Birckel's lamp has been used for nearly a year in the Pechelbronn mines, which are very fiery, without any accident having happened.

A Good Suggestion to Housekeepers.

No one knows until she has tried it, says an experienced housewife to one of our contemporaries, how much she may change the aspect of things about the house by using a little varnish. On a sunshiny day take the old chairs and tables out on the porch or by an open door, and, after thoroughly dusting and wiping off with a damp cloth, apply a thin coat of varnish, and so cover up scratches and marred spots of all kinds. It will dry in a very short time, and you will be surprised to see how much good you have done. A flannel cloth, with a very little linseed oil, is good to rub furniture with, but the greatest care must be exercised to prevent any oil being left on the wood to attract dust. It must be rubbed until you would not know, except by the improved appearance, that any oil had been used.

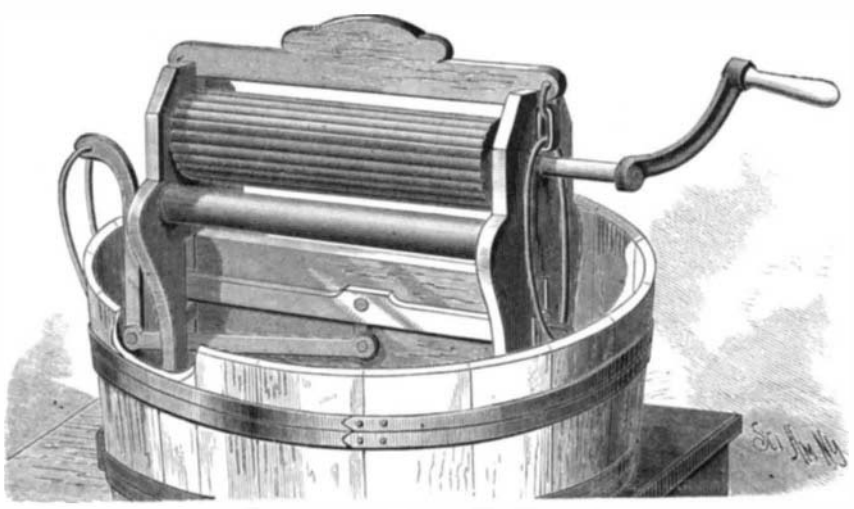
NOVEL WASHING MACHINE.

The washing machine shown in the annexed engraving employs a system of rods and levers by which the vessel and water in which the clothes are washed are made to produce the pressure necessary to cause sufficient friction for cleansing the goods, and insure a uniform pressure upon all thicknesses of material without the use of springs or complicated devices.

In machines of this class it has been the general practice to employ springs to produce the necessary pressure, and this is the principal reason why clothes washers have not come into more general use. Where springs are used the thicker the goods the greater the pressure and the more difficult it is to use the machine, but where the weight of the tub, water, and washing apparatus is employed the pressure is uniform on all thicknesses, and the work of washing with the machine becomes easy.

The washing machine, consists of three rollers mounted in a frame fixed to the bottom of the tub, two of the rollers having stationary bearings, while the third or upper one has movable bearings connected by straps with a cross bar beneath the lower rollers. This cross bar is connected by a link with a lever fulcrumed in the frame of the machine; the longer arm of the lever being connected with a standard rising from the bench.

The side of the tub opposite the standard is pivoted or hinged to admit of the oscillation of the tub as the rollers adapt themselves to clothes of different thicknesses. This invention was lately patented by Mr. J. K. Dugdale, of Richmond, Ind.



DUGDALE'S WASHING MACHINE.

Effects of Optical Slits.

M. Trève has lately described some curious effects. Looking through a fine slit at a vertical object (a post or a mast for instance), he finds the perception much more distinct when the slit is horizontal than when it is vertical. On the other hand, to distinguish horizontal lines more clearly, the slit must be held vertically. But if, in general, one look at a house or a landscape through a fine slit, it is found that the maximum of brightness of the horizon is when the slit is horizontal. This effect, it is said, is also produced with the solar and lunar disks; they are seen much more distinctly with the horizontal slit. M. Trève has reproduced the effect by photography, and the negatives taken with the horizontal slit were more distinct. The light appears to be propagated with more intensity through the latter than the former, the vertical bands of solar photographs showing well the interferences and passage of light through a vertical slit. Again, if a cross-slitted disk be held between the sun and white screen, the horizontal part of the cross on the screen is brighter than the vertical. The practical application of these experiments of M. Trève to photography would appear to be the relation which they bear to the shape of the apertures of diaphragms and to instantaneous shutters. Is it a fact with regard to the latter that the uncovering of the lens horizontally admits more light, and therefore produces a picture more quickly than a shutter which opens vertically? There may be no difference, but the point, at any rate, is worth deciding.—*Photographic News.*

Seaweed Jelly.

