of the oil regions. Since the organization of the company in 1861 its properties have produced 2,748,820 barrels of crude petroleum, of 42 gallons each. During the same period the price of oil has ranged from \$13 per barrel in July, 1864, to 65 cents per barrel in June, 1879. During its existence the company has declared and paid dividends to the amount of nearly four million dollars (\$3,980,100), and the selling price of its stock (par \$50) has ranged from \$105 per share all the way down to \$4.75 per share. The original shares numbered 10,000, but in 1864 were "watered" to 50,000 shares, making wealthy men of the "ground floor" stockholders. The oil-producing territory of the company comprises a number of farms in Venango, Butler, and McKean counties, Pennsylvania, but by far the most productive tract is the "Story Farm," located on Oil Creek, six miles from Oil City, Pa. In fact it is very doubtful whether a tract of the same area in the known world has been compelled artificially to yield so enormous a quantity of oil. The Story Farm comprises 600 acres, but the oil-producing portion of the tract is less than 100 acres. From this tract has been produced, up to April 1, 1880, 2,226,995 barrels of petroleum, and at present there is still 60 barrels per day coaxed out of this farm. This is done in a thoroughly systematic way, a single engine by means of "sucker rod" connections, pumping seven wells at once, thus reducing the outlay for wages to a minimum. A singular well was developed upon this farm some years ago, and its irreverent activity fully earned its title of the "Sunday Well." For months this well would flow only upon the first day of the week, refusing to respond to any known processes for inducing it to produce on week days. The headquarters of this veteran oil company are at Pittsburg, but the stock is held in New York, Philadelphia, and St. Louis. The last dividend was declared April 10, 1878, the low price of oil compelling this action.

THE GREAT GAS WELL OF PENNSYLVANIA.

Since the appearance of the article in these columns regarding the great gas well at Murrysville, Pa., and the carbon black works in process of construction, the owners of the well have been overwhelmed with letters from all portions of the country. These were mainly letters of inquiry from parties possessing similar wells, and indicate a widespread interest in the matter of the utilization of the vast storehouses of fuel tapped by the drill in various portions of the country. Recent tests of the Murrysville stream of gas indicated a pressure of 150 lb. per square inch as shown by a steam gauge. The test was necessarily imperfect and brief, inasmuch as the pipes showed signs of bursting. Owing to unforeseen delays, the carbon black works have only just commenced operations.

A Bewitched Telegraph Wire.

Mr. Siemens states that when he was engaged on the line of the Indo-European Company between Djulfa and Tabreez he found it necessary to intimidate the natives, who rather fancied the wire for various purposes. He was able to do this in a very effectual manner, for having found that at that

time of the year there was a thunder storm nearly every afternoon, during which the line, being insulated, was charged by induction, he brought about a gathering of the natives and persuaded one of their notables to ascend a ladder and touch the wire, saying the wire would defend itself. On doing so, the man received such a shock that he fell down the ladder, and the wire was considered after that by the natives as being bewitched.

AMENDING THE PATENT LAW.

The raid upon our whole patent system, as it can only be properly characterized, which the proposed new law, referred to in our issue of March 6, promised to effect, seems now to be virtually defeated. There is no absolute safety against hasty and ill-considered legislation, it is true, so long as the matter remains in its present shape, but an effectual check has been put upon the operations of the would-be raiders. The exhaustive arguments presented to the Senate Patent Committee relative to the bill, with the amendments proposed by the members of the committee themselves, utterly destroy its force for the special end which was said to be the object of its promoters, and render it certain that the bill, if reported at all, will be so changed that its authors would not know it. It was conceded that the bill, as it passed the House, would be plainly unconstitutional, according to decisions already made by the United States Supreme Court; that it required a departure from all the fixed principles of jurisprudence; and, while the principal object or the ostensible plea made for its passage was, that it afforded the only way of stopping what were claimed to be unjust collections on account of the driven-well patent, it would have an equally disastrous effect upon thousands of other patents. One Senator asked why the bill should not, with equal justice, be made to apply to copyright cases, and it was apparent that there was no reason why it should not as well as to all other causes of action, as an effective way to stop vexatious litigation; because it not only deprived the plaintiff of any remedy, but actually put it in the power of the defendant to punish the plaintiff, where, on the merits of the case, the latter had been sustained.

