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PROGRESS OF THE GREAT SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.

The present appearance of the work on the East River Bridge is shown in the accompanying engravings so clearly that any description, except of details, is quite unnecessary.

The point of view chosen by our artist is (for the larger engraving) on the high ground northeastward of the Brooklyn tower, so as to show not only the progress of the work, but the graceful structure of the tower, which from its great height appears to be very slender, notwithstanding its massive thickness and breadth of base.

Beneath the bridge is seen the harbor, looking southward, with Governor's Island and Castle William in the middle distance. Beyond is the lower bay, and beyond that the ocean. Only the southern point of New York is seen on the right. Across the mouth of the Hudson, which looks like a pointed bay, lie the Jersey shores and Staten Island. Across the bay, on the left, is the Long Island shore, with Bay Ridge and Brooklyn.

The smaller cut shows the underside of the bridge, without the timber flooring, as seen from the deck of a ferryboat passing beneath. The work of suspending the floor beams progresses with practical uniformity at both towers and on both sides of each tower, the design being to keep the strains

on the masonry as equally balanced as possible. At this writing about twenty-five beams are in place on each side of the two towers, or something near a hundred in all. Suspender ropes are in place for more than twice as many additional beams, there being four suspenders to each beam.

From below the suspenders look like spider lines; they are, however, stout ropes of steel wire, from $1\frac{1}{8}$ to $1\frac{1}{4}$ inches in diameter, and able to sustain a weight of 50 tons or more each, or five times the heaviest load likely ever to fall upon them. The bands by which the suspenders are attached to the cables above are of wrought iron, five-eighths inch thick by 5 inches wide. They were put on when the cables were being wound, and fit closely to the cables. On the outer side the ends of the bands terminate in two lugs, seven-eighths inch thick. An iron screw bolt, $1\frac{1}{4}$ inches in diameter, passes through the lugs to hold the suspender socket and to tighten the band around the cable. The bands were put on by the winders, who heated the backs of the bands in little forges until they could be opened far enough to let them go over the cable. The two ends of the band were then drawn together, a thin plate of iron being slipped between the cable and the hot band so as to protect the galvanizing of the wire of the wrapping until the band was cool. To these bands the suspender ropes are attached by

means of wrought iron closed sockets. On the lower end of each suspender is a cast iron socket for the reception of the stirrup rods which hold the floor beam. The stirrup rods have long screw threads, by means of which the beam can be raised or lowered to regulate the floor grade, it being impossible to cut and fasten the suspenders to the exact length required.

The floor beams are made in halves at the steel works; are landed at the foot of the towers; are hoisted to the level of the bridge floor and run out upon a tramway to the point of suspension; and after being attached to the suspenders are securely riveted together, making a continuous beam the entire breadth of the bridge, or 85 feet. These floor beams are unlike any ever before used on a suspension bridge. They are 32 inches deep, $9\frac{3}{4}$ inches wide, and weigh four tons. Each beam has two top and two bottom chords tied and braced together in the form of a triangular lattice girder. The chords are of steel channel bars. The main beams are suspended 7 feet 6 inches from centers, and between each pair of principal beams a lighter I beam is placed, resting on the truss chords, so that the floor planking will be supported and fastened every 3 feet 9 inches from centers. Wooden bridging will be inserted between the beams to resist the

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SUSPENDING THE FLOOR BEAMS OF THE EAST RIVER BRIDGE.

PROGRESS OF THE GREAT SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.

[Continued from first page.]

strain of the over-floor stays. The longitudinal trusses are six in number, dividing the bridge floor into five sections. The two outside sections, 18 feet 6 inches in width, are for vehicles. A tramway will also be laid down in each, in case it may ever be desirable to run street cars across the bridge. Inside the carriageways will be two railways for cars to be propelled by an endless iron rope, operated by a stationary engine. Between the railways, and elevated 12 feet above them, will be a footwalk, 15 feet wide. This promenade will be the first part of the structure completed, since it will be needed for the workmen upon other parts of the superstructure. On both sides of the river the masonry of the approaches to the bridge is substantially finished.