The seaweed, *Arachnoidiscus japonicus*, which is used by the Japanese and Chinese to pack porcelain and other articles for exportation, is said, by the *Journal of Applied Science*, to be made use of in France for the purpose of making a spurious fruit jelly. When placed in a tumbler of water it absorbs the water in a few minutes; then a number of shoots grow, and constitute a jelly nearly as transparent as the water from which it is made. The jelly is easily sweetened with glucose, and cochineal or other coloring matter is added with equal facility to imitate the color of the fruit. The perfume and the taste were the only real difficulties that remained to be overcome. After considerable study it was discovered that by using a mixture of certain ethers with tartaric acid, glycerine, etc., a perfect imitation of the odor of raspberries was produced. By putting a little of this essence to the seaweed which has been allowed to develop itself in water, a substance is obtained which has the consistency of fruit jelly, though no fruit has been used, which is sweet, though no sugar has been employed, and which has the color and fragrance of raspberries, though altogether destitute of that fruit. When this ceases to please, another very good fruit flavor is produced by treating castor oil with nitric acid. The jelly still retains a little of the fibrous nature of the plant, and has a tendency to split and fall to pieces, instead of forming adhesive lumps. Examined by the microscope, it has no resemblance to the jelly made from fruit. Then, as the jelly must be colored, it is easy enough to discover the presence of an artificial dye. Without resorting to the laboratory, it suffices to dissolve a little of the suspected jelly in some tepid water, and dip a white silk ribbon in the solution. If it is a natural jelly the ribbon will only be a little soiled; but if the jelly has been artificially colored the ribbon will also be colored.

ENGINEERING INVENTIONS.

Mr. William H. Birge, of Franklin, Pa., has patented an improved storage tank for petroleum, so constructed that the floating cover can never sink to the bottom of the tank, and so braced that it will stand all weather and wind storms without the necessity of an external roof or other inclosure. The floating cover is so constructed that it will serve the purpose of a roof and afford ready access to the interior of the tank, and also a partial roofing made in sections whereby the body of oil is protected from rain and from fire.

An improvement in connecting rods has been patented by Mr. Jacob J. Anthony, of Sharon Springs, N. Y. The object of this invention is to provide a lubricating connecting rod for cranks, crank pins, slides, or other parts of mechanism where connecting rods are used. It is composed of a straight tube forming an oil chamber, having a journal box secured on each end and communicating interiorly. The caps of the journal boxes are held in position by straps extending parallel with said tube and on either side of it.

Mr. Daniel Gallafent, of Woolwich, County of Kent, England, has patented an improved rotary engine, which may be driven by steam, compressed air, water, or gas, and which may be adapted for use as a pump, a water meter, a blower or exhauster, or as a hydraulic buffer for absorbing or destroying the recoil of heavy guns, or other purposes.

Mr. Robert H. Elsworth, of Bayonne, N. J., has patented an improved boat for transporting city sweepings and offal to sea and safely and quickly discharging them. The invention consists of a barge covered amidship for nearly its entire length with a peaked roof or deck that slopes downward on both sides from a central longitudinal line at an angle of about forty-five degrees to the side-rails of the boat; and it consists, further, of hollow or box guards extending along each side of the boat or barge above the water line, open at the top and provided at the bottom with doors that swing open downward, these doors being simultaneously operated by ropes or chains that are made fast to winches or other suitable devices, the intention being that the sweepings and garbage loaded on the sloping deck and in the guards shall be quickly discharged on either side of the barge by opening the guard doors, so that even in very shoal water the barge load may be discharged clear from the barge and without interfering with her movements.

