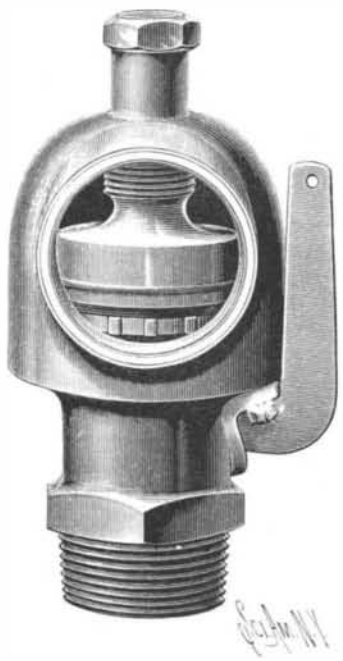
AN IMPROVED SAFETY VALVE.

The illustration represents a safety valve adapted for use on locomotives and steam engines generally, the device being of such construction that it cannot readily be tampered with without such interference being noticed by the engineer or other person in charge. It is a patented invention of Mr. E. B. Kunkle, of Fort Wayne, Ind. On the top of the valve body is screwed a semi-spherical cap having an outlet to be connected with a pipe for carrying off the steam, the top portion of the valve being partly seen through this opening. The valve is substantially cup-shaped, with a double flange around its top edge, and is vertically guided by a series of ribs on the inside of the valve body, the valve seat being opposite the opening. Within the valve is a central bottom depression engaged by a point on the under side of a disk on which rests a coil spring, the upper end of the spring supporting a disk having in its top face a depression engaged by the pointed lower end of a regulating screw. To prevent steam or water from passing to the spring, a disk with a hub screws on the regulating screw, the disk having a downwardly extending annular flange which engages the outer edge of the flange at the top of the valve, while the hub screws into the semicircular top, the hub being also enlarged at its upper end to receive a locking nut screwing on the upper end of the regulating screw.

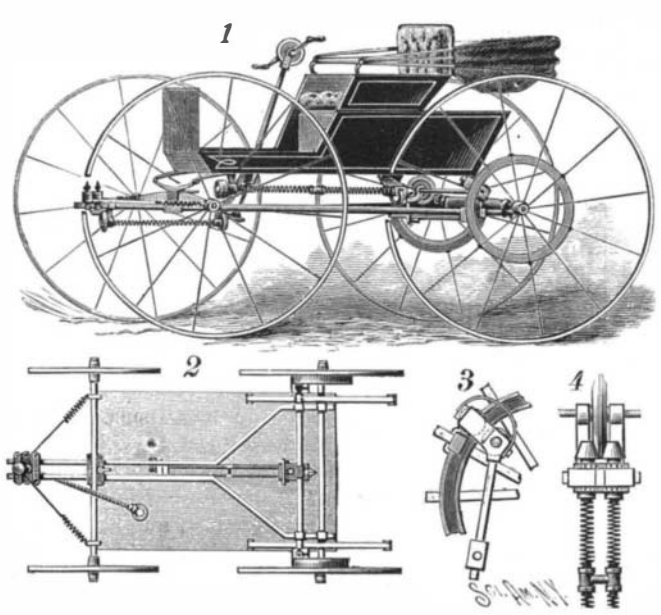


KUNKLE'S SAFETY VALVE.

When this locking nut is removed, the regulating screw may be turned, by means of a special form of key provided therefor, to regulate the tension of the spring, and thus determine the pressure at which steam shall be permitted to escape. Surrounding the valve seat, in the valve body, there is also a regulating collar, adapted to be screwed up or down to regulate the escape of steam passing through the valve seat, the collar serving to regulate the lifting force of the steam on the extended area of the valve. To open the valve at any time, a vertically sliding pin in a recess of the valve body is arranged to engage the under side of the flange at the top of the valve, the lower end of the pin being engaged by a projection on a lever at one side, as shown in the illustration. By placing the compression spring between centers, as provided for by this invention, all friction is obviated, and the tension at which the valve is set is not likely to be changed except by one having authority to take such responsibility.

A PROPELLING MECHANISM FOR VEHICLES.