An idea of the magnitude of the work already accomplished may be had from the following figures, which are furnished by Mr. E. E. Farrington, master mechanic of the bridge:

Length of the main span.....	1,595½ feet.
“ “ land spans, 930 ft. ea., total	1,860 “
“ “ New York approach.....	1,562½ “
“ “ Brooklyn approach.....	971 “
Height of main span above water.....	135½ “
Depth of N. Y. foundation below high water	78½ “
Depth of Brooklyn foundation below high water	44½ “
Size of N. Y. caisson (for foundation)...	172x102 “
“ “ Brooklyn “	168x102 “
Cubic yards of masonry, N. Y. tower....	46,945
“ “ “ “ Brooklyn tower,	38,214
Size of towers at high water mark.....	140x59 feet.
“ “ “ “ top	136x53 “
Total height of tower above high water..	271½ “
Height of roadway at towers.....	119 “
“ “ arches above roadway.....	117 “
“ “ towers “ “	159 “
Width of openings through towers.....	33¾ “
Size of anchorages at base.....	129x119 “
“ “ “ “ top.....	117x104 “
Height in front.....	85 feet.
“ “ rear.....	80 “
Width of flooring.....	85 “
Grade of roadway.....	3¼ ft. in 100
Number of cables.....	4
Diameter of cables.....	15½ in.
Length of each cable.....	3,578½ feet.
Wrapping wire on each cable.....	243 miles 943 “
Number of wires in each cable.....	5,434
Total length of wire in each cable.....	3,515 miles.
Number of suspenders—	
Each cable, main span, 208; in all.....	832
“ “ each land span, 86; in all.....	688
Total.....	1,520
Number of post bands—each land span, each cable, 35; in all.....	280
Number of double floor beams supported by cables.....	450
Strength of each suspender.....	140,000 lb.
Sustaining power of each cable.....	12,000 tons.
Greatest weight on a single suspender.....	20,000 lb.
“ “ “ “ cable.....	3,000 tons.

NOVEL OIL SEPARATOR.

We give an engraving of a machine for separating oil from metal chips, such as turnings, drillings, chips from bolt and screw machines, and from small articles such as screws, bolts, and nuts, which in their manufacture are necessarily coated with oil, much of which is commonly lost. By the use of this machine the oil carried by the chips, crews, etc., is very quickly separated from the metal by centrifugal action, leaving only a slight film, which is beneficial rather than otherwise.

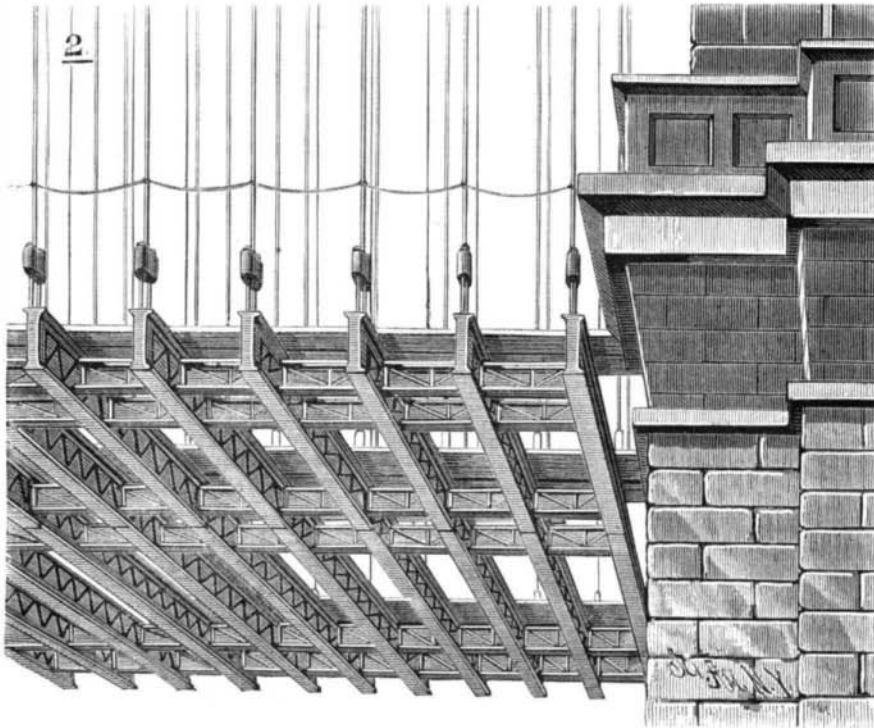
The article from which the oil is to be separated is placed in a removable conical pan in the revolving drum, and confined by a metal cover fastened securely over the top of the drum by the lock nut shown in Fig. 2. The machine shown in the illustration is about thirty inches high and requires a floor space about twenty inches square. It revolves at a speed of 2,000 revolutions a minute, and is noiseless and free from jar. The machine is well made, carefully finished, and is accompanied by a shaft and hangers. It is in use in several of our largest and best machine shops, giving complete satisfaction.

