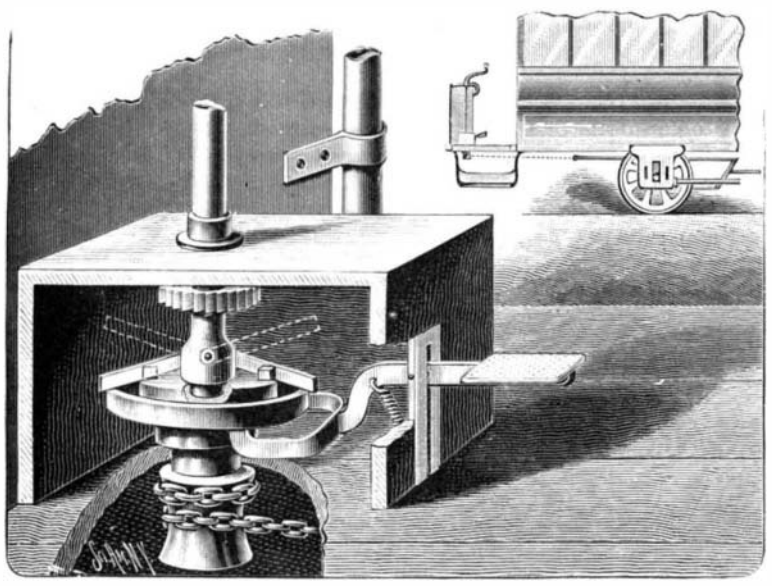
A BRAKE FOR STREET CARS.

The device shown in the engraving is designed to be operated as easily and effectively as the ordinary brake, while it obviates the forcible flying back of the brake-shaft crank-arm as the brakes are taken off, whereby persons standing on the car platform are frequently injured. The drum on which is wound the chain connected with the brake beams is journaled in the car platform, the top of the drum shaft carrying a



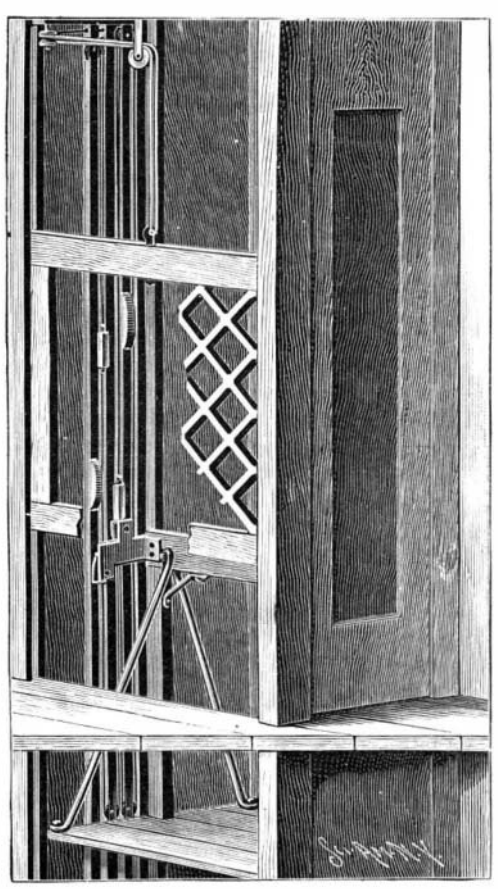
CHASE'S STREET-CAR BRAKE.

head-plate, which preferably furnishes a loose bearing for the lower end of the usual vertical brake-shaft, journaled to the dash-board and in the top of a box or casing on the platform. The chain drum is not fixedly connected to the brake-shaft, but the latter carries at its lower end two pivoted clutch-bars adapted to engage two lugs on the head-plate of the drum shaft. These clutch-bars automatically drop by gravity into engagement with the lugs, but to disengage them, as shown in dotted lines, and allow the drum shaft to unwind without rotating the brake-shaft and its crank, a trip device is provided, consisting of a ring which underlies the outer ends of the clutch-bars, and is connected to a treadle lever. A spring normally holds the ring down, except when the treadle is depressed. Within the box or casing is arranged a spring-pressed pawl which engages a ratchet wheel fixed to the brake-shaft to prevent backward turning of the clutched shaft and chain drum when the brake is applied.