Although influential supporters, and a certain number of votes in both Houses, can always be had for any measure which proposes to give infringers of patents a wider latitude, it is plain that the opposition to the driven-well patent at the West furnished the principal means by which this measure was passed through the House. This patent was obtained in 1866, after having been put in interference with two others for the same purpose; it was sustained by the Commissioner of Patents, and by the Supreme Court of the District of Columbia, but the controversy here gave the first opportunities for misrepresentation as to the validity of the patent, and, very soon afterward, driven wells began to be put down by parties not having the authorization of the patent which had been declared valid. It was not until 1871 that, in the hands of parties financially strong, earnest efforts were made to vindicate the rights of the patentee, and then a suit was commenced for this purpose which did not come to a decision till April, 1876, the testimony alone covering 2,800 printed pages, and the arguments being very exhaustive. During all this time the owners of the patent did not ask any royalty from users of the well, and, had the decision been against them, never could have collected anything. Upon getting a decision in their favor they immediately commenced to collect, but were met by such opposition that two more suits were necessary, one in Minnesota and one in Indiana, in both of which the patent was sustained. And now we come to the point which has given rise to all the excitement about the matter. The patentees gave notice that they wanted ten dollars from each unauthorized user of a driven well, but would make a deduction of one-half for all who voluntarily paid within twenty days.

Suits were commenced against those who did not, the Minnesota lawyers having at one time over four hundred suits commenced, and in these cases they made the royalty and costs come to \$46.50 in each suit. The patentees did not receive any more than their royalty, but the case was one in which the lawyers had an opportunity for fine pickings, and the public was justly incensed. After a good deal of delay and trouble the patentees were enabled to place their business in different hands, so the costs might be made more moderate, but the excitement had commenced, and, it being found that no relief can be had through the courts, the patent having been everywhere sustained, a rush was made to obtain favorable legislation by Congress. The feeling in many quarters was, perhaps, something like that against the Chinamen in San Francisco, when the populace demanded the abrogation of a national treaty and the passage of laws that were unconstitutional, because they declared "the Chinese must go," but, unjust and oppressive as the collection of such costs were in these cases, it is not likely that the agitation against patents will be any more successful than was that against the Chinamen.

What was really aimed at was to get rid of the enormous costs of the law suits, to regulate a mode of practice, but it will not do to strike down the patentee for this purpose. As was said before the Senate Committee: "Like any system of law, it will cause occasional inconvenience and occasional hardships in particular cases; like every system of law it will sometimes be badly administered. The question at the bottom of all propositions for amendment is, whether we shall amend it so as to cut off the evils, at the same time preserving its substance, its purpose, and its spirit, or whether we should cut off any evil that we find to exist,

any annoyance or inconvenience that arises under it, without regard to whether such change virtually destroys the life of the system or not." The patent law undoubtedly has its defects, but if we cannot remedy them without destroying its life we must submit, Western farmers as well as other men.

SOME ELECTRICAL MEASUREMENTS OF ONE OF MR. EDISON'S HORSESHOE LAMPS.

BY HENRY MORTON, PH.D., A. M. MAYER, PH.D., AND B. F. THOMAS, AT THE STEVENS INSTITUTE OF TECHNOLOGY.

(Additions and corrections to article on page 241.)

In reading the above named article in print we notice some errors which require correction and some points calling for a more full explanation.

In the second column, ninth line from top, it is said that the loss of weight in one of the electrodes was 1.0624 grammes.

This was, in fact, the amount gained by the cathode, the loss of the anode being a trifle greater. The gain of weight was, of course, what it was intended to take, so that the error was only in the expression, and not in the process or result.

