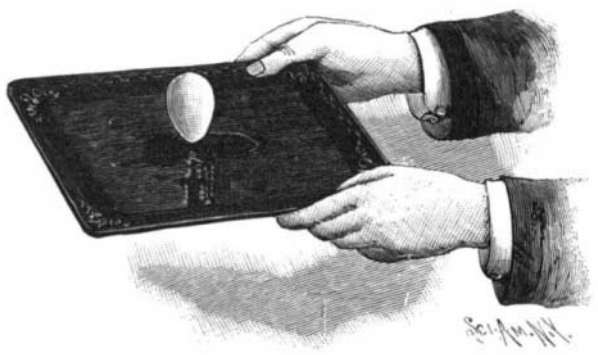
EGG AND POTATO TRICK.

For some reason or other jugglers have always been very fond of egg tricks, and in the repertoire of many of them, the egg takes an important position. Few laymen know that it is impossible to balance a raw egg. Jugglers use hard-boiled eggs, which are spun on their small ends on shallow japanned trays. If the tray is kept gently moving in a small circle in the opposite direction to that in which the egg is spinning, the latter will continue to spin as long as desired.

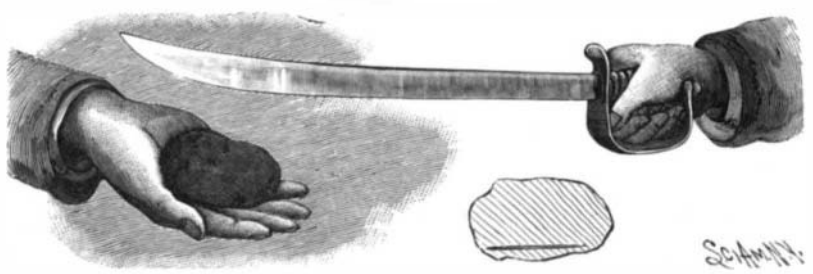
A fitting finale to any juggling act is to place a potato on the hand of an assistant and cut the potato in two with a sharp sword without leaving any mark upon the skin. A second potato is often cut on the neck of the assistant.

Among the several medium sized sound potatoes on a tray are placed two potatoes prepared as follows: Insert a needle crosswise of the potato near the bottom. After showing the sword to be really sharp, by cutting paper and slicing one or two of the potatoes, the performer picks up one of the prepared potatoes and places it on the assistant's hand; but apparently it does not lie to suit him, so he slices off one side of it, using care to cut away the side just under the needle and as close to it as possible, then places the potato once again on the assistant's hand. After making a few flourishes with the sword, he cuts through the potato, dividing it in half.

In striking the potato with the sword he makes sure that the sword will come exactly crosswise on the needle; consequently, when the sword reaches the needle it can go no farther, and the brittle nature of the potato will cause it to fall apart, the very thin portion below the needle offering no resistance to the separation. The second potato is then cut in the same manner on the assistant's neck. There are many other false juggling tricks, but the above will suffice to show that "there are tricks in all trades but yours."



SPINNING AN EGG.



CUTTING A POTATO ON THE HAND.

STEEL WIRE GUNS.

It was along about 1850 that Mr. Woodbridge first presented an iron gun wound with steel wire to the American government. The object that the inventor had in view was to reinforce cannon and, consequently, permit of the use of higher internal pressures. But this first tentative was unsuccessful, since certain arrangements, such as the welding of the wires together and the tension given them, were followed by poor results.

Five years later Mr. Longridge experimented in England with a gun based upon the same principles, and which may be regarded as the first steel wire cannon. The same study was undertaken in France, between 1871 and 1880, by Capt. Schultz, and then abandoned.

At present everybody is in accord in recognizing the advantages of this mode of construction, as far as the resistance of the piece is concerned, and for the last few years England has not hesitated to render such system of artillery reglementary. Its entire new fleet is provided with it. It is even surprising that it delayed entering upon the manufacture of such guns so long. The reason was that it was claimed for a long time that steel wire cannon were wanting in longitudinal resistance. This sort of prejudice was due to the results furnished by the first guns of the kind, which were composed of a simple bronze tube wound with several layers of wire. Under such circumstances, the longitudinal resistance was feeble, and the guarantees of safety and duration were insufficient.