For further information relative to this invention address the patentee, Mr. Joseph C. Chase, No. 88 Lyons Street, New Orleans, La.

AN IMPROVED ELEVATOR GATE.

The construction shown in the accompanying illustration is designed to provide for the dropping of an elevator gate by gravity, while the descent of the gate



GOLDER'S DEVICE TO OPERATE ELEVATOR GATES.

will be so controlled that nothing will be broken if the gate meets an obstruction. It forms the subject of a patent issued to Mr. William H. Golder, Nos. 18 and 20 Front Street, Portland, Oregon. In a vertically extending strip on one side of the elevator well are arranged three parallel vertical dovetailed slots, and pivoted in the upper portion of the strip between the slots are three pulleys, one a little above the other. Aligning with two of these pulleys are two pulleys pivoted in the lower portion of the strip, the pulleys at the top and bottom being adapted for the passage of the gate cables. In each of the two outer slots of the strip is dovetailed a catch projecting from the face of the strip and adapted to move vertically therein to engage the gate-operating latches, the catches being connected with the gate-operating cable. The latter is attached centrally to the upper portion of the gate, and is composed of two strands or members which pass upwardly over pulleys pivoted near the upper part of the story, thence turning at right angles and passing over pulleys pivoted near the upper corner of the elevator well, from which one of the members passes over the pulley pivoted at the top of the first dovetailed slot, and the other member passes over the pulley pivoted at the top of the third dovetailed slot. The member passing over the first pulley is continued down the slot and attached to the catch, while the other member extends down the third slot, over a pulley at the bottom, and up to the other catch to which it is attached. A second cord or cable is attached to the upper end of the first catch, and extends upward over the central pulley and down to engagement with the second catch, while a third cable extends downward from the bottom of this catch, around a pulley, and up to engagement with the bottom of the first catch, making a continuous cable system from the elevator gate around the pulleys. Projections having inclined ends are fixed to the vertical strips between each floor of a building, and a plate is fixed to the top of the elevator car to project across the strip, the plate having pivoted latches and oppositely projecting spring catches overlapping the grooves to engage the catches and projections, the operation being such that when the gate drops one of the latches is supported on a catch, thus allowing the gate to drop with the same speed as that at which the elevator car moves, and preventing it from falling too fast.

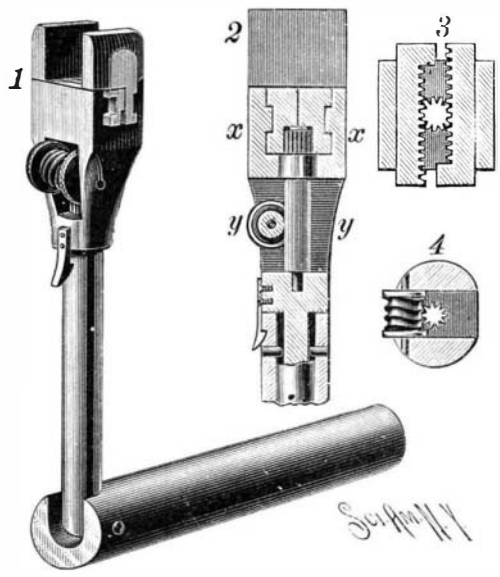
A CORK-DRAWING DEVICE.

The device shown in the cut is designed to facilitate the drawing of corks from the inside of a bottle without breaking the cork. It has been patented by Mr. Bernard Tormey. The body of the implement consists of a flat strip of spring metal, the upper end of which is looped over a handle, while, at a slight distance ftom its lower end, are outwardly and upwardly extending claws, another set of similar claws being arranged at a point higher up on the strip. In operation the body of the device is inserted in the vessel, when the cork is engaged by the claws and drawn out through the neck, as shown in the illustration. The handle has one tapering outer end, suitable for use in forcing the cork down into the bottle in case of full bottles or where the cork has lodged in the neck, after which the cork is withdrawn as described.

Further particulars relative to this invention may be obtained of Mr. M. E. Donally, No. 166 Third Avenue, New York City.

A MARKER FOR WOOD-WORKERS.