Further information in regard to this useful invention may be obtained by addressing Mr. C. F. Roper, P. O. Box 1211, Boston, Mass., or Hartford, Conn.

Making Old Rails into New.

But few people are aware, says the *Indianapolis Journal*, of the immense amount of handling that it requires to convert an old iron rail into a new one. From the time it arrives in the yard at the Indianapolis rolling mill until it is shipped out, a rail is handled thirty-one times. The process is as follows: It is first unloaded from the car, then picked up and run on a set of rolls to the shears, then cut up, when cut piled into fagots, then loaded on to a barrow and charged into furnace, heated to a welding heat, then

hauled out and placed on iron buggies, run to weighing rolls, handled six times, until finished to a bloom, then returned to the buggy, carried to a repeating furnace, brought to a welding heat, then returned to the rolls on a buggy, passed through the rolls nine times, then run to saws where both ends are put off at once, then laid on the cooling bed; when cold, placed under the straightener, which takes out all minor crooks. The burr on the ends is then filed off, when the rail is inspected, then taken to the punching machine and fitted for splice bars, thence to the slotting



THE FLOOR BEAMS FROM BELOW.

machine, where it is slotted for the spikes; then the rail goes on the benches in the yards and from thence to the cars.

MISCELLANEOUS INVENTIONS.

Mr. Charles T. Sands, Jr., of Nassau, New Providence, West Indies, has patented a cheap, simple, and convenient device for enabling persons to escape with safety from burning buildings. It consists, in combination with a fire escape, of novel devices for arresting or regulating the descent of the basket or cage of the fire escape.

An improved holder for nuts and dies has been patented by Mr. Edward Squires, of Beaverton, Oregon. The invention consists of a frame or box for holding dies or nuts, and is provided with a sliding perforated bottom and an adjusting screw, and is held between the forked end of a rod or hand brace.

An improved means for preventing escape of sewer gas from waste pipes has been patented by Mr. Willis Knowlton, of New York city. Heretofore cocks have been applied to waste pipes for closing such pipes when not in use, but no provision has been made for preventing overflow, or else the

arrangements have been complicated and liable to get out of order. The object of this invention is to provide the waste pipe with a valve whereby it can be closed, and to combine with this device valves in the water pipes and means for operating them, whereby the waste pipe shall be automatically closed, and the overflow pipe of the basin opened simultaneously with the water pipe.

Mr. James Corr, of Jamaica, N. Y., has patented an improved cigar holder, constructed to inclose the cigar entirely while it is being smoked, thus avoiding danger of fire and preventing the ashes from being an annoyance.

An improved metallic sole for boots and shoes has been patented by Mr. William T. Burrows, of East Dubuque, Ill. The object of this invention is to increase the durability of the boot or shoe sole, and it consists of a plate of metal of the shape of the sole, and designed to be secured thereon, made with parallel cuts or slits, that alternately begin at the opposite edges and extend nearly across the plate, thereby forming, in effect, a series of parallel end-connected crossbars.

A device whereby the driving reins will be securely held and can be easily and quickly inserted and detached, has been patented by Mr. Jonathan S. Pitcher, of San Diego, Cal. It consists in posts having one or more cams hinged to them, the cams being held forward by springs pressing against pins attached to the cams and prevented from being forced too far forward by stops attached to the clamp. The device is intended for attachment to the dashboard of the vehicle.

A cheap and strong ear for earthen pots and pans, attached so that it does not interfere with the cover, and so that the strain upon it will not break it loose from its fastening, has been patented by Mr. Milton T. Geren, of New Brighton, Pa.

An improved horse power for gins, etc., has been patented by Mr. Willis H. Harvey, of Somerville, Tenn. The invention relates to an apparatus for transmitting motion from a prime motive power to the machinery intended to be driven by it, the object being to reduce the cost of construction, to adapt it to any present gin house room, and to economize in space and in power.