IT is stated that the Bank of France has almost entirely abandoned chemical tests in favor of the camera for detecting forgeries. The sensitive plate not only proclaims forthwith the doing of the eraser or penknife, but frequently shows, under the bold figures of the forger, the sum originally borne by the check. So ready is the camera to detect ink marks that a *carte-de-visite* inclosed in a letter may to the eye appear without blemish, while a copy of it in the camera will probably exhibit traces of writing across the face, where it has merely been in contact with the written page.

IN a letter to *La Nature*, M. Cornillon states that when observing the sun lately with a telescope, he was struck with certain undulatory movements on the disk. On inquiry into their cause he is led to connect them with the wind blowing on the earth's surface at the time. They vary in intensity with this, and they have generally (but not always) the same direction as the wind. Where they have a different direction they indicate a change of weather, or at least the direction of the wind next day.

The Timber Line of Mountains.

Some very interesting facts were brought out at a meeting of the Academy of Natural Science of Philadelphia, concerning the timber line of mountains. The highest Alpine vegetation consists for the most part of short stemmed perennials. Lower down are found dwarfed trees of species, which, still further down the mountain sides, form forests of considerable height, and which, as trees suited to merchantable purposes, make what is known to mountain travelers as the timber lines. In the mountains of Colorado the forests commence at about 7,000 feet above sea level, and continue up to about 11,000 feet, when they suddenly cease. At this point the coniferous trees are from thirty to forty feet high, and above the same species exist as stunted shrubs, seldom exceeding three or four feet in height, and often but a foot, though trailing widely over the ground. In this dwarfed condition they are often found some 1,500 feet higher up, or half way from the recognized timber line to the top of the mountain. On Mount Washington, in New Hampshire, which is a little over 6,000 feet high, the timber runs up to about 4,000 feet, while Mount Webster, a mountain forming the southern peak of the same chain, and about 4,000 feet high, has little timber above 3,000 feet. Roan Mountain, in North Carolina, is about 6,300 feet above the level of the sea, and on some parts of it timber extends to its summit. At a height of 6,000 feet a black oak was measured that was five feet in circumference at three feet from the ground, and forty feet high.

The question as to the peculiar course of the timber line is a mooted one. Until recently it has been referred wholly to climatic conditions, of which temperature and moisture have been regarded as the chief elements in producing the result. The objection urged to this theory is that the dwarfed and gnarled cone-bearing species, extending so many hundred feet up the mountain sides, never produce seed, which leads to the alternative of believing that the seeds have been carried up the mountain sides in enormous quantities and to great distances from the fruiting trees below by winds, or else that there were seed-bearing progenitors of these scrubby trees, beneath the tall protecting branches of which they had their earliest stages of growth. The result of an examination of different parts of Mount Washington favors the latter supposition. As is generally known, there is a railway running straight up the mountain side from the base to the summit. Near the timber line a cut about ten feet deep had to be made through an area covered by mature balsam firs. Under the trees moss and dead roots and old fir leaves had made an earthy strata of a foot in depth. The moss was still green from the rains, melting snows, and fogs of this elevated region, and sustaining the various kinds of low vegetation common to such heights. Young firs were springing up in great abundance, but all the larger trees were dead, though here and there might be seen a branch with a few lingering green leaves. This mass of dead, standing timber occupied several acres, and the reasor of the death of the trees was evident. The cut showed that the forest stood on a mass of large but loose rock, through which the water from the mountain above rushed, carrying with it all the earthy matter on which the larger trees had subsisted, but leaving the tough, turfy matter at the surface, on which the smaller trees of the same sort may live for many years. With the death of the larger trees there is an increase of light, and then the grasses and sedges speedily take possession, holding together the loose soil and permitting, in many cases, an increase of the earthy layer by holding much of the disintegrated rock which washes down from above.

A careful examination of the patches of scrubby spruces above the timber line not infrequently shows dark patches of vegetable mould, evidently the remains of larger trees that have been growing, where now only the masses of small scrubby plants exist. In some places a sharp stick may be pushed down among the dwarf firs and spruces, and the mass of roots intermixed with earth found to be but a foot or so deep over the loose rock from which the earth has been wholly washed away. Again, there are some places, often nearly an acre in extent, where the scrubby firs are still standing, dead, from the earth having been washed away, not leaving enough for even the moderate demands of these small bushes.