The illustration shows a machine especially designed for laying off and marking the stiles of shutters and doors and similar work, preparatory to cutting the mortises by a mortising machine, to save labor and insure accuracy in the joiner work. It has been patented by Mr. Robert G. Love, of No. 814 East Clay St., Richmond, Va. Upon the front edge of a strong framework, adapted to support dressed lumber, is fixed a stationary horizontal rail having horizontal slots in which slide markers. These markers, one of which is shown in the small figure, have toothed edges, and are fastened by a screw to a dovetail lug in a block clamped to the rail by a screw bolt passing through one of the slots, whereby the markers, of which there are a number in the rail, may be adjusted horizontally as desired. To limit the depth of cut of the marker teeth, an adjustable stop-screw is placed in each block beside the marker blade. A second movable rail similarly slotted, and provided with markers which point inward, is arranged in front of and parallel to the stationary rail, the movable rail being fastened by means of screws and tail guides to a reciprocating frame which slides upon horizontal guide rods supported at their outer ends by offsetting curved brackets. To the bottom of the frame are jointed the outer ends of curved connecting bars which at their inner ends are jointed to cranks on a rock-shaft, the latter being connected by other cranks with a vertical

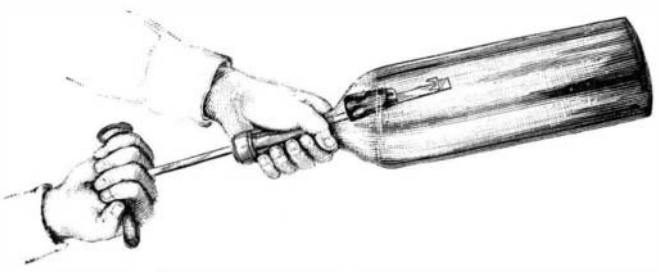


O'NEILL & REINHART'S WRENCH.

pitman jointed to a treadle. When the treadle is depressed, the reciprocating frame, carrying the front rail with its markers, is forced inward, marking upon both sides at once the piece of lumber that has been placed beneath the rails. A vertical leaf spring is arranged to force the reciprocating frame backward when the foot is removed from the treadle.

AN IMPROVED WRENCH.

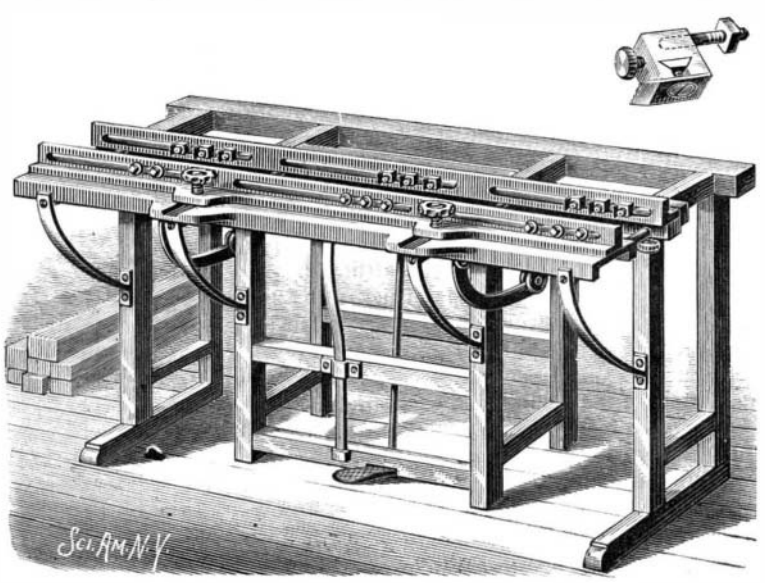
The wrench shown in the illustration, of which Fig. 1 is a view in perspective and Fig. 2 a longitudinal section, is especially adapted for use in places where working room is limited and where ordinary wrenches cannot be employed. The jaws of the wrench extend outwardly from arms adapted to slide longitudinally in suitable guideways in the head. On the opposite faces of the arms are formed racks meshing into a gear wheel, as shown in Fig. 3, which is a sectional plan view on the line, *x x*, of Fig. 2. This gear wheel is on a central shaft turning in suitable bearings, and on



TORMEY'S CORK-DRAWING DEVICE.

the portion of this shaft shown at *y y* in Fig. 2 are vertically arranged worm teeth, adapted to be engaged by a longitudinal worm wheel, as shown in the sectional view, Fig. 4. The worm wheel has milled heads, by turning which the central shaft is rotated, with the gear wheel meshing in the racks, whereby the jaws are made to approach or recede from each other.