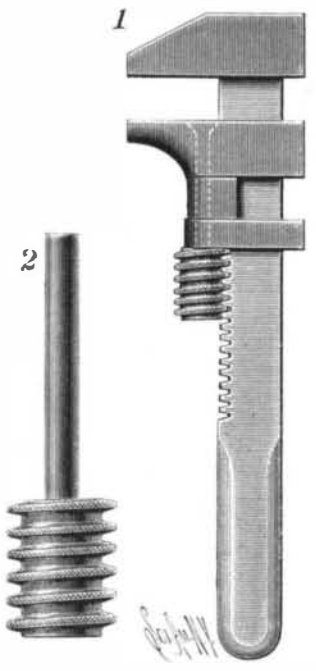
A driving device for vehicles, especially designed to remove the weight and strain from the axles, by placing the weight of the body and its accessories in continual suspension on the circumference of the advancing half of the drivers, is shown in the accompanying illustration. This improved vehicle, which is styled by its inventor the "Princess of the Highway," has been patented by Mr. M. A. Libbey, of South Berwick, Me. The improvement provides a power mechanism adjustable for varying lengths and widths, and designed for application to ordinary light road vehicles without marring the paint or varnish. Fig. 1 is a view in perspective, and Fig. 2 is a bottom plan view of an ordinary four-wheeled vehicle having this propelling mechanism, the body being supported by suitable springs resting on the axles in the usual way, and the front and rear axles being connected by a light frame, which projects beyond the forward axle to support a steering apparatus. The frame is pivotally attached to the forward axle, and spreading rear members of the frame extend below the rear axle, to which such members are attached by clips. Depending from each of the members, a little in front of the rear axle, is a clip, these clips supporting a hollow transverse shaft, from each end of which projects a rod, the outer ends of the rods having clamps which support upwardly extending spindles which terminate in boxes or frames. Each of these frames is adapted to support in effective operative position a pair of friction rollers, pressed firmly together by a spring, as shown in Fig. 3, there being interposed between the rollers the horizontal portion of a thin metal annular flange, attached to the spokes of each rear wheel, so that the rollers will press on opposite sides of the flanges. One of these friction rollers on each side is on the outer end of a transverse shaft, and on the inner ends of the shafts are friction disks, as shown in Fig. 4, to which power is transmitted through two spiral shafts extending forwardly under the box, a motor of any approved form being used. The shafts are composed of two or more strands of wire wound spirally, and stiffened by collars, to form a shaft which will be light and strong, and flexible enough to yield to the motion of the vehicle. In the forward part of the body is a case through which a steering shaft extends downward, a gear wheel on the lower end of the shaft operating a horizontal shaft of spiral wire, passing under the front axle to another gear at the forward end of the frame, and which moves a belt connected at each end to the front axle, whereby the latter may be readily turned to the right or left. The mechanism may be inclosed or open as desired.



LIBBEY'S DRIVING DEVICE FOR VEHICLES.

AN IMPROVED WRENCH.

The wrench shown in the illustration, patented by Mr. John Ryan, is composed of but three parts, and is designed to be very strong and durable, while being quick and easy of adjustment. The shank has the usual fixed jaw at its outer end, and its inner edge, for a portion of its length, is concaved and provided with screw threads. The adjustable jaw, held to slide on the shank by integral straps, is bored longitudinally, the end of the bore on the face of the jaw being countersunk. The operating nut, shown in Fig. 2, is made solid, and has a peripheral thread adapted to fit the threads in the concaved portion of the shank, the edge of the thread being milled. The nut also has an integral axial stem adapted to fit the bore of the adjustable jaw, the inner end of the stem being upset in the countersunk portion of the bore on the inner face of the jaw when the parts of the wrench are put together.



RYAN'S WRENCH.

For further information as to this invention address the inventor, or Mr. Seymour G. Smith, No. 127 Water Street, New York City.

A SAFETY BOLT FOR SPRING LATCHES.

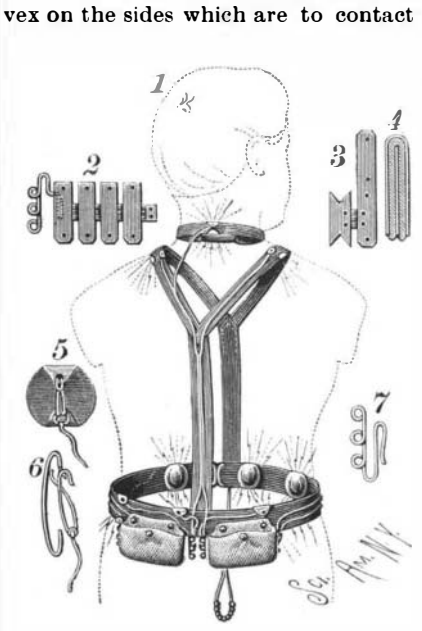
The illustration represents a locking bolt independent of the latch of a door, but capable of being operated with the latch, to impart additional security to the door. The device has been patented by Mr. John Bradley, of No. 2416 Pennsylvania Avenue, Philadelphia, Pa. The latch may be of any approved make, and just above the latch, at its rear, is pivoted a vertical lever bar. A trip rod contacting with the rear end of the spring-actuated latch bolt extends through a rear aperture in the latch casing, and is pivoted upon the vertical lever bar, and the lower end of the latter bar is pivoted upon the rear end of a bolt held to slide upon the door and engage a keeper attached to the door jamb. A spring is located within the lower bolt, so that when the door is closed both bolts will automatically slide into their keepers, and when the latch bolt is moved back to open the door, the trip rod, through the vertical lever, causes the lower bolt also to be withdrawn from its keeper. The trip rod may be held to slide in suitable guides, and simply contact with the rear end of the latch bolt, or the rod may be pivoted to the latter, in which case the spring in the lower bolt may be dispensed with.