In the next place, in the foot note at the end of the same column, it is simply stated that the average of the maximum and minimum lights in azimuths at right angles and in the plane of the loop was taken as the average luminous power of the lamp. Our reason for this, however, was not mentioned, but was, in fact, that we found by measuring the light at every azimuth varying by ten degrees between 0° and 180°, that this was approximately the true expression for the total amount of light emitted. We see from the article of Profs. Rowland and Barker, in the *American Journal of Science*, that they, assuming certain conditions and discussing the same in a mathematical manner, have reached a different result; but as experiment shows this result not to be attained in fact, it is evident that the assumptions on which the mathematical reasoning is based do not include all the conditions present in the experiment.

Two other sets of experiments, made since those given in our paper of April 17, in which the candlepower of the loop was in its best position, 17.6 and 19.8 candles, corresponding to averages of 11.7 and 13.2 candles respectively, showed a consumption of energy of 0.104 and 0.109 horse power per lamp, or 9.6 and 9.1 lamps per horse power. This would give 112 candles and 120 candles respectively per horse power of electric energy consumed or transformed in the lamp. These results certainly agree very closely with each other and with our former determinations.

The Philadelphia Wool Exhibition.

The International Exhibition of sheep wool and wool products, under the auspices of the Pennsylvania State Agricultural Society, will be held in the Permanent Exhibition Building, Fairmount Park, in September next. It is said by the officers of the society that the money realized at the fair held last year will enable them to offer unusual premiums for all classes of stock and machinery. Replies to circulars and letters addressed to prominent stock growers throughout the country already indicate that the exhibits will be so numerous that it will be difficult to accommodate them all, unless the exhibits already in the building are packed close together. The aggregate of prizes to be offered is \$40,000, including \$8,500 for cattle, \$7,000 for horses (racing prohibited), \$6,500 for sheep, \$3,000 for swine, \$1,500 for poultry, \$2,500 for the dairy, \$4,000 for tools, implements, and machinery, \$3,000 for State, county, club, and individual exhibits of farm, orchard, and garden products, and \$4,000 for wool and wool products and other manufactured goods. The sheep prizes are, for flocks \$450 and \$250, and for ram and five of his get, \$250, \$200, etc. No officers or members of the State society will be appointed for service on the juries of award.

Heavy Patent Damages.

In the United States Court, Rutland, Vt., Judge Wheeler granted a decree giving judgment for the plaintiff for \$161,011.71, in the suit of Riley and Burdett against J. Estey & Co., organ manufacturers of Brattleboro. This action was originally brought several years ago to recover for the alleged infringement of a patent in the manufacture of organs. It was heard before the late Judge Johnson, but his death occurring before a decision was given, necessitated a reargument. This was had before Judges Blatchford and Wheeler, who found for the plaintiff and referred the case to ex-Governor Stewart, of Middlebury, with directions to compute the amount due. Governor Stewart reported in favor of awarding Mr. Burdett \$149,039, to which Judge Wheeler has added interest from December 4, 1878, making the total judgment over \$160,000. The defendants will appeal to the Supreme Court.—*N. Y. Sun.*

Progress in Walking Matches.

It is but a few years since 500 miles were considered a great achievement in six-day walking matches. When the limit was pushed to 550 miles, it was thought that the extreme verge of human endurance had been reached. That distance was exceeded by a fraction over fifteen miles by Hart, in the recent contest in this city; and it is not a wild prediction to say that an average of one hundred miles a day for six days will soon be made; probably by some swift and enduring walker, who will not be allowed to exceed 100 miles in any one day.

Delicate Test for Albumen.

To Mr. Siebold belongs the credit of having introduced a modification of the heat test, which is adequate to the detection of albumen under conditions in which its presence might be completely overlooked. The following is the author's own account of the manner in which the test is to be applied:

"Add solution of ammonia to the urine until just perceptibly alkaline; filter, and add diluted acetic acid very cautiously until the urine acquires a faint acid reaction, avoiding the use of a single drop more than required. Now place equal quantities of this mixture into two test tubes of equal size, heat one of them to ebullition, and compare it with the cold sample contained in the other test tube. The least turbidity is thus distinctly observed, and gives absolute proof of the presence of albumen."

A NEW WAREHOUSE TRUCK.