It is evident that many of these dwarfed specimens are of a great age. Some that were examined were certainly fifty years old, though the stems at the ground were no thicker than a man's wrist, and, trailing on the ground, occupied but sixteen or twenty square feet of space.—*N. W. Lumberman.*

Large Locomotives.

The working of the experimental locomotive, "No. 10," lately tried, of the Pennsylvania Railroad, has been so satisfactory that ten more of the giants are to be built at the Altoona shops this summer. The driving wheels of the "No. 10" stand 6 feet 6 inches above the rails. It is said that ever since it was put upon the fast train between New York and Philadelphia, this engine has been making a mile in fifty-seven seconds on up grade with a long train in tow without getting heated. It makes more than a mile a min-

ute and "keeps cool." Of course there is a great consumption of fuel. In 180 miles 12,000 pounds of coal are used up. The water tank contains 3,000 gallons, 400 more than is usually carried. Everything else is on a proportionately large scale. Only the delay in getting boilers sufficiently large has prevented the completion of two others of nearly the same pattern.

NOVEL CANDLESTICK.

The engraving shows a candlestick which has a candle receptacle formed of elastic fingers capable of fitting can-

NOVEL CANDLESTICK.

dles of different diameters, and it has a case for matches contained within a hollow pillar supporting the candle receptacle.

The hollow pillar bearing the candle receptacle is permanently fixed to a base plate, and the match case, which is entirely separate from the other parts, is introduced into the pillar through an opening in the base plate, and kept there by spring catches. It is readily removed to expose the matches.

This invention has been patented by Mr. M. Brassill, of Hartford, Conn.

NEW TELEPHONE TRANSMITTER.

We give an engraving of a new transmitting telephone, patented by Mr. E. Berliner, of Boston, Mass., and owned and made by the American Bell Telephone Company, of that city. Fig. 1 is a front view and Fig. 2 a perspective view showing internal parts.

The instrument is very simple and compact, and has the all important advantage of not being liable to disarrangement.

The principal feature of the invention is the disposition of the carbon contact surfaces, one being attached to the diaphragm, the other being supported by a metal socket attached to a hinged plate secured to an arm that projects from the back of the mouthpiece downward over the diaphragm. This arm serves the double purpose of supporting the free carbon electrode and clamping the diaphragm in its place against the back of the iron mouthpiece. The diaphragm is bound around the edges with soft rubber, and is separated from the mouthpiece by a ring of pasteboard. The iron mouthpiece is hinged to a casting fastened to the circular box which contains the induction coil and supports the binding screws for the battery, line, and ground wires. To the front of the induction coil is attached a plate connected with the battery wire, and carrying a spring having in its free end a screw which bears against a spring connected with the center of the diaphragm and acts as a dampener as well as a conductor, through which the current passes to the carbon electrode at the center of the diaphragm. The battery current enters at one of the binding screws, passes through the primary wire of the induction coil, through the spring and carbon electrode at the center of the diaphragm, through the hinged electrode, metallic mouthpiece and its hinge, and back through a binding screw to the battery.

The variation of the current in the primary circuit occurs at the contact of the two carbon electrodes, the contact being varied by the vibration of the electrode attached to the diaphragm.

When the transmitter is used for long distance telephony, the pendent carbon electrode is made heavier, to reduce resistance in the local current and to amplify the electrical undulations.

The terminals of the secondary wire of the induction coil are connected with the two remaining binding screws, which are connected, one with the ground and the other with the line, in the usual way.

The accessory devices connected with this transmitter may be of the usual character. It will operate well with any of the well known forms of receiver, and is easily managed and thoroughly efficient. This transmitter has been well introduced, and large numbers of them are being used in Europe. They have been adopted on several of the leading German railways, and are extensively used in the German postal service.