BRADLEY'S SAFETY BOLT FOR SPRING LATCHES.

AN ELECTRIC BELT AND BODY ATTACHMENTS.

The illustration represents a body battery with attachments to facilitate the effective sending of a current of electricity to different parts of the system, as may be desired in the treatment of acute and chronic diseases of various kinds, the electrodes contacting with the body without corroding, and without cutting or injuring the flesh. This improvement has been patented by Messrs. John A. Crisp and George F. Webb, of Jefferson, Ohio. The battery and attachments are shown in position in Fig. 1, a portion of the battery cells being shown in Fig. 2, while the blanks forming a cell are shown in Fig. 3, and a cross section through one of the cells in Fig. 4. The belt has upwardly extending straps leading to a shoulder support and neck yoke, and the cases adapted to contain the battery pockets are buttoned to the belt. The cases are preferably of leather-lined silk, and the pockets of cloth-covered rubber. Each battery is preferably composed of nine cells, each cell having a central copper plate and an outer zinc plate, with layers of felt to absorb acid placed between the copper and zinc. As shown in Fig. 3, the zinc plates are longer than the copper plates, over which they are doubled and fastened by rivets, the several cells being connected by hinges, the copper element of one cell being hinged to the zinc element of the next cell. The end cells of each battery have contact hooks by which the circuit may be cut out at any point on applying the hook to one of the hinges.

A spring-wire adjuster, shown in Fig. 7, has a bend to pass over the edge of the pocket and rings to engage the circuit hooks, with another bend adapted to clasp one of the hinges, wires leading to different parts of the body being conveniently connected with the battery through the rings, a spring snap-hook of special design, as shown in Fig. 6, being used to facilitate making such connection. The electrodes, shown in Fig. 5, are made of pure coin silver, and are made convex on the sides which are to contact with the body. As many of these electrodes are employed as is deemed necessary in the case to be treated, and each is connected by the ordinary covered copper wire with a battery. A different form of electrode may be used when desired for the special treatment of any particular portion of the body. To prepare the batteries for use,



CRISP & WEBB'S ELECTRIC BELT.

they are first dipped in an acid, preferably cider vinegar, the belt and attachments being then placed on the body, the batteries inserted in the pockets, and the connections made between the batteries and the electrodes. Mr. Webb, one of the inventors of this apparatus, is a medical electrician who has had an extensive practice in the treatment of diseases by electricity, and he has received numerous testimonials from physicians and prominent people in his section of the country as to his success in this specialty.

A Patent Fuel Saver.

Few of us know how many benefits are yet in store for us, that keep latent until the keen eye of the inventor searches them out. One of our correspondents has recently sent us a sample of a patent coal-saving composition, but for obvious reasons it will be advisable to omit the name of the ingenious inventor.

A circular accompanies the sample, in which we find in large letters, "More heat! No black smoke! 50 per cent of coals can be saved! and suitable for all domestic purposes!" The circular states that the composition is perfectly free and clean, and can be used in a dry state, no mixing with or damping the coal being required. All that has to be done is to sprinkle a small quantity over the fire after it has been made up, which promotes combustion. Sitting room, sick room, office, and greenhouse fires can be kept burning from 6 to 15 hours without attention, when the fires are made up according to the simple directions given on each tin. The circular goes on to state that all the heat is thrown out into the room from the front of the fire, therefore combustion is obtained of the gas and coal tar, that in the ordinary way of things is allowed to pass off in smoke up the chimney. This is so burned that the fire lasts considerably longer, while also throwing out more heat.

The sample that has been sent to us has been analyzed in our laboratory, and we find it to contain: Common salt, 68 parts; chalk in powder, 32 parts.

The composition is sold in tins at 1s. each, which are stated to contain sufficient dressings for 150 fires.