We give an engraving representing an improved truck for mills, warehouses, railroad depots, etc., recently patented by Mr. Montgomery A. Reynolds, of Stanton, Mich. The truck frame is mounted on two large wheels turning on an axle located a little behind the middle of the truck, and is supported in front by two castor wheels whose pintles turn in a stout iron frame hung from a crosspiece attached to the under side of the truck frame near the forward end. A handle is attached to the forward end by means of two strong iron arms.

The platform is provided with side boards and end boards, which may be used or not as occasion requires. Each end board has along its upper edge an iron rod which is bent downward at the ends so that when the end boards are in place the end of the rods may be turned down over the side boards and thus prevent them from being pressed outward when the truck is loaded. The truck, as its appearance indicates, is strongly built and intended to do good service wherever an article of this kind is required.

We are informed that these trucks will be exhibited at the Millers' Exhibition to be held in Cincinnati, Ohio, early in June.

A NEW VENTILATOR.

The accompanying engraving represents an automatic house ventilator recently patented in the United States and Canada by Mr. Walter S. Sayers, of Guelph, Ontario, Canada. This invention is intended to overcome in the simplest and most effective manner all of the difficulties which have stood in the way of ventilating from the top of windows without draughts of air on the occupants of the apartments. This ventilator is independent of either sash, and does not interfere with lowering or raising them, it does away with the necessity of hanging them with weights for the purposes of ventilation, and does not in any way interfere with hanging the curtains in the usual way. The ventilator is completely hidden from view in the interior of the room by the curtains or lambrequins, and on the exterior of the building it presents the appearance of a neat Venetian blind above the sash, and is an embellishment rather than otherwise.

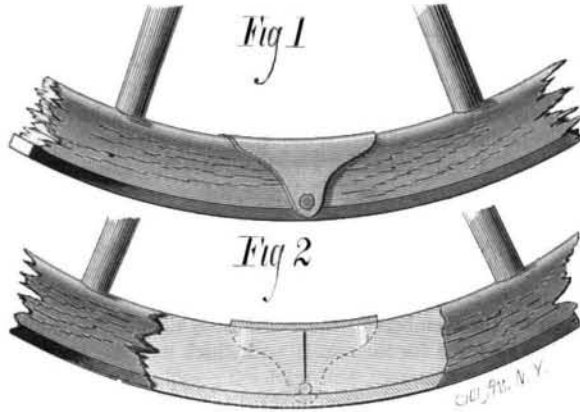
For windows in public buildings, offices, etc., where curtains are not used, the ventilator affords a good ground for stucco designs or other ornamental work. This ventilator admits pure air into the room without draughts; the air entering the room at the top of the window is directed by the air duct toward the ceiling, where it is distributed, displacing the vitiated air, which escapes by the ventilator. It is entirely automatic and requires no attention; the wind, on reaching a certain velocity, closes the pivoted guards, C, and prevents very strong currents of air from entering. The guards also exclude dust, and when the pressure of the wind diminishes the guards swing open automatically. If at any time it is desired to close the ventilator—and this will happen very seldom—it may be done by closing the valve, B, which is worked by a cord hanging down at the middle of the window. The valve opens by its own weight, when the cord is released. To prevent the entrance of flies and insects a netting is placed over the cornice board, A.

This ventilator can be used in connection with Venetian blinds or winter sash, as it does not in any way interfere with them. The inventor informs us that he has had this ventilator in use in his own residence for the last eight months, giving the most complete satisfaction. He also states that it is indorsed in the highest terms by physicians who have seen it. Further information in regard

to this useful invention may be obtained by addressing the inventor and patentee.

IMPROVED FELLY PLATE.

The annexed engraving shows an improved attachment for vehicle wheels, which is intended to strengthen the felly joints and at the same time keep the tires in place on the

**CREMER'S FELLY PLATE.**

wheels. The device is exceedingly simple, being nothing more than a carved plate fitted to the rounded portion of the felly over the joint and held in place by a single bolt passing through the joint near the tire. The extreme ends of the plate project over the edges of the tire and prevent it from running off should the wheel shrink.