Subsequently, the use of a jacket carrying the breech block and trunnions has dispelled every doubt that this new artillery could give rise to.

Mr. Longridge, continually improving his processes of manufacture, has finally produced a powerful gun that is capable of withstanding in the chamber pressures that amount to nearly 5,000 kilogrammes to the square centimeter.

In No. 1 of the accompanying figure, from La Nature, is represented an English rapid-fire regulation piece of 152 mm. of the Longridge model. Its length is 6·3 meters—say about 41 calibers. It consists of a bored steel tube of 152 mm. diameter, upon the back part of which is shrunk a second steel tube, around which are wound several layers of steel ribbon 6 mm. wide and 1·5 mm. thick. The resistance of these ribbons to rupture is comprised between 140 and 150 kilogrammes per square millimeter of section. Their tension is regulated by special machines. Over the ribbons is fixed the jacket, designed, as we have stated, to assure longitudinal resistance.

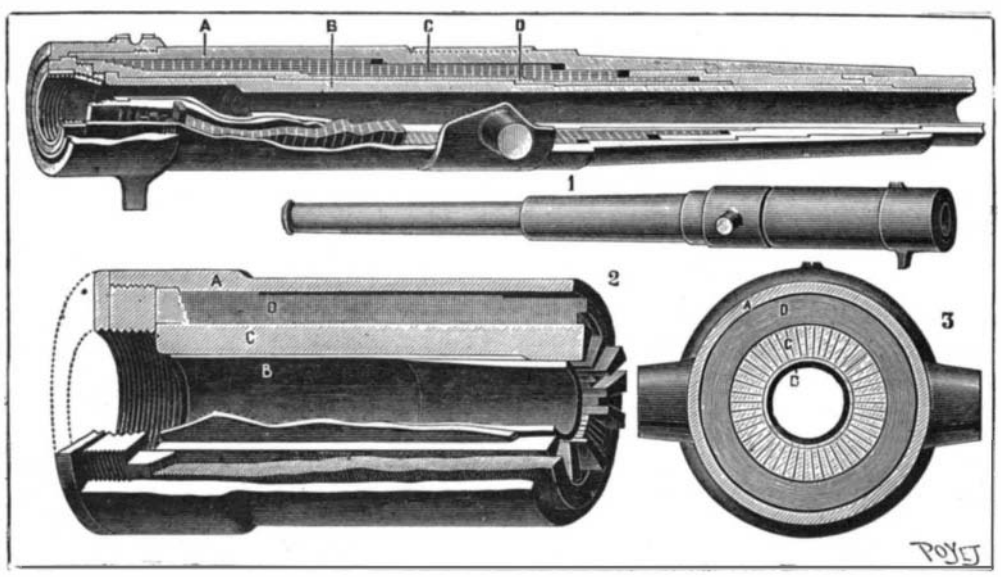
In the construction of steel wire guns, England has been followed by the United States. Mr. Brown, who is well known on the other side of the Atlantic through his remarkable work upon artillery, proposed to the war department of the United States a system of cannon in which the ordinary steel hoops were replaced by windings of wire. One of the peculiarities of this gun consists in the replacing of the second steel tube of the Longridge piece by a series of jointed segments that unite with each other upon a thin steel tube. This latter constitutes the chamber of the gun and is provided with the grooves that give the projectile its rotary motion.

According to Mr. Brown, the advantages presented by this new gun reside especially in the use of materials, such as segments, wire, etc., of small dimensions, the material to be given the highest possible qualities of resistance, and ensures very perfect results.

The manufacture of the new piece is relatively simple. The longitudinal segments are assembled as shown in Figs. 2 and 3, and the two extremities of the tube thus formed receive a ring. The whole is then turned upon a lathe in such a way as to give it the proper dimensions, and form upon the external surface a series of steps of which the height is precisely equal to the thickness of the steel wire designed to form a hoop.

These wires have a square section of 3·5 mm. They are wound successively over each step and alternately in one direction and the other, the proper tension being given them by a special machine. After the winding is finished, the gun is heated, and there is introduced into the interior a thin steel rifled tube.

The jacket that carries the breech block and trunnions assures the longitudinal resistance, as in the English pieces. Such resistance is further increased by the arrangement adopted for the winding of the wires.