Several newspapers have testified to the importance of this coal-saving composition. Whether the newspapers in question purchase and use it may be gathered perhaps by writing to the various editors; but we should hardly think that any one would be without such a valuable compound, if, as is stated, a fire can be made to burn for over 15 hours undisturbed in an ordinary office fireplace by merely sprinkling a few grains of salt over the surface of it.

The salting of coal to prevent smoke is a very old invention. It was proposed for Manchester many years ago, at a time, we believe, when Dr. E. Frankland was a resident there, and some very bitter controversies took place with regard to his advocacy of the salt smoke annihilator.

Let us now turn to the chemical side of the question. It is generally admitted on all sides that hydrochloric acid gas is more destructive to vegetation, and even to buildings, than sulphurous acid. It is more soluble in water (that is in the rain) than is sulphurous acid, and therefore falls in a more limited area and in a more concentrated state. It kills our trees and shrubs, and by falling on the greensward renders grass land one vast desert, as may be seen in Widnes and St. Helens; it dissolves carbonated building stones, and the mortar from between the brickwork. Sulphurous acid in similar places and under similar conditions is not so dangerous, for being soluble only to a slight extent in water, it is spread over a larger area, and thus becomes greatly diluted in comparison with hydrochloric acid.

What is now the effect of dusting common salt over the surface of burning coal? The sulphur of the coal during combustion becomes sulphurous acid, and this in the presence of air acting on the salt forms sulphate of soda and hydrochloric acid, which is to a large extent evolved and passes away with the products of combustion. It is true that some of this hydrochloric acid might become absorbed by the carbonate of lime with which the salt is mixed, but experimental trials made upon an ordinary house chimney with this coal-saving composition show us that hydrochloric acid is to be found in the escaping gases. In our experiments, dusting the coal-saving composition over the fuel in an ordinary office chimney, we have observed as much as 0·39 grain of hydrochloric acid per cubic foot, an amount nearly double that prohibited by act of Parliament in the case of alkali works.

It is on account of this dissemination of hydrochloric acid over such a vast area as that over which coal is consumed domestically, that we protest against the use of chloride of sodium as a smoke annihilator, though we in no wise desire to interfere with what seems to be a very lucrative business. Salt and chalk at 1s. per pound will no doubt make some of our readers' mouths water.—*Chemical Trade Journal.*

THE five-masted sailing vessel La France, which was illustrated in SUPPLEMENT No. 780, accomplished the voyage from Cardiff to Rio de Janeiro in 33 days. She was laden with 6,000 tons of coal.

The Diazo Photo-Printing Process.

The following process, by Dr. Feer, patented in Germany, depends upon the fact, which the inventor has discovered, that diazosulphonic salts ($R - N = N - SO_3 Na$) with phenolalkali, and chlorides of or free aromatic amines, react under the influence of solar or of the electric light, forming an azo dyeing substance.

For carrying out the process, the inventor impregnates paper or textile fabric with a dilute molecularic mixture of a diazosulphonic salt (for instance, of aniline, amidoazobenzole, benzidine, and their homologues) and phenol alkalies (for example, phenol, resorcin, and β-naphthol) or chloride of or free amines (aniline, naphthylamine phenylendiamine, and homologue). The paper or fabric is then dried in the dark, and exposed for about five minutes to the sun, or to the electric light. Thereby is formed in the illuminated portions an *insoluble* azo dye, while the parts protected by the opaque portions of the negative remain in their original colorless and soluble condition. The picture is thus developed while printing. It is, after exposure, washed with water, or with very dilute hydrochloric acid, whereby the unaltered sensitive preparation is washed from those parts not affected by light through the negative. The picture is thus fixed, and only requires drying to finish it.

The following are some examples of mixtures with which the paper or fabric is treated:

1.—Toluoldiazosulphonate of soda	25	grammes.
β-Naphthol	25	"
Caustic soda	8	"
Water	1,000	"
2.—Ditolyltetrazosulphonate of soda	25	grammes.
m-Phenylendiamine	8	"
Water	1,000	"
3.—Ditolyltetrazosulphonate of soda	25	grammes.
Resorcin	22	"
Caustic soda	16	"
Water	1,000	"

The following examples will illustrate the application of ditolyltetrazosulphonate of soda mixed with resorcin and α, β-naphthol respectively, and phenylendiamine.

Preparation of the Solutions.

1.—Ditolyltetrazosulphonate of soda	30	grammes.
Resorcin	20	"
Caustic soda	15	"

All, finely powdered, are dissolved by gentle heat in one liter of water.

2.—Ditolyltetrazosulphonate of soda	30	grammes.
α-Naphthol	25	"
Caustic soda	7	"

Dissolved in one liter of water.