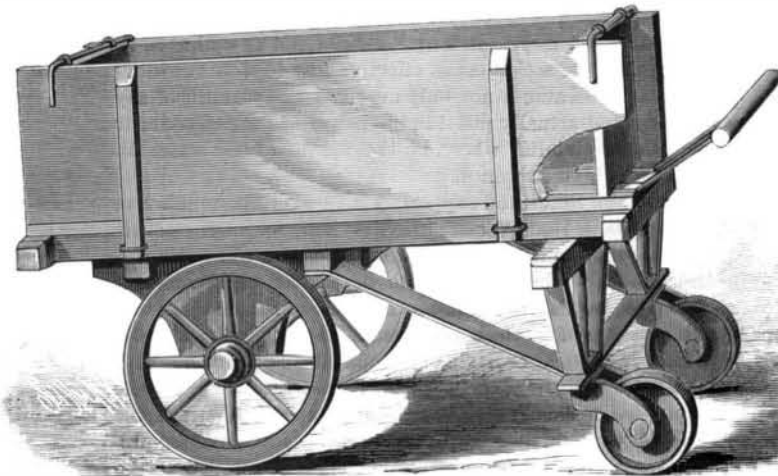
**REYNOLDS' IMPROVED TRUCK.**

Fig. 1 shows a portion of a wheel with the felly plate applied, and Fig. 2 is a sectional view of a felly taken through the joint, showing the position of the plate in dotted lines.

Further particulars in relation to this invention may be obtained by addressing the inventor, Mr. Charles Cremer, Cosumne, Cal.

Boracic Acid in Eye Diseases.

Dr. Saml. Theobald calls the attention of the profession, in the *Medical Record*, to the astonishingly favorable results

known, has long entered as an ingredient in popular remedies for the eye; and the use of boracic acid itself is not by any means as new as Dr. Theobald seems to suppose. It does no harm, however, to occasionally call attention to the value of old remedies, and which might otherwise be overlooked or forgotten.

Butter and Cheese by Machinery.

In our last issue we gave considerable space to the illustrations and description of the manufacture of oleomargarine. We now publish from a correspondent of the Philadelphia *Ledger* an account of the process of making butter and cheese on a large scale from fresh milk:

"The milk is brought to the creameries in the morning, and after being weighed, is run into long vats to undergo the process of raising the cream. In the center of these vats is a pipe about three inches in diameter, and in which are smaller pipes, through which cold water is forced by steam power, thus keeping the milk cold, and causing all the cream in the milk to rise to the surface in from three to four hours' time. The milk is then drawn from the vat, leaving the cream behind. The cream is then placed in churns, each holding about one hundred gallons, which are moved by steam power until the butter is formed, the time required being about thirty minutes. The churns have only two revolving wings, instead of four, as used in the ordinary hand churn. The churn is not moved at any greater speed than in the old process, but a regular and uniform motion is kept up until the work of bringing the butter is completed. The butter, after being removed from the churns, is placed upon tables and worked by hand, a round bar being used. The work can be done by machinery, but in most of the cream-

