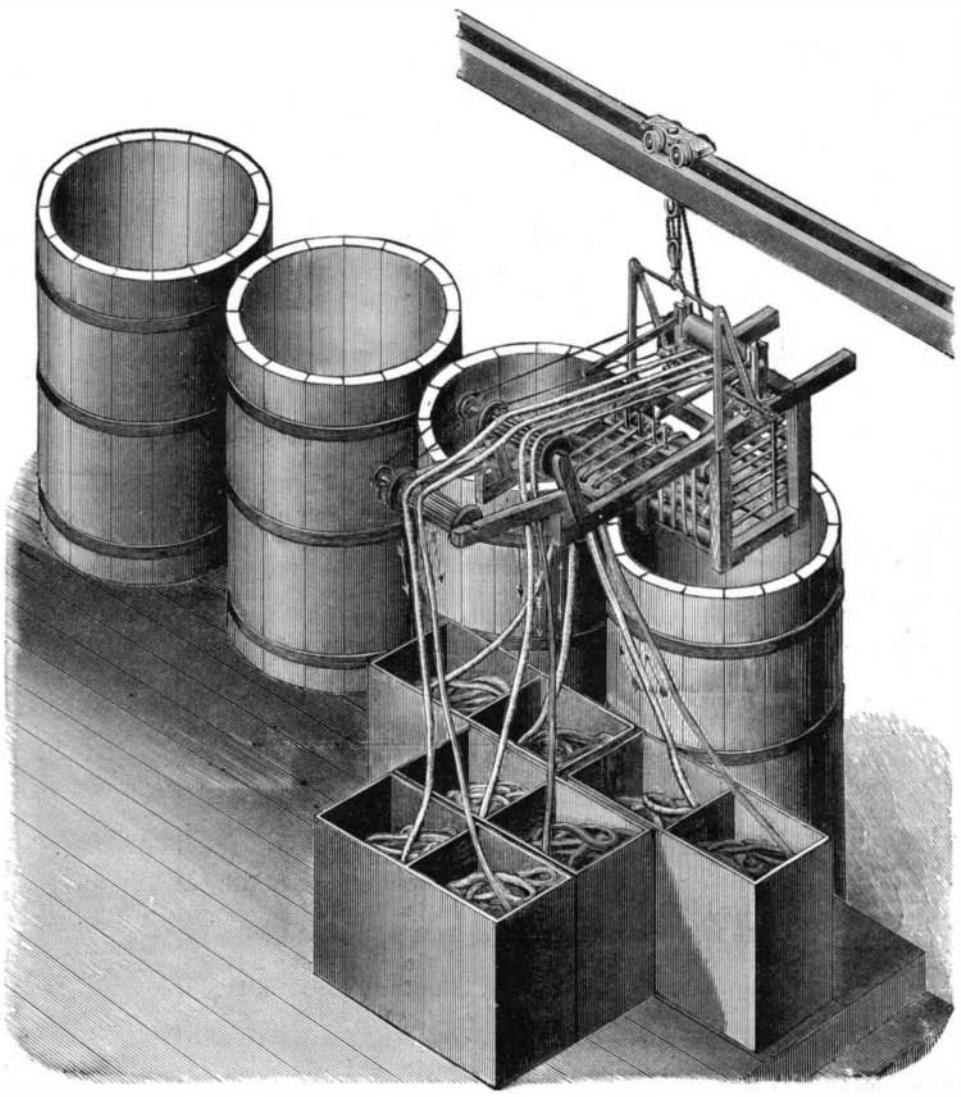
NEW DYEING APPARATUS.

The accompanying engraving illustrates an apparatus designed by Messrs. Thomas Wood & Co., of Twenty-second and Wood Streets, Philadelphia, Pa., for dyeing warps indigo, blue, and black. The colors are formed by passing the warps through the liquor contained in a series of from four to fifteen vats, according to the quantity of warps to be dyed and the shade required. The warps pass from the inside boxes through the machine in the first vat and are then delivered into the outside boxes. The boxes are then shifted, the dyeing machine is lifted up and moved along, by means of a pulley block and truck, as shown in the cut, to the second vat; the warps make the passage through the liquor in this vat in the same manner, and so on through the series of vats until the proper shade has been acquired. When there is a large number of vats, two or more machines are employed, the one following the other. This process is simple and economical, and gives very superior results. Messrs. Wood & Co. also make machines for dyeing fancy colors, with a capacity to work four, six, or eight warps at a time. The carrier rollers of these machines are copper, and the squeezing rollers are made either of wood, iron, or iron covered with rubber.