3.—Ditolyltetrazosulphonate of soda	30	grammes.
Phenylendiamine	20	"

Dissolved in one liter of water.

The solutions 1 and 2, or 2 and 3, may be mixed in equal parts.

The paper is impregnated with the above mixture, and then exposed for from ten to fifteen minutes to direct sunshine. After exposure, the picture is washed with very dilute hydrochloric acid, then with water, and finally dried.

Claim.—A process for the production of colored photographic images on paper or textile fabrics, consisting of the preparation of the material with an aqueous or alcoholic solution of a diazosulphonic salt and a phenol alkali, benzene, a chloride, or free amine; dried in the dark, then covered by a negative, exposed to the influence of solar or the electric light, whereby an insoluble azo dye is formed only in the parts affected by light, the picture being thus developed; and, finally, the preparation unaffected by light is washed out with water or dilute hydrochloric acid, and the picture is thus fixed.

Planning a Great Aquarium for New York City.

For many years, Castle Garden, a large circular structure at the southern end of Mahattan Island, was the receiving depot for all the immigrants landed at New York, but the government has now made other arrangements for such service, and Castle Garden is at present unused, in the hands of the New York Park Commissioners. It is proposed to utilize the location for a mammoth public aquarium, for which purpose there could hardly be a more ideally perfect site. On the side toward the city is the well shaded but rather limited common now formed by Battery Park, while to the south the tides of New York Bay wash the walls of the present structure, Governor's Island and the statue of Liberty being in the near foreground, and the land and water prospect in every direction being of the most interesting character. Besides this, there is hardly any place in the city which crowds of visitors could so readily visit, at but little or no cost, either in money or time.

Mr. Eugene Blackford, the well known fish merchant and a State fish commissioner, has been asked to prepare plans for a great public aquarium here, and says that if the work is decided upon: "In the center of the garden we will sink several tanks to a level with the floor. These will be of different sizes. One, for the use of small whales, will have to be about thirty feet in diameter and eight or ten feet deep. Then there will be others of various sizes for the use of small sharks, crocodiles, alligators and all varieties of large fish. Another will be set aside for turtles and shellfish of all sorts, another for seals. Then, in a circle around the walls, we will build the small tanks. They will be about six feet long by four feet deep and two wide. Each tank will be built into a wall of imitation rock. The back and sides will not show, and only the front will be covered with glass. This will give each tank the effect of a pool of water in some rocky grotto. The lights will be so arranged that they will fall from above directly upon the water, thus illuminating the entire tank. The tanks will be arranged in groups, all the salt water fish will be in one group, the fresh water pond fish in another, those that live in running water will have quarters of their own, and so on. On the upper floor of the garden we propose to build large storage tanks for water. All our fresh water would have to settle before it could be used for the fish. From the fresh water storage tank would be run wooden pipes, lined with glass, to nearly all the fresh water tanks. Of course, in some of these it will not be necessary to change the water at all, plant and animal life being all that is necessary to keep some fish alive. In these tanks we will place marine plants of various kinds. These live on carbonic acid gas, which is given out by fish in breathing, and give out oxygen, which fish breathe. So, you see, it will not be necessary to have running water in all the fresh water tanks. There are some active fish, such as the trout and pickerel, that must be kept in running water. Through these tanks a stream of fresh water will run constantly. Then on small tables about the building we would place small tanks containing the smaller varieties of fish, such as the Japanese goldfish, whitebait, etc. We also will have a series of incubators showing the eggs of fish in each stage of development."

Jackson S. Schultz.

Mr. Schultz died in New York City, March 1, in the 76th year of his age. For upward of forty years he had been a prominent figure in New York life. He learned the tanning trade at his father's tannery in Delaware County, N. Y., but, while yet a young man, became engaged in the leather business on his own account in this city, and his connection with this line of business never entirely ceased until his death. As a tanner and leather merchant he occupied a unique position, not so much for remarkable financial success, although he early attained a strong position and acquired a handsome fortune, as from the fact that he was always interesting himself in matters designed to benefit the trade generally and to elevate the standard of the leather manufacture. He set on foot many investigations, and at his own expense made numerous experiments, with the view of improving tannery methods and practice, to lower the cost of production and make better leather, and the information he thus acquired was always freely at the service of even the humblest member of the trade. For many years a large portion of his time was surrendered to answering inquiries or giving advice to those who had no other claim upon him than that of trade interest. Perhaps the most widely known of his efforts in this direction, for the intended general benefit of the sole leather tanners, was the opposition he organized to the recognition of the validity of the Moses Thompson tan-burning furnace patent. A tedious law suit was the result, which cost the tanners about a hundred thousand dollars, many of the tanners also settling independently with the representative of the patentee, but the patent was finally sustained, although the damages awarded the complainant were only six cents.