1. English Regulation Gun of 152 Millimeters Caliber: A, jacket; B, internal tube; C, steel ribbons; D, second tube.
2 and 3. Sections of the Brown Gun: A, jacket; B, internal tube; C, segments; D, steel wires.

Mr. Brown made his first experiments with a 25 mm. gun. As the results were favorable, he constructed upon the same principle a piece of 127 mm. caliber and 5,300 kg. weight. The tests of this, which were made under the supervision of the United States war department, were very remarkable, and the piece showed an unprecedented resistance.

A second gun of the same caliber, presented by the inventor, was experimented with in 1893 at Sandy Hook. It was put out of service after 216 shots by the splitting of the internal tube, and after there had been developed in the chamber a pressure reaching 5,800 kilogrammes to the square centimeter.

The experiments have, therefore, fully decided in the inventor's favor. The only difficulty consists in the selection and arrangement of the internal tube, which, in the experiments, exhibited a slight weakness. This has not prevented the United States government from deciding upon the construction of a Brown gun of 250 millimeters caliber.

The length of the wire designed for the winding will be about 120 kilometers. Upon the English guns of 305 millimeter caliber, the length reaches 160 kilometers. Mr. Brown estimates that the initial velocity will be from 900 to 930 meters per second. If the experiment proves a success, the Americans will possess a gun that will be greatly superior to any of those now employed in the various European navies, and, with their habitual spirit of decision, they will doubtless make a transformation in their present armament, which leaves much to be desired.

The Waste of Shipping.

Lloyds Register keeps us informed as to the waste of shipping. There are many causes which lead to vessels being removed from the register. Most of them are painful to contemplate, since they involve danger to life, while one gives cause for satisfaction. A certain number of vessels are broken up or condemned, and it would be well if this number were greatly increased, since it would reduce the loss under other heads. It is not often that the well-found ship appears in these returns under the headings of "Abandoned at Sea," "Foundered," "Lost or missing." The experience of the Atlantic companies has shown that a ship can be rendered almost as safe as a house on shore by a liberal expenditure of money and by increasing vigilance on the part of the captain and crew. It is the ship on which undue economy is exercised that usually falls a prey to bad weather.

The period of July 1 to September 30, 1897, was not marked by any excessive amount of casualties. During that time 176 vessels, or 137,286 tons, were removed from the register in various ways. This compares favorably with the same period in 1896, when 211 vessels, or 162,724 tons, were removed. It is, however, slightly over the average for the past decade. There is improvement under every heading, as compared with the same quarter of last year, except under "Wrecked," and this increase seems to be due to the larger size of the vessels, and not to an augmented number of casualties.

In the third quarter of 1896 there were 96 vessels, or 62,763 tons, wrecked, against 80 vessels, or 68,882 tons, in 1897.

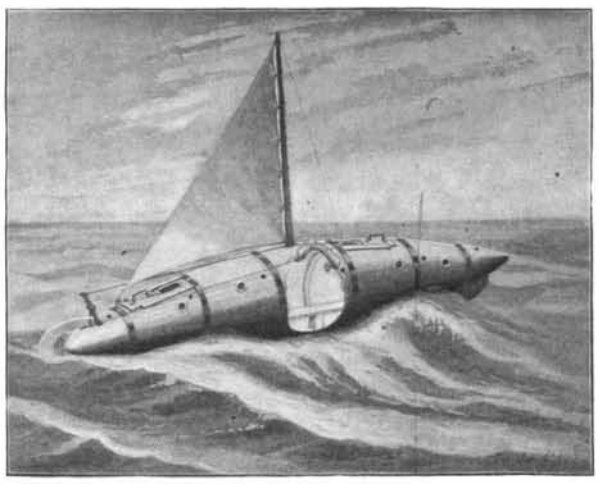
Of vessels owned in the United Kingdom, there were 21 lost in this way in each quarter, but in 1896, 33,000 tons. There were 42 vessels, or 35,325 tons, broken up, condemned, etc., in the period under review, against 39 vessels, or 47,640 tons, last year. The vessels which foundered seemed to have been generally of small size, and only two, totaling 454 tons, were owned in the United Kingdom.

