river. When this section is completed the work further out toward the river is begun, a new obstacle is to be met with and overcome. From the heading to beyond the river bulkhead wall is a distance of forty-seven feet, but before the tunnel can pass under the wall it must pass through the earth into which the piles on which the bulkhead walls rest are driven. But little trouble is anticipated, however the plan being to cut these piles off and build the walls of the tunnel of twice the ordinary thickness in order to support the additional weight imposed. Once beyond this wall of piles, and under the river bed, it is thought that the progress upward and downward will be comparatively easy, for it is expected that at a distance of from 300 to 400 feet from the caisson the workmen will strike the impervious silt which permits of much more rapid progress. Fifty feet below the mean low water level the opening cut is situated, but the tunnel most descend considerably below this level before the middle of the channel is reached, for at that point the depth of the water is sixty-three feet. With the increased depth of the water comes an increased pressure, a necessity for heavier masonery, and more problems which may defy theoretical engineering. The engineers in charge are confident, however, that the penetration of the treacherous soil on the New York shore—virtually a quicksand—is the most formidable obstacle to be overcome. Others, however, think that the greatest difficulties are yet to come and the greater skill yet to be exercised in successfully carrying the tunnel under the bed of the river channel. The interior of the tunnel is lighted with electricity, and telephonic communication is maintained with the shore. The work is expected to be completed in five years.—*Illustrated News.*

A CURIOUS TORPEDO.

This latest offspring of Australian destructive ingenuity promises to be a distinct success. Its motive power is not compressed air, neither is it contained in the body of the torpedo. To propel the weapon through the water at a speed of from 15 knots to 20 knots an hour for 1,000 yards, a separate engine, or at least a special connection with an existing one, is necessary. This engine drives two drums, about 3 feet in diameter, with a velocity at their peripheries of 100 feet per second. Their duty is to wind in two fine steel wires, No. 18 gauge, of the same sort as that used in the deep sea sounding apparatus of Sir William Thomson. The rapid uncoiling of these wires from two small corresponding reels in the belly of the fish imparts to them, as may readily be conceived, an extremely high velocity. The reels are connected with the shafts of the two propellers which drive the torpedo through the water. The propellers work, as has long been known to be necessary to insure straight running, in opposite directions and both in one line, the shaft of one being hollow and containing the shaft of the other. Now, at first sight it would seem as if hauling a torpedo backward by two wires was a sufficiently curious way of speeding it "full speed a-head," but it is found in practice that the amount of "drag" is so small, as compared with the power utilized in spinning the reels that give motion to the propellers, that it may be left out of calculation altogether. Of course it is at once seen that this method of propulsion does away with the necessity for air-compressing engines and reservoirs pressed to 1,500 lb. on the square inch, which, however carefully constructed, must always involve a certain element of danger, however small. Neither are any delicate little engines, controlled and stopped by complicated, though exquisite mechanism, required. But these advantages, great as they may be, are as naught compared with the power possessed by the user of the Brennan torpedo to guide and govern its course and movements.

Many experiments have been recently made at Woolwich, and more especially at Chatham, and there seems little doubt, as far as can be seen at present, that the new torpedo will prove most valuable for the defense of harbors.—*Standard.*

A NEW BRANCH OF SILK MANUFACTURE.—A new and curious branch of silk manufacture has started into life in Paterson, N. J. The mode of manufacture is a secret, and is very closely guarded. Only the wearers posses the secret. The weaving is of a very high order, and those employed earn very high wages. The goods produced are made up to perfectly imitate sealskin. The process is entirely dissimilar from that of making plush and velvets. The goods in appearance are said to puzzle experts. If this statement is correct, a patent had better be risked than secrecy in manufacture.

Mechanics.

MACHINE FOR COLORING AND GROUNDING PAPER FOR PAPER HANGINGS, ETC.

In printing offices, book-binderies, paper hanging factories, etc., large quantities of colored paper are used which is generally colored on one side only. Formerly these colored papers were produced by manual labor, but of late, machines have been used for applying the color, rubbing the same on the paper, drying the paper, and then smoothing the same.

Mr. Ferdinand Flinsch, of Offenbach a. M., Germany, is well known as a manufacturer of machines for coloring paper; and the machine exhibited at the patent exhibition in Frank. a. M, gives ample proof of his ability in constructing and manufacturing machines of this class. In the annexed engraving a perspective view of this highly interesting machine is shown. Into the machine the paper is placed in large rolls: it is then unwound by the machine, colored, dried, smoothed, pressed, and finally wound into a roll. The first machine in which the roll of white paper is placed is a coloring machine, and the same draws the paper through coloring mechanisms, and then takes it over a large cylinder, upon which the color is distributed on the paper by a series of rotating brushes. The moist paper is then conducted upon a second machine which is used for drying it. In this second machine the moist paper is hung on a series of rods or shafts, and is moved backward and forward on the same a greater or less length of time until it is dry. This drying machine is very interesting, and is different from other similar machines inasmuch as chains are used to turn the rods, whereas heretofore belts or ropes were used, which produced irregular movement, as the ropes or belts contracted more or less, and thus some parts of the sheets were moved faster than others. These defects are avoided by the use of the chains. The paper is conducted through the space or room several times, and thus a very great length of paper can be dried within a very small space. After the paper has been dried it is passed to the winding machine, which winds it into a very solid and firm roll, the edges of which are as smooth as if they had been turned off. The fourth machine is an automatic adjuster for the rods or shafts on which the paper is hung while drying. A small steam engine of about one-half horse-power is sufficient to drive all the machines.—*Der Practische Maschinen-Constructeur.*

IMPROVED PULVERIZER.

We give an engraving of the Thompson Patent Pulverizer, improved by Stephen P. M. Tasker, of the firm of Morris, Tasker & Co., Lim., of Philadelphia. It has been so changed by Mr. Tasker that nothing now remains of the original mill but the ball held between flexible disks. These improvements are results of experiments made at the Pascal Iron Works and during a year and six mouths' run at the mines. It is now perfected as a machine; and for the reduction of ores, etc., it stands, as we believe, unequaled. The efficient working of the mill cannot be realized unless it is seen in operation.

As the motion is a simple rolling motion no foundations are necessary. The pedestals are supplied with screws for raising or lowering the journal-bearing boxes in the event of the mill being set out of plumb.

In this mill contrifugal force is given to a *loose* ball. This is a principle which we believe has never been correctly applied before. The ball, B, is carried around the inner periphery of a steel shoe ring, C. by means of flexible disks. B, whose surfaces are chilled where they touch the ball to prevent wear. The disks are set up by means of nuts, I, on the shaft on the outside of the screen frames, and they are kept apart by a strong steel spring, E, between them on the shaft. The disks are carried by the clutches, which are fast to the shaft. On the sides of the machine are the screens, N. As the ore is fed in at the top by the automatic feed it drops into the mill, and, after being pulverized, is washed under the edges or rims of the disks, which have a clearance of one-eight inch. All that is fine enough passes through the screen; that which is too coarse is caught in the take-ups and forced back under the ball again until it is fine enough to pass through the screens.

The fineness depends on the number of mesh of the screen and the quantity of water used; the more water used up to a certain quantity, the more pulp will be washed out. With very little water a less quantity will be done, but it will be