The handle is preferably made in two parts, one part rigidly secured to the head and having side grooves engaged by pins near one end of a cylindrical part adapted to be closed over the other part and held



LOVE'S MACHINE FOR LAYING OFF WOOD-WORK.

thereon by a spring latch. This cylindrical part may be disengaged from the latch, moved outward, and swung into a right angular position as shown in Fig. 1, to be used as a lever to turn the wrench.

For further information relative to this invention address the patentees, Messrs. Augustus J. O'Neill and Henry Reinhart, in care of Parrot Smelter, Butte City, Montana.

THE DEFENSE OF NEW YORK.

It has for many years been patent to every one that New York City, with the great industrial forces and vast aggregate of wealth concentrated around what is known as the Port of New York, are entirely without defense against such an attack as might be made by the vessels of any first class power with but a few hours' notice. The forts at present guarding the entrance to the harbor would not protect the city from the long-range guns now in use, and in heavy armored vessels, and the high-powered ordnance therefor, by which such attack might be repelled, we have as yet nothing that will compare with the great ironclads of several of the European powers. The matter has for several years had much consideration by eminent engineers of the government War Department, but no complete system, adequate as a permanent and thoroughly effective defense, has yet been decided upon, although the Fortifications Board has declared the urgent need of such work, not only at New York, but at twenty-seven of our seaports, New York coming first on the list, Boston second, and San Francisco third.

The illustrations on our first page present a plan quite unlike anything heretofore attempted anywhere for the construction of forts for the defense of the ocean approach to the city. It has been, in fact, only within a few years that such constructions would have been deemed at all possible, but such have been the recent advances in engineering methods and practice that not only does the plan appear practicable, but engineers are ready to-day to figure on the cost and at once commence the work. The plan we illustrate has been brought forward in its present shape by Mr. John F. Anderson, a New York engineer, and consists in the construction, on artificial islands, of three forts, each with a diameter of 500 feet, between Rockaway Beach, on the Long Island shore, and Sandy Hook point. The bird's eye view afforded by the principal engraving gives a good idea of their proposed location. They would be about two miles apart, and the same distance from each shore, so as to command all the channels of approach, while being from twelve to fifteen miles distant from the city.

At the points where it is proposed to place these forts there is now a depth of water of from twelve to twenty feet, but with deep water on all sides in each case. The manner of their construction is not unlike that of several large engineering undertakings which have been successfully prosecuted by Mr. Anderson. There will first be built, of iron or steel, a double-walled circular caisson having an outside diameter of 500 feet and an inside diameter of 400 feet. The inner and outer shells of the walls of the caisson will be suitably tied together by cross rods and braces, and the bottom of this space will be shaped to form an inner and outer cutting edge, with an intermediate working chamber, as shown in the sectional view at the middle of the page, while vertical working pipes or wells will be placed at frequent intervals. This structure will be towed to the proper position over the shoal where the future island fort is to be made, where it will be sunk by opening valves in the bottom. The space between the outer and inner walls is then to be weighted with concrete, and at the same time the sand underneath the structure is excavated through the wells in the ordinary manner, so that as the excavation proceeds, the caisson will continue to sink evenly, and a solid wall of concrete will be built up within the iron shells.

The excavated material passed up through the working wells would be dumped on the inside, to fill the area inclosed by the walls. The remainder of the interior filling would be readily accomplished by means of steam sand pumps or dredges, which would take up sand from the sea bottom outside the fort, and dump it within the inclosure. Thus the principal materials required for the work are ready at hand.