Fig. 1

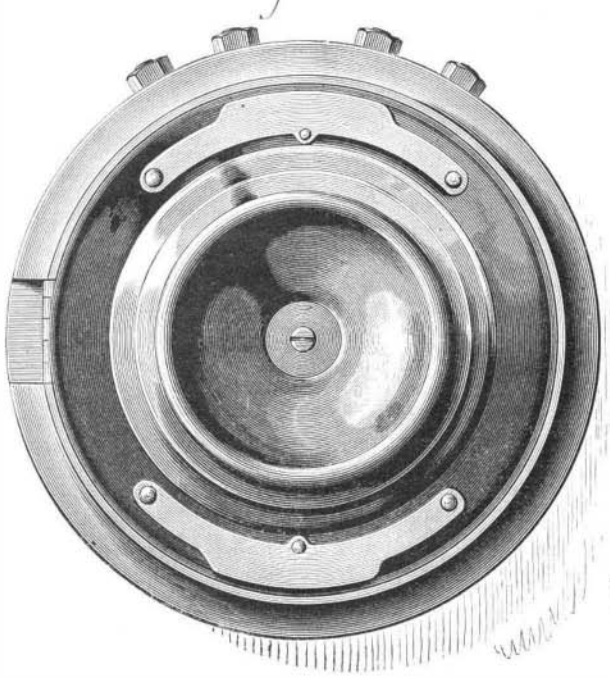
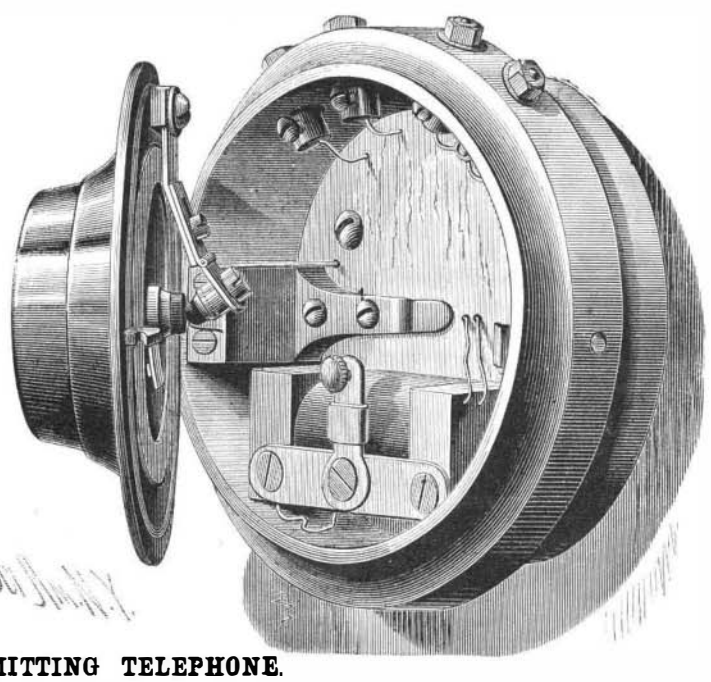


Fig. 2



BERLINER'S TRANSMITTING TELEPHONE.

100,000 Buffalo Killed Last Winter.

It is estimated by competent authorities that 100,000 buffalo hides will be shipped out of the Yellowstone country this season. Two firms alone, says the *Sioux City Journal*, are negotiating for the transportation of 25,000 hides each. When to this is added the immense amount of skins and furs of other kinds—deer, elk, antelope, bear, beaver, etc.—some idea may be formed of the extent of the Yellowstone pelt and fur trade.

Most of our citizens saw the big load of buffalo hides that the C. K. Peck brought down last season, a load that hid everything about the boat below the hurricane deck roof. There were 10,000 hides in that load, and they were all brought out of the Yellowstone on one trip, and transferred to the C. K. Peck. How such a load could have been piled on the little Terry not even the men on the boat appear to know. It hid every part of the boat, barring only the pilot house and the smokestacks. But such a load will not be attempted again. For such boats as ply the Yellowstone there are at least fifteen full loads of buffalo hides and other pelts. Reckoning 1,000 hides to three car loads, and adding to this fifty cars for the other pelts, it will take at least three hundred and fifty box cars to carry this stupendous bulk of peltry East to market. These figures are not guesses, but estimates made by men whose business it is to know about the amount of hides and furs awaiting shipment.

Nothing like it has ever been known in the history of the fur trade. Last season the output of buffalo hides was above the average, and last year only about 30,000 hides came out of the Yellowstone country, or less than a third of what is there now awaiting shipment.