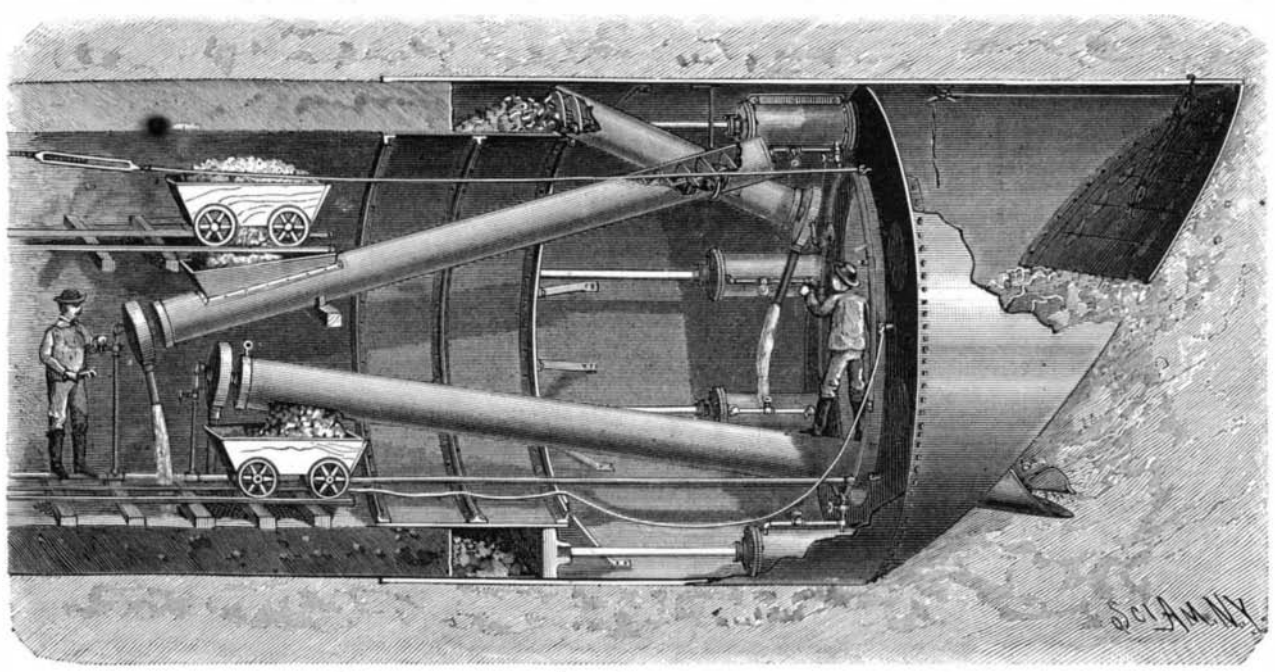


THOS. WOOD & CO.'S NEW DYEING APPARATUS.

IMPROVED SEWER TUNNELING MACHINE.

Situated just behind the diaphragm, within the outside iron cylinder of the machine, are several hydraulic cylinder presses, which are connected with the necessary pipes, so that they can be operated independently or collectively from one principal pipe running to some place in or outside of the tunnel. Each press is also provided with a relief valve, which can be so adjusted as to relieve the pressure at any desired point. The piston of each press works toward the rear of the machine or away from the heading, and is provided with a heavy iron follower, made segmental in shape, in order to fit in between the outer and inner rings of the machine. The duty performed by these presses is twofold: To compress and solidify the fresh body of concrete or other material forming the tunnel, and, after this is accomplished, to advance the shield of the machine to a position to receive a new ring of the concrete. The great pressure thus exerted—from three to four hundred pounds to the square inch—permits of much better work than is possible with hand labor, since the concrete can be worked comparatively dry, thereby preventing shrinkage in the finished work, which is almost immediately fit for its intended uses. The presses are so arranged that the water pressure can be made to act on either side of the piston.

Around the outside of the diaphragm is a series of strong iron hooks, and embedded in the finished tunnel, some distance in the rear of the machine, are other substantial fastenings, corresponding in number and location with the others. Wire ropes, provided with turn buckles, reach from the hooks to the fastenings. This rigging is intended to guide the machine in any direction; by shortening or lengthening the ropes, so that the pressure of the hydraulic presses can be exerted on that side of the machine in which the slack guys are located, the machine can be turned toward the taut ropes. The angle of the front of the machine is made to vary, to suit the angle at which the material will stand, so that in case any hard obstacle should be encountered, it can be got at without making any extra excavation. When the material is too soft to stand at any reasonably practical angle, then strong ribbed or braced iron plates can be used in between the angle irons, which are riveted to the inner top part of the forward end of the shield, and held in place by block and tackle. Plates can also be used in front of the diaphragm to any height from the bottom that may be required to stop the flow of material from a point in advance of the shield. When these plates are used, the diaphragm can be dispensed with entirely. The stone, gravel, sand, cement, or other material is dumped from cars running upon an elevated track into a hopper at the lower end of a conveyer, which carries it up to or near the roof of the tunnel, where it is dropped into another conveyer, which delivers it into the chamber formed of the two rings of the machine, the segmental followers and the completed work. When this chamber is full, the supply of concrete is stopped, and the hydraulic pressure is turned on to compress the material and advance the machine. The material in front of the diaphragm, when soft, can be entirely removed by means of the conveyer, which empties it into a car running upon a track along the bottom of the tunnel; but if this is of tough clay or similar substance, the diaphragm can be taken away and men employed to pick and shovel it into the conveyer. All the conveyers are designed to be operated by water motors, attached to the end of the shaft, receiving their supply from the main pipe furnishing the presses.