One of the most valuable of the many books which have been published relative to the tanning industry is Mr. Schultz's "Leather Manufacture," issued by the *Shoe and Leather Reporter*, New York. Mr. Schultz did much to promote the establishment of an export trade in American sole leather, in which he was one of the pioneers, and also to establish the bark extract manufacture as a distinct line of business.

Apart, however, from his business as a tanner and leather merchant, Mr. Schultz was prominent in many ways in public life. He was an organizer and one of the presidents of the Union League Club, was a leading spirit in the work of the United States Sanitary Commission during the war, 1861 to 1865, was United States Commissioner at the World's Fair in Vienna, in 1873, and his energetic efforts could always be counted upon in every movement tending to hold public officials to a strict accountability and promote the cause of good government.

ALUMINUM at $1.25 per pound is in the market. A price list sent out to the trade by the Cowles Electric Smelting and Aluminum Co., of Lockport, N. Y., gives the following figures: In lots of more than 2,000 lb., $1.25 per lb., less 20 per cent discount, and in 1,500 lb., 1,000 lb., and 500 lb. lots, $1.25 per lb., with 15, 10, and 5 per cent discount. In 50 to 500 lb. the price is $1.25 net; 10 to 50 lb., $1.50; and less than 10 lb., $1.75 per lb.

The Effect of Removing the Tassels on the Productiveness of Corn.

It has been claimed that if the tassels were removed from corn before they have produced pollen, the strength thus saved to the plant would be turned to the ovaries, and a larger amount of grain be produced. To test the effect of this theory, the following trial was made during the past season.

In the general corn field a plat of forty-eight rows, with forty-two hills in each row, was selected for the experiment. From each alternate row the tassels were removed as soon as they appeared, and before any pollen had fallen. The remaining rows were left undisturbed.

The corn was Sibley's Pride of the North, planted the last week in May in hills, three feet six inches by three feet eight inches, on dry, gravelly, moderately fertile soil.

On July 21 the earliest tassels began to make their appearance in the folds of the upper leaves, and were removed as soon as they could be seen, and before they were fully developed. A slight pull was sufficient to break the stalk just below the tassel, and the removal was easy and rapid.

On July 25 the plat was gone over again for the removal of such tassels as had appeared since the previous work, and at this time by far the greater number of the tassels were removed.

On July 28, when the plat was gone over the third time, the effects of the tasseling became apparent in the increased number of silks that were visible on the rows from which the tassels had been removed. On the 1,008 tasseled hills there were visible 591 silks; on the 1,008 untasseled hills, 393 silks.

On August 4 the plat was gone over for the last time, but only a few tassels were found on the very latest stalks. The preponderance of visible silks on the tasseled rows was still manifest, there being at this time 3,542 silks visible on the tasseled rows, and but 2,044 on the untasseled rows.

The corn was allowed to stand without cutting until ripe.

On September 29 to October 1, the rows were cut and husked, and the stalks and ears weighed and counted, with the following results:

	Aggregate Yield.		Comparative Yield.	
	Tassels left on.	Tassels removed	Tassels left on.	Tassels removed.
Number of good ears	1,551	2,338	100	151
" " poor ears	628	885	100	141
" " abortive ears	2,566	951	100	37
Total number of ears	4,745	4,174	100	88
Weight of merchantable corn, pounds	710	1,078	100	152
Weight of poor corn, pounds	130	187	100	144
Number of stalks	4,186	4,228	100	101
100 stalks weighed, pounds	82	79	100	96

It will thus be seen that the number of good ears and the weight of merchantable corn were both a little more than fifty per cent greater on those rows from which the tassels were removed than upon those upon which the tassels were left. This is not only true of the two sets of rows as a whole, but with the individual rows as well. In no case did a row upon which the tassels were left produce anywhere near as much as the tasseled rows on either side of it. In fact, the results given above are really the aggregate results of twenty-four distinct duplicate experiments, each of which alone showed the same thing as the aggregate of all.

By abortive ears is meant those "sets" that made only a bunch of husks, and sometimes a small cob, but no grain. It will be noticed that they were by far the most numerous on those rows from which the tassels were not removed. It will also be noticed that the total of the good, poor, and abortive ears is about fourteen per cent greater on the rows on which the tassels were left, while the weight of merchantable corn is more than fifty per cent greater on those rows from which the tassels were removed.