The plates forming the shell for the walls would not necessarily be carried up further than was required by the sinking of the caisson, but, although the walls of this fort would be fifty feet thick, it is probable that their outer face would be provided with a belt of nickel steel or other approved armor. The guns with which such fortifications would be provided would, of course, be of the heaviest and most effective kind, and they would probably be mounted in armored turrets, whereby the guns and gunners would be protected during loading and training. An oscillating turret for heavy guns, operated by hydraulic rams, is now in use in France, with which a crew of five men and one officer are found sufficient to fire a 100 ton gun twice in three minutes. There are also various methods of mounting heavy guns on disappearing carriages and lifts, whereby the gun will be exposed to an enemy's fire only at the moment of firing, and a fort of the character described would afford facilities for mounting and working such an armament far superior to those which could be provided on the largest war vessels.

Another feature proposed by Mr. Anderson in the plan for these forts is to have a portion of their interior left partially open on the New York side as a harbor for torpedo boats or rams.

In the view at the top of the page one of the proposed forts is shown, presenting a space of about five acres, with temporary buildings occupying a portion of its area, in the manner it would probably be used in time of peace, a bomb-proof magazine being centrally located almost entirely underground. The top of this magazine would be protected with any required number of heavy plates, and underground passages would probably lead from it to each gun or battery.

Mr. Anderson has roughly figured up the cost of building an island such as here described, and estimates that three of them could be built at an expense of about one million dollars each. His approval of the scheme as entirely practicable, and the moderate figure at which the outlay for such defensive works is placed has caused considerable attention to be attracted to the plan. Mr. Anderson now has a contract with the government for building a lighthouse off Cape Hatteras, he has built the foundations of many of the most important bridges in the country, and in the building of the Hawkesbury Bridge, at New South Wales, Australia, he successfully carried down piers 155 feet below the water line and 108 feet below the bottom. It is not expected that the caissons for the proposed island forts would have to be carried to a great depth to obtain a firm foundation.

Taking Care of Ropes.

An article in a recent issue of the Chicago *Journal of Commerce* gives some interesting and valuable information regarding ropes, from which the following extracts are made. It is stated that the reason why it is necessary to take out the "turns" in a new rope, and that it is untwisted when first put to work, is that in making ropes, the fibers are first spun into yarn, this yarn being twisted in a direction called right hand. From twenty to one hundred of these yarns are then put together and twisted in an opposite direction, or left handed.

This forms a single strand or rope; from three to four of these strands are again twisted together, and it will be noticed that as this twisting is again in the right hand direction, it untwists the strands and again twists up the yarn. When a weight is placed upon one end of the rope, its tendency is to untwist and become longer, and the untwisting will continue until the strain of the untwisted strand just equals the strain of the yarn being twisted together.

If it were possible, in making a rope, to put in just enough twist so that these strains should balance each other, then there would be no necessity for taking out the turns when a new rope is put to work. The greater the twist, the harder the rope, and to the contrary, a rope with little twist is much softer and stronger. The reason for this is easily seen, as in a tightly twisted rope the strain does not come as near in the direction of the length of the rope; that is, the fibers lie at a greater angle to the axis of the rope, and weight upon the rope forms a breaking instead of a stretching strain.

Ropes sometimes wear out internally while apparently sound outside. This is caused by bending the rope over a sheave. In doing this the fibers slide a small distance upon each other and eventually wear out. In the best ropes this wearing out is prevented by lubricating the strand with plumbago, mixed with a small quantity of tallow, just sufficient to hold it in place.

In designing pulleys, they should not be made less than forty diameters of the rope; this is the limit of economical wear and they may be made as much larger as practicable. The speed of ropes may vary from 2,500 to 5,000 ft. per minute. If five feet be taken as a minimum diameter of a pulley for a rope one and a half inches in diameter and running 2,500 ft. per minute, the pulley should increase one foot in diameter for each 1,000 added revolutions per minute.

Imitation of Marbles.

Good Portland cement and colors that take on that material are mixed dry and made into a paste with the least quantity of water added. One paste has to be made for each color. The different pastes are placed on top of one another in layers of different thickness. The mass is pressed from all sides and beaten so that the colors of the different parts impress themselves on each other without uniformity. The result is that more or less deep veins penetrate the mass; this is then sawed into plates, which are pressed in a mould for twelve days, during which time it is necessary to keep them moist as long as they are not entirely hardened. The plates are polished in the same way as marble.

Census Adventures in Alaska.