When we begin to discriminate between steam and sailing craft, we find that it is the former that accounts for the major portion of the tonnage lost, while the latter swells the number of vessels lost, the vessels being: Steam, 57 vessels, of 84,681 tons gross; sailing, 119 vessels, of 52,606 tons net. During the quarter there was not a single steamer posted as "Burned," "Lost," or "Missing," and only two were abandoned at sea. As against this, there were 11 sailing ships abandoned, six burned, one lost, and four missing. Of vessels owned in the United Kingdom, 0·044 per cent of steam were removed, and 0·057 per cent or sailing vessels, a fact that a timid voyager may well note. The disparity of these figures would be increased still further if vessels broken up were not included. If we were to judge by the tables, the safest ship to go to sea in is a Swedish steamer, since only 0·018 per cent of the vessels under that flag were lost in the quarter. This high figure of safety is not always maintained, but, nevertheless, Swedish steam vessels have an excellent record. Their sailing craft do not do so well, but then many of them are engaged in the timber trade, and any leaky tub is considered good enough for that.

WHAT struck a Fiume, Austria, warehouse and set it on fire turns out to have been a meteor. It was assumed to have been lightning till a four-ton meteoric stone was found in a deep hole in the cellar.

A NEW LIFEBOAT.

The accompanying illustration represents a novel lifeboat which has been devised and patented by James Mitchell, Sr., of Arrow River, Manitoba, Canada. In general form the boat is cigar shaped, tapering from the middle to both ends, and is constructed either of metal or wood. The boat pictured in the engraving is formed of wooden staves, surrounded by hoops and strengthened from within by stout ribs. A large conical block at each end of the boat is provided with a passage or rope guideway, whose ends are at right angles to each other. A rope passes through these guideways, extends through the whole length of the boat and is attached to a ship by the usual means. Within the body of each conical block and intersecting each rope guideway is a recess containing a spring-pressed block. When the rope is removed, the block is automatically forced down so as to prevent the entrance of water. Should it be impossible to lower the boat in the ordinary way by letting out the suspending rope, it may be launched upon an even keel by severing the rope from within.

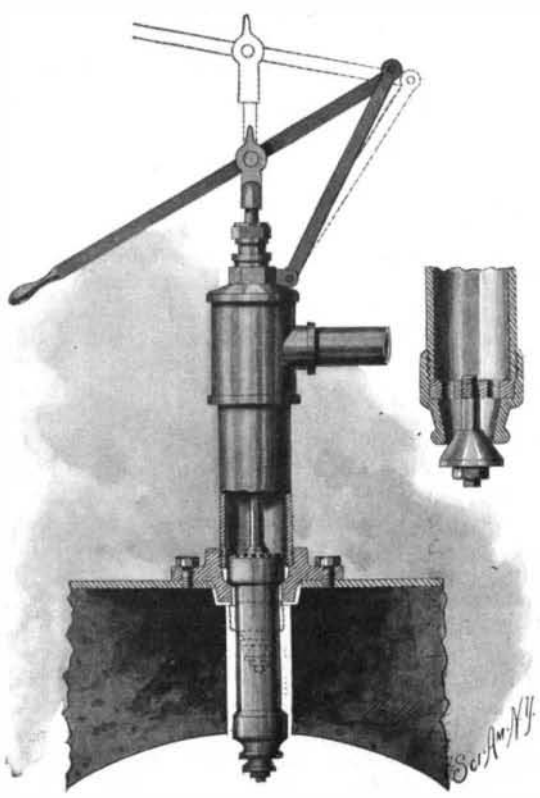


A NEW LIFEBOAT.

Hatchways for the entrance and exit of passengers, a rudder, and steering ropes operated from the hatchways or from within the boat, are all provided. A heavy keel gives the boat stability and rights it, should it be overturned. Ventilating pipes are provided which can be closed by valves to prevent the entrance of water.

A NOVEL SPRAYING DEVICE FOR CARBURETERS.