While for a single trial the results of this experiment seem particularly marked and conclusive, it yet remains to be determined whether it will pay for a farmer to remove any considerable proportion of the tassels from his corn, what proportion it will be best to remove (for some evidently must be left), and whether all that it is advisable to remove may be taken off at one time or not. So far as we could estimate the time taken, it certainly paid us from a commercial standpoint to remove all the tassels from one-half the rows this year. It is also still to be determined whether the removal of the tassels would be followed with the same effect in a season and on a soil where there was abundant moisture for all the needs of the plant at the time when the tassels were shooting and the ears forming.—*Cornell Bulletin, Ag. Exp. Station.*

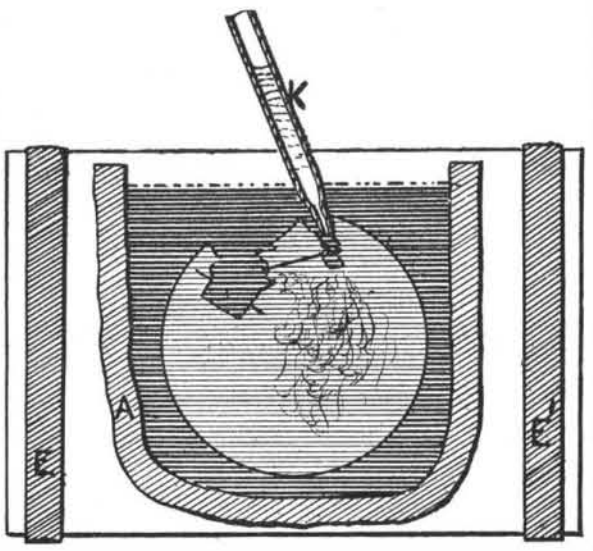
SUBMARINE TELEGRAPH CABLES.—With one or two trifling exceptions, the submarine cables of the world, which stretch over 120,000 nautical miles, and have cost $200,000,000, are of British construction.

A SMOKE EFFECT WITH A SINGLE LANTERN.

The effect of rising smoke in magic lantern pictures is generally produced by means of a double lantern. Upon one of the slides there is a picture in which smoke will come in conspicuously. The other slide is a rackwork arrangement, by means of which the effect of moving smoke is produced upon the screen.

The accompanying figure illustrates a method by which quite a natural smoke effect may be produced with a single lantern; though the variety of pictures to which the effect may be applied is more limited than it is when the older method is employed. The simple manner of constructing a transparent cell is not new. A method which is practically the same is described by Mr. Hopkins in his book, "Experimental Science."

In this case the bottom and two sides of the cell are formed by a piece of soft rubber tubing, A, bent as shown in the figure, and clamped between two glass plates by means of rubber bands, E E'. The glass plates are of a size suited to the slide stage of the lantern. If the cell leaks when filled with water, this may be stopped by greasing the tubing with lard. Upon one of the glass sides is pasted a mask of black paper, having a large circular opening in the center. A silhouette of the head and shoulders of a man smoking a pipe is pasted upside down in the upper part of this opening. K is a piece of glass tubing drawn out to a point and broken off so as to leave a small opening at the narrow end. The cell is filled with a moderately strong solution of some soluble sulphate. The glass tube is partly filled with a solution of baric chloride, by dipping the pointed end into that liquid to a depth of about an inch, and then removing it with the finger placed over the upper end. The outside of the tube is then wiped dry. If the small end of the tube is now held in the cell about half an inch above the



bowl of the pipe, and a little of the chloride is allowed to escape by moving the finger at the upper end, a cloudy precipitate of baric sulphate will descend through the liquid. When this operation is projected upon the screen, the cloud will appear to rise from the bowl of the pipe. The tube should occasionally be placed behind the face of the silhouette, to produce the effect of smoke issuing from the mouth of the smoker. It requires a little practice to make sure of producing smoke clouds of a natural appearance. It will be observed that the tube must be kept hidden behind some part of the picture.

Of course this effect may be applied to quite a variety of silhouette slides. It may also be used with transparent pictures whose foreground is dense enough to hide the tube and precipitate. In some cases, where the column of smoke may be of considerable width, the end of the tube need not be brought behind the visible part of the picture at all. No doubt other precipitates than baric sulphate will answer equally well.

LANGTON BYLLESBY.
254 Allegheny Ave., Allegheny, Pa.

Rapid Telegraphing by the Wheatstone Machine.