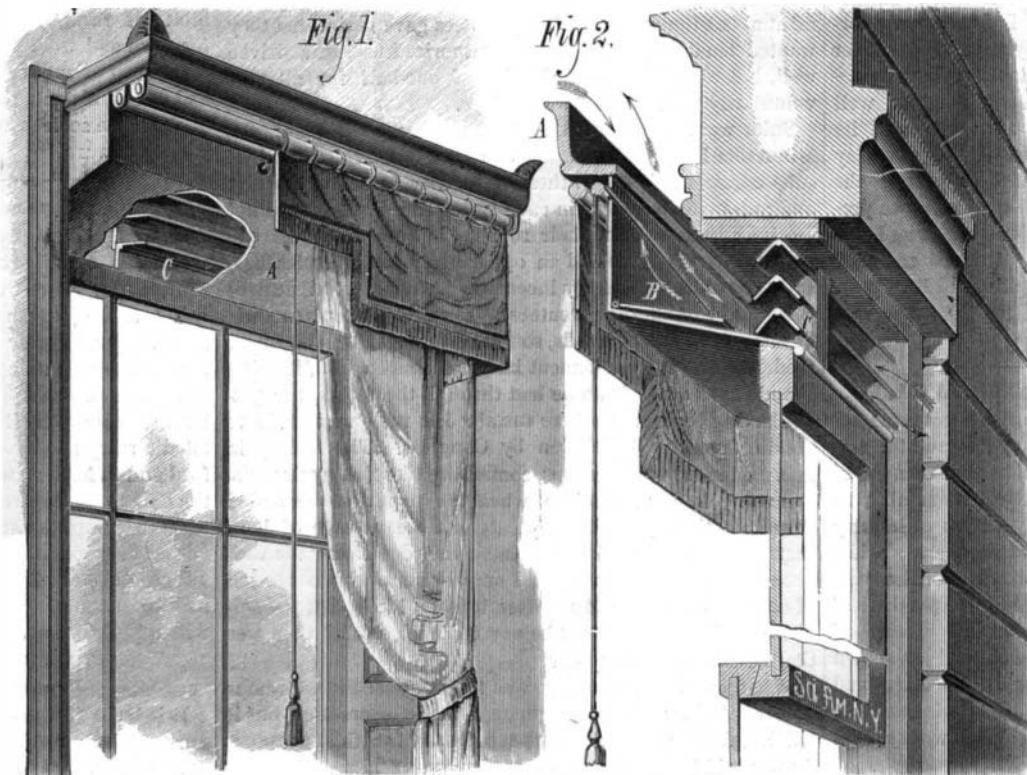
eries the process by hand is preferred. The skimmed milk is taken to the cheese department and placed in large tin vats, and hot water, instead of cold, is forced through the milk in which rennet has been placed to make it curdle. When this process is completed, the product is put in boxes holding thirty-five pounds, and pressed. It is then stored for about thirty days, when it is ready to be sold in the market as cheese.

"The first creamery in the State, it is said, was started less than a year ago at Quakertown, Bucks County, and now some fifteen of them, and more new ones are talked of. The establishments are generally owned by companies, the capital required to start one of the capacity of 4,000 quarts daily being from \$4,000 to \$6,000. What effect these establishments will have upon the supply of milk to consumers in large cities, or its price to them, has yet to be seen. At all events, the experiment of making butter and cheese by the processes described above is fully under

way, and it will not take long for the parties interested to ascertain how much profit there is in it. At present, the great want in the establishments is milk enough to run them to their full capacity, but this want, no doubt, will be met as the farmers gain a knowledge of the demand."

Paper Leather.

The *Paper World* describes a new kind of paper sizing which promises to be exceedingly useful. It is considerably cheaper than ordinary size, and it has the merit of making the paper waterproof without discoloration. In one experiment one hundred and eighty-five pounds of leather board were manufactured from hemp, which was made nearly fine in the engine, and then the new sizing added, mixed, precipitated, and beaten fine. The thin, endless sheets were woven around a cold cylinder, and when of sufficient thickness, cut, removed, and dried in the sun. Strips one-fourth of an inch thick, when dry and before rolling, were as pliant as most sole leather, and could be bent square over without cracking. This leather board can be made insoluble in either hot or cold water. A piece of it not perfected, and not wholly impervious to water, one-fourth of an inch wide, cut lengthwise of the fiber, held up seventy-seven pounds stone. By rendering the same board insoluble, the strength was increased from seventy-seven to two hundred and eleven pounds. Leather paper of less thickness, made in the same manner, is described as pliable, somewhat elastic, apparently durable, and suitable for the uppers of shoes.

**SAYERS' AUTOMATIC VENTILATOR**

which he has obtained from the use of boracic acid in the treatment of various affections of the eye; and, from these results, he feels constrained to say that this remedy must, ere long, obtain a position in ophthalmic therapeutics second only to that of atropia. Biborate of soda (borax), as well

ONE of the cars of the Edinburgh and Glasgow Railway which fell from the Tay Bridge, was picked up several weeks after the disaster by fishermen on the western coast of Norway.