An improved governor for vulcanizing apparatus has been patented by Mr. William E. Gwyer, of New York city. This governor is for regulating the flow of gas to the steam generators of vulcanizing apparatus, by which the temperature in the vulcanizing chamber is maintained at a uniform point, the object being to utilize an ordinary pressure diaphragm for that purpose, and also to allow escape from the steam space or steam generator of expanded air, which, when allowed to remain, interferes with the indication pressure.

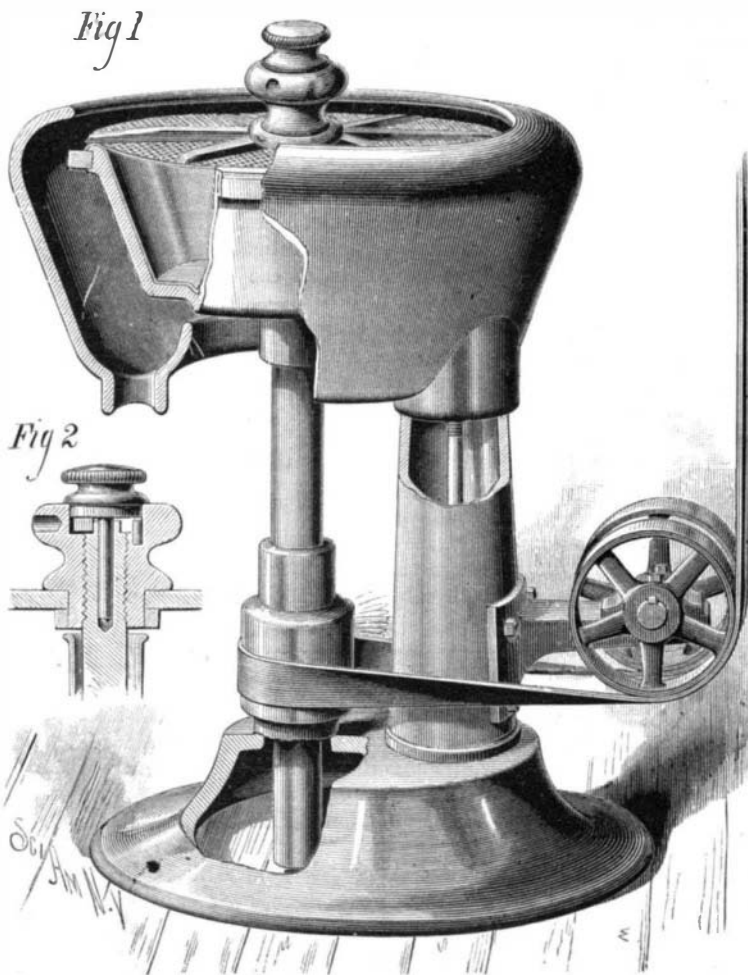
An improved truss, which is simple, durable, convenient, and effective, has been patented by Mr. Henry E. Garst, of Cincinnati, Ohio. The truss is provided with two pads adjustably attached to a spring bar, which is pivoted to one end of the truss spring by a pin passing through a slot in the end of the truss spring, and the other end of the spring is attached in a like manner to the truss cushion, to which the belt is fastened.

An improved shovel handle has been patented by Mr. Wm. H. Johnson, of Industry, Maine. This invention relates to that class of wooden handles for shovels, and similar implements, which are bifurcated and the parts curved in opposite directions to receive the round or hand gripe between them at their ends. In the improved handle the round or hand gripe is firmly secured between the curved arms in such a manner that it cannot revolve.

An improvement in pool tables has been patented by Mr. John Jefferson, of Columbus, O. This invention relates to that class of billiard or pool tables which are provided with pockets; it is a device for conducting the balls from the pockets to a large pouch or pocket at the foot of the table. It can be attached to old tables, using the same pockets without changing the external appearance.

A simple, convenient, and efficient device for cleaning knives and forks has been patented by Mr. Benjamin J. Howe, of Sing Sing, N. Y. The invention consists of a scouring table mounted on a box which is open at both ends of the table, and of a sliding rubbing block guided by or in grooves for applying the polishing powder to the knives or forks.

Mr. Charles W. Stiff, of Foxborough, Mass., has patented an improved lamp extinguisher, by means of which a lamp can be extinguished immediately at any desired time, and which also operates automatically if the lamp is accidentally upset. The invention consists in a lamp burner having two extinguishing caps pivoted to the wick tube, or some other suitable part of the burner, in such a manner that they can close over the top of the wick tube and thus extinguish the flame.



ROPER'S OIL SEPARATOR.