A recent report of progress in taking the census of Alaska has been issued by the U. S. Census Office in the form of a bulletin. It comprises a preliminary report by Mr. Ivan Petroff, special agent in charge of the Alaska division, and embodies a vivid picture of the difficulties encountered in getting results in the northernmost regions of the United States. After a preliminary trip in the mail steamer, a second trip was undertaken from San Francisco to the shores of the Bering Sea, at Nushegak, in a leaky little steamer of only 25 tons burden. Special agents for different sections were appointed and sworn in on these voyages. To reach one special agent a voyage up the Nushegak River was undertaken, but failed, owing to his recalcitrant Indian paddlers. On returning to Nushegak, the U. S. Fish Commissioner's steamer Albatross took the party on board, and after six days landed them on an inhospitable shore, with a crew of Indians, mostly sick from pneumonia. The work, in spite of all obstacles, was accomplished, Mr. Petroff having divided the territory into six districts and organized a force of special agents familiar with the many languages spoken there. His journeys aggregate some 12,000 miles, while the special agents will probably travel over five times as much ground to cover Alaska's 570,000 square miles of territory.

Effect of Copper upon Rubber.

In a paper read before the British Association, Sir William Thomson made interesting remarks relating to the decay of India rubber. The following extract, showing that copper has a marked effect upon rubber when in contact, will be noted with interest: Prof. Dewar observed, accidentally, that metallic copper, when heated to the temperature of boiling water, in contact with the rubber, exerted a destructive effect upon it. With a view of finding whether this was due to the copper *per se*, or to its power of conducting heat more rapidly to the rubber, he laid a sheet of rubber on a plate of glass, and on it placed four clean disks, one of copper, one of platinum, one of zinc, and one of silver. After a few days in an incubator at 150° F., the rubber under the copper had become quite hard, that under the platinum had become slightly affected and hardened at different parts, while the rubber under the silver and under the zinc was quite sound and elastic. This would infer that the pure metallic copper had exerted a great oxidizing effect on the rubber, the platinum had exerted a slight effect, while the zinc and silver respectively had had no injurious influence on it. A still more curious result was this, that the rubber thus hardened by the copper contained no appreciable trace of copper; the copper, therefore, presumably sets up the oxidizing action in the rubber without itself permeating it.

The Use of the Diamond Drill by the Ancient Egyptians.

Mr. W. F. Durfee recently, in connection with his lecture at the Franklin Institute, Philadelphia, investigated the curious question of the ancient use of an annular drill, equivalent in mechanical action to the modern diamond drill. Through the U. S. Secretary of State and the U. S. Consul-General at Cairo, the Hon. Eugene Schuyler, a statement from Mr. Flinders Petrie was secured. It is this last named archæologist who originated the theory. The substance of the statement is as follows: In Mr. Petrie's "Pyramids and Temples of Gizeh" illustrations are given of samples of work, showing in his judgment the use of jewel points in drilling and sawing. Various samples of this work he states are now in his own possession. In Egypt he cites six examples, some in the Bulak Museum and some at Gizeh. One is of special interest. In the granite temple at Gizeh there is found in one of the lintels of a door a drill hole with the core still sticking in it. Almost as interesting as this is a base of a tube drill hole between the feet of a statue of Chefren (Kofra) now preserved in the Bulak Museum.

A Life-Saving Invention for Use at Fires.

Mr. Alfred Harley, of Albany, N. Y., has invented a life-saving apparatus to catch those who are forced to jump from windows in case of fire. A cushion or mattress is carried upon a suitable carriage or running gear. Springs of long range of action are placed intermediately between the mattress and carriage frame. The whole is so light that it can be very speedily dispatched to the scene of conflagration. The springs are not the only feature of construction. Under the stress of a falling body the mattress may descend nearly three feet. This might result in a disastrous rebound. To prevent such action, dashpots or air cushions are applied, as in the well known door checks, so that the mattress gradually rises to its normal level. Deflecting wings are provided that increase the effective area of the apparatus to about 100 square feet. It is claimed that with the ordinary life-saving net the jumper must be an expert as well as the men who catch him as he descends. Mr. Harley's contrivance eliminates to a great extent the expert element, and would seem to be a most useful advance on the old form of net.