The most valuable factor in carrying on the immense volume of telegraphic business between New York and Chicago, during the breaking of wires by the storm of January 25, was the Wheatstone instrument, as stated by Acting Wire Chief C. B. Mitchell to a reporter of the New York *World*. The Wheatstone is a duplex machine which the telegraph people refer to as the "old mill," because it can grind out such an amount of "copy." An expert telegraph "sender" can transmit forty words a minute. The Wheatstone can do ten times as much and keep it up indefinitely. All that is necessary to do is to take the dispatches which are to be sent and give them to a man who takes a punch and cuts dashes and dots and spaces into a strip of paper to represent the letters of the message to be transmitted. When he gets through this operation, the perforated slip looks not unlike a sheet of orguinette music, only it is not so wide. When several thousand words have been properly prepared, the strip of perforated paper is fed into the mouth of the old mill and the message is ground out at the other end of the line at the rate of four hundred words a minute. The machine works mechanically and does not require an operator of skill. The transmitted message is received at the other end in the shape of a strip of paper punched full of dots and dashes representing the Morse alphabet. This strip is cut up into sections and placed in the hands of expert typewriters who read the Morse alphabet, and the message is reproduced in printed characters. This machine will furnish work enough to keep ten girls busy copying. During one of the most trying days of the recent storm the longest time there were open wires between New York and Chicago was about one hour, and the Wheatstone transmitted 30,000 words in that brief space of time, thus doing the work of ten expert senders. Had it not been for this, there would have been a great load of delayed business that day.

Joaquin C. G. Vianna.

The central figure of the India rubber world at the present time is Joaquin C. G. Vianna, or Baron de Gondoriz, who, backed by foreign and native capital, is boldly endeavoring to corner the entire rubber output of the Amazon region. About forty-five years ago, Vianna first saw the light of day in a small village near Oporto, Portugal, and at an early age was sent, as was the custom with well-to-do people in his country, to England, to receive an education. He was bright, studious, and industrious to a remarkable degree, as shown in the letters which he often writes to this country, and which are written in a smooth, flowing hand, and are models of English business diction. He also speaks our language without the slightest accent, and with grammatical accuracy.

Going to Para at an early day, he entered the house of Victor Roiz d'Oliveira & Co., as a clerk, but the senior partner of that company afterward retiring, he succeeded him in the partnership. It was then that he began to show signs of his intrepidity in attempting to control rubber values, for in a short time afterward he formed the firm of Vianna & Co., and attempted to corner the market.

The manufacturers of this country combined against him, and an eventful struggle commenced. Vianna forced the price up to $1.25; but the united efforts of his opponents were too much for him, and he reluctantly yielded after a campaign of nearly a year's duration, with heavy losses. He was next heard of in the firm of Barros & Vianna; then in the Uniao Commercial, firms which he carried on with good success until 1887, when he formed the Nova Uniao, with increased capital, but its operations were unfortunate, and its affairs soon passed into liquidation.

At this time his brother, much younger than he, had formed the company of J. Vianna & Co., while he himself united his fortunes with the Cia Mercantil of Para, a company which at the beginning of the season was credited with the purpose of controlling the rubber product of the Amazon. Other companies have lately sprung into existence, the Empreza Industrial do Gran Para, under the auspices of the Banco Emissor, and the Empreza Industrial do Norte y Oeste do Brazil—results of the great prosperity in that country in the past year. The bank has a very large amount of capital at its disposal, and as it is credited with an understanding among the rubber men to advance any reasonable amount to them, this feature is a very strong factor in the situation. As a consolidation of all interests in Para has now been made, and placed under the control of Vianna, nothing now remains but to execute the scheme, the success of which seems to rest entirely upon Mr. Vianna. A knowledge of his personality is, therefore, interesting at this juncture.

His abilities command the admiration and confidence of his associates, both at home and abroad. He is clear headed, incomparably bold, quick of decision, fertile in resource, active, and with these qualities is combined a resolute will which does not discern defeat until the last gun has been fired. This is the man who will be carefully watched for the next few months, and whose name will probably be in the mouth of many a person who happens to get short of a contract in the market. In appearance, the Baron de Gondoriz is about five feet four inches tall, of full habit, light complexion, and red hair. He smokes the conventional cigarette of the country, but does not taste liquors. He is a good companion, agreeable in manner, and chummy in conversation. He is married, the baroness being a Para lady of excellent family and wealthy. The title he bears comes to him from the king of Portugal, whose subject he remains. He is a good traveler, visiting this country and Europe quite often, and in New York is quite well known. His acquaintances here say that he is quite able to hold his own, in business matters and leadership, with the best minds in Wall Street.—*India Rubber World.*

NATURAL GAS IN ENGLAND.—The Salt Union borings have been proceeding simultaneously in Cleveland and Cheshire. It is reported that in the former district natural gas has been struck and issues in great volumes.