The past severe winter caused the buffalo to bunch themselves in a few valleys where there was pasturage, and there the slaughter went on all winter. There was no sport about it, simply shooting down the famine-tamed animals as cattle might be shot down in a barnyard.

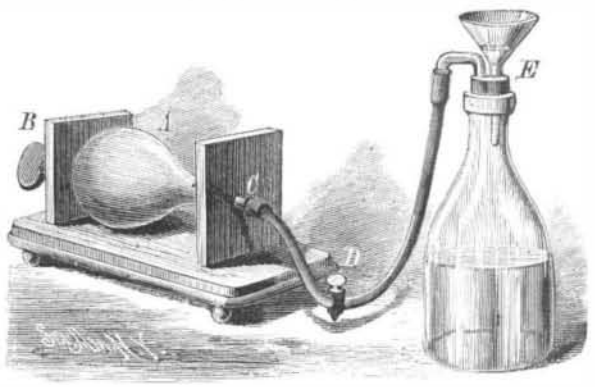
To the credit of the Indians it can be said that they killed no more than they could save the meat from. The greater part of the slaughter was done by white hunters, or butchers, rather, who followed the business of killing and skinning buffalo by the month, leaving the carcasses to rot. When the buffalo are all killed off, as they bid fair to be in a very few years at this rate, then everybody will wonder that the government did not do something to preserve this. the noblest of animal game, or at least prevent the killing of the buffalo for the hides alone.

A SIMPLE FILTER PUMP.

BY JOHN EITEL.

The engraving shows a simple device for accelerating the operation of filtering. It is intended to replace the Bunsen filter pump in many instances, and it consists of a collapsible rubber bulb, A, mounted between two standards and capable of being compressed by the thumbscrew, B. The mouth of the rubber bulb is connected with the filtering bottle by means of a flexible tube provided with a pinch cock, D. The filtering funnel is provided with a small platinum cone which prevents the filtering paper from being drawn downward with such force as to rupture it.

The exhaustion is effected by first expelling the air by turning the screw, B; the flexible tube is then connected and the screw retracted, to produce a partial vacuum. To ren-



A SIMPLE FILTER PUMP.

der the operation continuous the cock, D, is closed when it becomes necessary to again expel the air from the bulb.

The Uses of Mica.

The *Tradesman*, referring to the mica beds which have been recently discovered in East Tennessee, adds:

The mica chiefly met with in commerce is of that variety which is proof against acids and intense heat. Its toughness, elasticity, and close approach to transparency naturally led, at first, to its use for windows, and especially to its employment in lanterns. It is found in large quantities in North Carolina, where there are unmistakable evidences that some of the beds were worked a great many years ago. The finer sheets of tough mica are now used for such purposes as the dials of compasses, the lettering of fancy signs, covering photographs, constructing lamp shades, reflectors, etc. Of late, mica has been used in the soles of boots and shoes, as a protection against dampness. The invention consists of a sheet of mica embedded in thin coatings of cement and placed in the boot or shoe between the outer and inner sole, the upper leather lapping over its edges, and covering the upper space from the toe to the instep.

There are many other uses to which mica is put, and it is becoming more and more valuable as the arts and trades progress.

A Monster Cylinder.

There was cast at the Morgan Iron Works, in this city, the other day, what is said to be the largest steam cylinder ever cast. It is 16 feet 1½ inches long, 110 inches in diameter, and required for its casting 45 tons, or 90,000 pounds, of gun metal. It is intended to accommodate a piston stroke of 14 feet. The metal in the thinnest part is 1¾ inches thick, and the flanges at the top and bottom are 2⅝ inches thick by 5¾ inches wide. Under the top flange the cylinder has a belt 16 inches wide, another 6 inches wide above the bottom flange, and between these two, three more belts, each 6 inches in width. The thickness of the metal at the belts is 2⅛ inches. A nozzle for the upper steam chest is cast on the cylinder, with an opening 14½ by 63 inches, the metal on the top of this nozzle being 1¾ inches in thickness, and on the sides and bottom 1½ inches.

The casting of this massive piece of work was done in a mould constructed of brick, and lined with loam, the outside being covered with heavy iron plates to prevent the matrix from bursting when the molten metal was poured in. The mould is constructed of one cylinder of brick and loam within another, the space between them being the required thickness of the casting, the flanges, belts, and other parts