BROWN'S IMPROVED SEWER TUNNELING MACHINE.

When bricks are used in the construction of the sewer or tunnel, the lower half of the inside shell can be omitted; the upper half will then serve as a centering for the arch.

The saving obtained by the use of this method of building sewers—which is the invention of Mr. F. O. Brown, of 39 Broadway, New York city—is apparent. In the ordinary open-cut, the timber and excavation necessary to reach the tunnel become useless as soon as the work is finished. This method also saves the expense of taking up and replacing the pavement, and does away with the inconvenience of blocked streets.

The Horses of the World.

Professor D. Leonhard, of Frankfort, gives in the *Mittelrheinische Verbandkalender* for 1886 the following statistics of the horses of various countries and cities:

According to Schwarzenecker, Prussia possesses altogether 2,313,817 horses, or 97 horses for 1,060 inhabitants (91 per 1,000). Omitting the detailed census of the number in each division of the empire given by Prof. Leonhard, we may note that, according to the census of 1873, the German Empire contained altogether 3,352,231 horses, about 14 per cent younger than three years; of the horses older than this, in round numbers, 70 per cent were employed in agriculture, 10 per cent in commerce and industries, 3·2 per cent in army use, 0·4 per cent as stud horses, and 3 per cent as saddle and carriage horses. This gave 82 horses per 1,000 inhabitants.

Austria-Hungary possesses three and one-half millions, or 99 per 1,000 inhabitants. Hungary alone has 2,000,000. France has altogether 2,882,850 horses and 300,000 mules, or 78 horses per 1,000 inhabitants, and 54 per square kilometer.

Denmark (census of 1881) possesses 316,570 horses; Belgium, 283,163 horses, or 60 per 1,000 inhabitants; Holland, 250,000, or 73 per 1,000 inhabitants; Italy (census of 1868), 657,544, but in 1879 she had only 615,457 horses, besides 293,868 mules; Switzerland, in 1866, about 105,000, or 40 per 1,000 inhabitants; Spain (in 1865), 680,373, besides 2,319,846 mules and asses; every year there are killed in the bull fights 3,000 to 4,000 horses; Portugal, 88,900 horses, 50,390 mules, and 127,950 asses; Russia (in 1872), 21,570,000 horses; Sweden and Norway, 655,456, or 115 horses per 1,000 inhabitants; Greece, about 100,000; United States of America, 9,504,000; Canada, 2,624,000; Argentine Republic, 4,000,000; Uraguay, 1,000,000; Australia (in 1871), 304,000.

Prof. Leonhard gives for different cities the figures cited below: Berlin, 32,527; Breslau, 4,581; Bremen, 2,199; Buda-Pesth, 11,611; Cologne, 1,850; Dantzig, 2,385; Dresden, 5,641; Frankfort-on-the-Main, 3,000; Hamburg, 4,171; Hainburg, with suburbs, 7,600; Hanover, 4,158; Konigsberg i. P., 4,477; Copenhagen, 5,302; Leipzig, 2,483; Monaco, 5,883; Rome, 11,733; Stockholm, 3,506; Stuttgart, 2,591; Vienna, 14,317; Paris, 64,247; (the Omnibus Company has most horses of any corporation, 12,000); London, 200,000, of which about 60,000 are used in public carriages, 10,000 for street cars, and 60,000 for omnibuses.

The number of horses in St. Petersburg is not given, but is supposed to be about the same as in London.

[The horses of the city of New York are estimated as being between 60,000 and 75,000.—ED.]

THE Newark Filtering Company, manufacturers of the Hyatt system of filtering, 141 Commerce St., Newark, N. J., has just placed one of its 10 foot filters in the Carew Paper Mill, at South Hadley Falls, Mass. This is one of the most complete systems for the purification of water, probably, that has ever been introduced into this country.