In using spraying devices for the introduction of oil and hydrocarbons as fuel, it frequently occurs that the intense heat to which the nozzles are subjected causes them to burn out. New nozzles must then be substituted, necessitating the loss of much time and causing considerable expense. To avoid these inconveniences, Mr. George H. Weeks, of No. 412 East One Hundred and Twentieth Street, New York city, has patented a spraying device in which the nozzle is withdrawn from the heated chamber when not in use. Referring to our illustration, it is seen that the spraying device is provided with a protective casing fixed to the walls of the carbureter and screwing into a plate, whose inner surface constitutes a valve-seat. Within the casing a movable cylinder is fitted and provided with a perforated cap, through which oil may pass. The inner edge of the cap forms a valve adapted to engage the valve-seat mentioned previously, so as to prevent the oil from flowing around the cylinder. To the other end of the cylinder another cap is threaded, which forms the head of the nozzle. Into the outer end of this cap an adjustable cone screws, by means of which the size of the spray may be regulated. To the perforated cap upon the inner end of the cylinder a rod is attached which extends through the casing and is pivoted to a lever fulcrumed upon a link. As soon as the spraying is discontinued, the nozzle is withdrawn from the immediate action of the heat merely by operating the lever. In manufacturing illuminating gases, spraying devices of this character would be exceedingly useful, preventing, as they do, the rapid burning out of nozzles and obviating the necessity of frequently substituting new ones for those which have been destroyed.



A SPRAYING DEVICE FOR CARBURETERS.

The Heat of the Incandescent Electric Lamp.

The incandescent electric lamp is essentially a device which transforms electricity partly into light but mostly into heat, says The London Lancet. As is well known, the carbon filament of the lamp is a substance offering great resistance to the passage of the current, and the product of this resistance is light and heat. It is an instance of the translation of one form of energy into another. It may not, however, generally be known that the light produced is but after all only a small percentage of the energy thus manifested—some 5 or 6 per cent only at the most. This fact is very important, bearing in mind a very common notion that the electric incandescent lamp is free from the heat rays. It is true that the lamp when working is not comparable with a flame or naked light, but at the same time the heat evolved is such as may lead to ignition. We are disposed to emphasize this point because the incandescent electric lamp is used for the purposes of illumination and decoration in shops without any regard to the possibility, nay, probability, of fancy goods being fired which happen to be contiguous. Indeed, so firm is the idea that the incandescent electric lamp is free from heat that it is frequently to be found buried in a mass of easily ignited and highly inflammable material. This is a mistake, and care should be exercised with the electric lamp in its application in this connection, but the risk, of course, is not so great as where naked lights are employed. We have found by experiment that on immersing a 16 candle power lamp (100 volts pressure) in half a pint of water, the water boils within an hour and in proportionately less time when a 32 candle power lamp is substituted. If again the lamp be buried in cotton-wool, the wool soon begins to scorch and ultimately to burst into flame. In one experiment which we tried, the bursting into flame of the wool was accompanied by a loud report, due to the implosion of the lamp. It clearly appears from this that the incandescent electric lamp cannot be regarded as an unlikely means of starting a serious fire, and shopkeepers, especially those who exhibit highly inflammable fabrics, should know that there is risk in placing such goods too close to the lamp. The lamp in contact with celluloid fires it in less than five minutes, and therefore the danger is particularly obvious in the case of toy shops, where electric incandescent lamps are often suspended in the midst of toy celluloid balls.

Too Poor to be Economical.

Several leading Americans who have been seeking to place contracts in this country, says the English Iron and Coal Trades Review, both for labor-saving machines and for other American notions of merit, have informed me that they are surprised to find how generally the complaint is made that our manufacturers are too poor to be able to afford the luxury of more economical methods and appliances. In a number of cases this is known to be the case, but it seems to be more largely the fact than most people anticipated. And yet it is not so surprising after all. The majority of the large concerns engaged in the iron and steel industries of this country are limited liability companies, and it rarely happens that limited companies are allowed by their shareholders to provide as large a reserve as they ought to do in order to meet all emergencies. In many cases almost the last sixpence has been paid out in dividends, and repairs and renewals are inadequately provided for. In some industries this might not be a matter of much concern. In the iron and steel industries it counts for a great deal. The truth is that, as history has been lately made in these industries, it has almost been necessary to completely reconstruct mills, forges, and other plant, every ten years, so that any plant kept in use for a longer period has become more or less antiquated. Our American friends appear to have realized this condition more fully than ourselves, and when they find that a plant is no longer up to date they make no fuss about removing and replacing it. It is their readiness in this respect that has brought them to the front; it is our backwardness in the same essential that has left us in many cases lagging behind.

