

**THE BARBER-COLMAN KNOTTER.**

BY IRVING U. TOWNSEND.

The operation of spooling consists in transferring the thread intended for the warps of the woven fabric from bobbins to spools, a spool usually holding the contents of seven or eight bobbins. The ends of the threads wound on the various bobbins are joined together by knots, so that the thread when wound upon the spool is continuous. The spools are arranged in long banks or tiers, one operative having charge of a single tier. The thread frequently breaks while being wound, so that much of each operative's time is occupied in piecing broken ends. The operative is usually a girl, who becomes very expert in rapidly tying with her fingers what is called the spoolers' knot. Hand knotting is objectionable on account of the uncertainty of the knots tied, their size, and the length of the ends left by the operative. Hence, for fifty years, there has been a demand for a practical mechanism for doing this work. The attention of inventors has been actively directed to the solution of the problem for twenty years. Among the devices invented is an apparatus of James H. Northrop, the inventor of the well-known Northrop loom. This was patented in 1885, and consisted of a standard, adapted to be attached to the frame of the spooling machine, and carrying a rotatable spindle having blades by which a knot was formed, much as in certain types of harvesters. In using this apparatus, the ends of a broken thread were drawn out until they could be placed in the blades of the knotter, there being one for each tier of spools, and the spindle was then manually rotated and the knot tied. This device never came generally into use, for the obvious reason that the thread ends to be united were usually at a considerable distance from the knotter, and it was easier and required less time for the operative to use her fingers to tie the knot. Among other devices tried and cast aside, was a knotter slidably mounted upon the spooler frame.

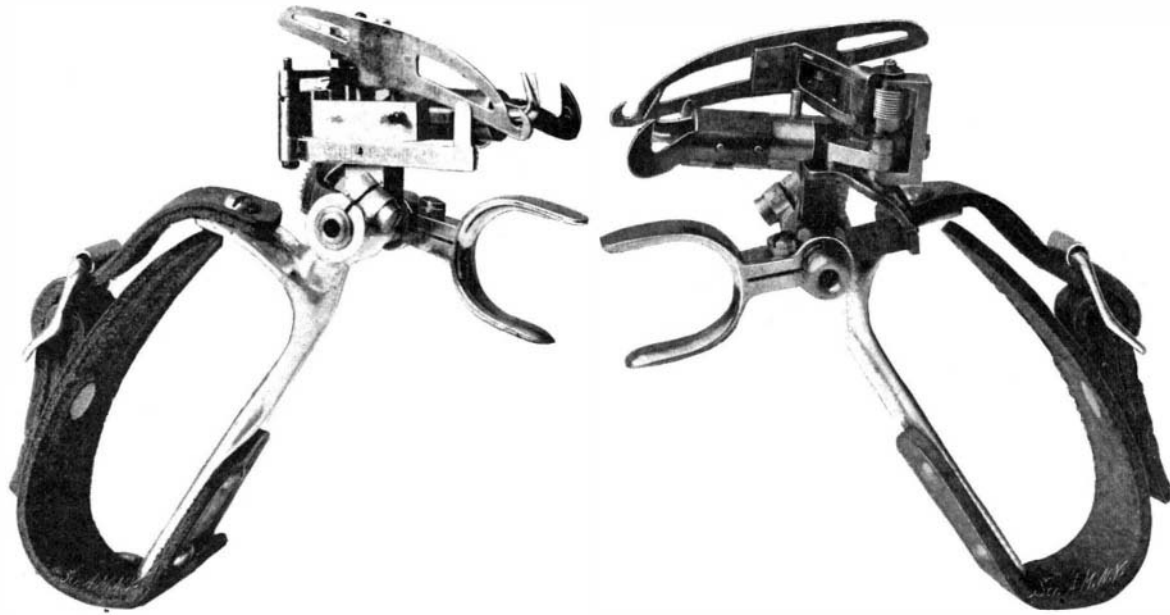
Mr. Howard D. Colman, of Rockford, Ill., a young but brilliant inventor, conceived the idea of mounting a mechanical knotter upon the hand of the operative in such a way as to be manipulated when desired by the thumb or one of the fingers, but leaving them free when the knotter should not be in use.

The accompanying illustration shows the knotter as now constructed. It is a wonderfully ingenious, compact, and well-constructed mechanism. It comprises a rotatable tying-bill having a shearing and clamping jaw, and a movable stripper for grasping the threads, drawing the knot tight, and pulling it from the tying-bill. In some cases the stripper mechanism is omitted and the tension of the threads is relied upon to draw the knot tight. The knotter is provided with a shaft adapted to be rotated by the thumb fork. Rigidly mounted upon the standard is a cylinder having attached to it a hooked guide. Upon a shaft within the cylinder is the tying-bill composed of two jaws with shear edges, one pivoted to the other and operated by a cam surface within the cylinder. The tying-bill shaft is rotated by a sector cam gear, upon the main shaft. In operation, the two thread ends are placed across the guide, the tying-bill (which is turned

into an upright position), and the stripper. The stripper, which draws the knot tight after it is formed by the rotation of the tying-bill, is moved toward and from the latter by the cam gear. It is so timed in action as to pull upon the threads after the knot has been formed and the ends severed close to the knot, and while the severed ends are still held by the jaws

the free use of the fingers and the thumb of that hand.