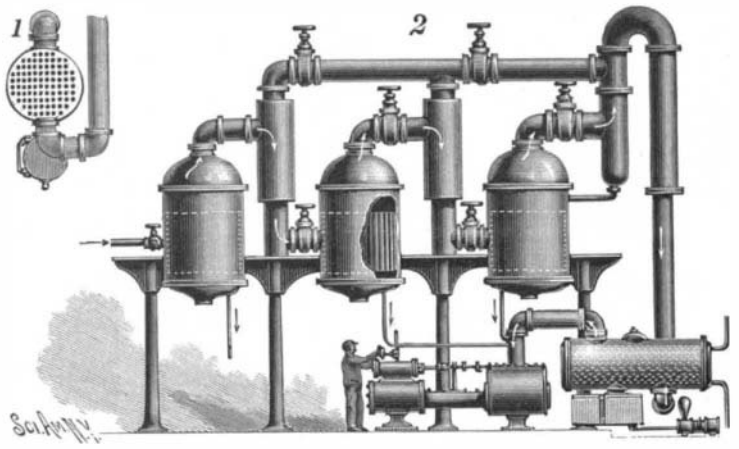
Patterns and Models.

It has been decided by the Board of United States General Appraisers that "dress patterns are not models of invention." A case was brought before the board in which it was claimed that an importation of muslin dress patterns, made up and stiffened to show the effect of the garment, ought to be exempt from duty under the provision of the law bearing upon "models of invention and other improvements in the arts." General Appraiser Wilkinson affirms that, while it may be fairly assumed that a pattern is a model, and that dressmaking is an art, the question to be determined is whether a change of fashion in dress is an invention or improvement in the arts within the contemplation of the statute. In rendering judgment in the case he says:

"There are various devices in wearing apparel that are patented, such as skirt supporters and glove fasteners, and these would be inventions within the meaning of the law; but a change from a tight to a balloon sleeve and from a full to a narrow skirt are not patentable inventions, and only a vivid imagination could discover an improvement in the arts in the continual ebb and flow in the tide of fashion. We find that the goods are not models of inventions or of improvements in the arts."

A SIMPLIFIED VAPOR-CONDENSER FOR VACUUM PANS.

In the apparatus now generally used for condensing the vapors of sugar juices, some loss is occasioned by the vapors coming into contact with the water used for condensation. An improved apparatus for condensing these vapors without loss and without the use of any complex devices has been devised and patented by W. and A. W. Dunn, of Honolulu, Hawaiian Islands. The apparatus is provided with the usual vacuum pans, each connected by a valved pipe to a separator. Each separator is in turn connected with the next vacuum pan; and from the last separator a pipe leads to the bottom of a surface condenser containing a coil of pipe connected at its ends with water supply and water discharge pipes. The condenser is furthermore connected to a vacuum pump which draws the vapors from the vacuum pans and separators down through the condenser and around the coil of pipe. By this arrangement the vapors of sugar are condensed without direct contact with the water, the apparatus differing in this respect from the usual vacuum condensers. The products of condensation flow into a reservoir, from which they are pumped to a tank to be further treated. The drums of the vacuum pans are connected to the pipe of the vacuum pump, so that the discharge from the drums passes through the vacuum pump with the vapors.



DUNN'S VAPOR-CONDENSER FOR VACUUM PANS.

Reasons Why We Underdrain.

It is, explains The Drainage Journal:

To get the excess of water out of the soil.

To prevent the surface washing of the soil.

To save the humus of the soil.

To save the fine particles of the soil.

To save the fertility brought up by the capillary action of the soil.

To save the fertility brought down out of the air by rainfall to the soil.

A drained soil is ready for the plow several days in advance of the soil not drained.

A drained soil is eight or ten degrees warmer and is more easily made ready for the seed.

Is deeper, allowing the feeding roots to penetrate as deep as the tile are laid for food and moisture.

A drained soil is ready to cultivate sooner after a rainfall.

A drained soil is less injuriously affected by wet or dry weather.

Crops on a drained soil have a longer season for maturity.

A well underdrained soil will increase the crop productions from 10 to 50 per cent—sometimes more.

A drained soil is in the best possible condition to grow maximum crops with intelligent husbandry.