The speed of the average operative is by the use of the Colman knotter increased about twenty per cent over hand tying, so that about one dollar per week is added to the wages of each. The operatives at first objected slightly to the use of the machine, but after its advantage in earning capacity had been demonstrated, they adopted it readily and even eagerly.



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ANOTHER VIEW OF THE KNOTTER.

of the tying-bill. The stripper finally pulls the thread ends from the tying-bill and the knot is completed. The whole operation requires only four or five seconds, or even less time, and is performed by a single movement of the thumb after the threads have been laid in position. Instead of operating the knotter digitally,



HOW THE KNOTTER IS STRAPPED TO THE LEFT HAND.

it may, although worn upon the hand, be operated by power through a flexible shaft. In such case a thumb lever is adapted to operate a friction clutch for engaging the knotter mechanism with the driving means.

The effect of the knotter is to increase the speed of spooling on account of the rapidity with which it ties, and to increase the capacity of the weaving room

owing to the very tight, closely trimmed knots. A novice soon becomes an efficient spooler when armed with one of these knotters.

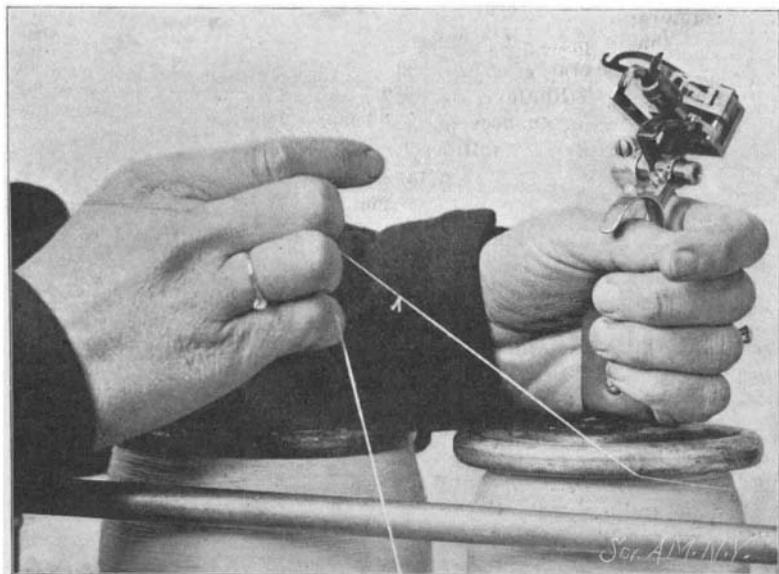
So compact is the mechanism that, although of many parts, its operative portions occupy only about two cubic inches and the entire device weighs but three and one-half ounces. It ties a smaller, firmer knot than is tied by hand, and the ends of the threads are cut shorter than when the knot is formed by the fingers of the operative. It is mounted on the left hand in such a manner that, although constantly worn, it does not interfere with

we give a brief abstract of what Dr. Iberti has to say of the Pino boat:

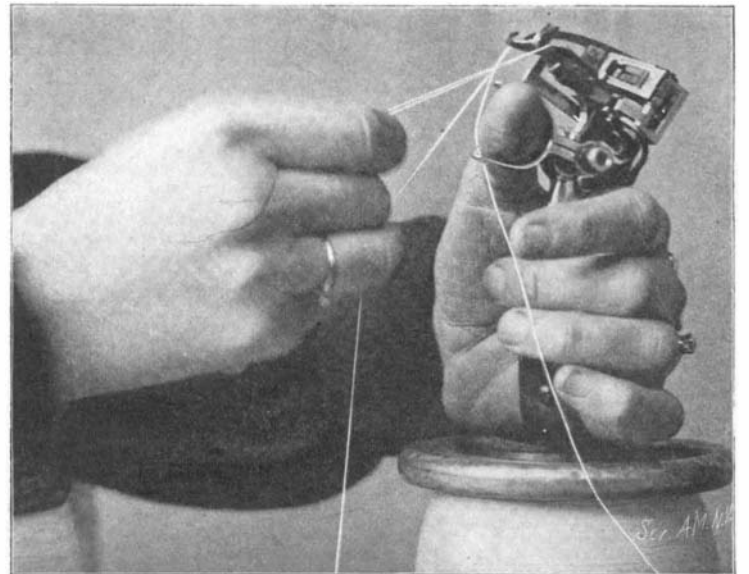
"In order clearly and exactly to realize the value of the invention under notice, the following facts have to be considered: 1. That every kind of operation for the salvage or recovery of ships or objects can be done with great ease by means of this small boat of about three meters diameter. 2. That it has been tested to a depth of 150 meters, and that the inventor, who has descended in it to the sea bottom at least 140 times, has successfully worked at a depth of 130 meters. 3. That two persons can work in it on the sea bed for twelve hours continuously without needing to return to the surface for air. 4. That every object lying in the sea is clearly and distinctly seen from it, at any depth, through windows of a special crystal. 5. That the boat (which can be set in motion or stopped instantaneously) ascends or descends at will at a speed of  $3\frac{1}{2}$  meters per second. 6. That it will stop and remain perfectly immovable at any depth, in perfect equilibrium, and for any length of time. 7. That it walks on the sea bed, moving freely on an ingenious single wheel, propelled by an electric-driven screw."

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AFTER THE KNOT HAS BEEN TIED.



REEVING THE THREAD THROUGH THE MACHINE.