(No Model.)

R. SMITH.

EXPANSIBLE MANDREL.

No. 452,854. Patented May 26, 1891.

Fig. 2.

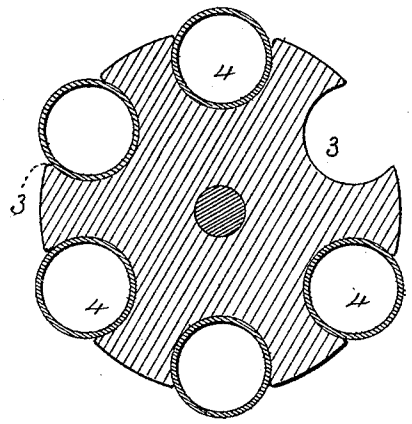

Fig. 1.

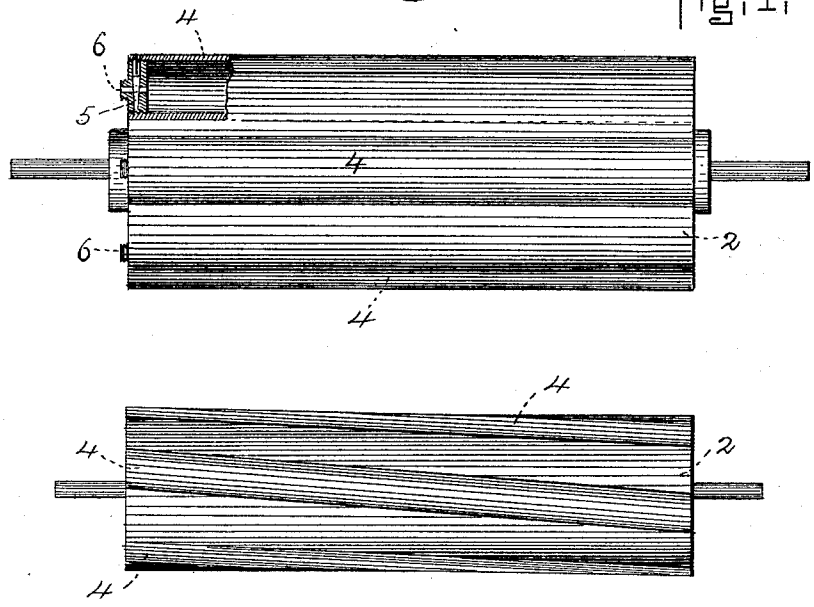

Fig. 3.

Witnesses.

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RICHARD SMITH, OF SHERBROOKE, CANADA.

EXPANSIBLE MANDREL.

SPECIFICATION forming part of Letters Patent No. 452,854, dated May 26, 1891.

Application filed July 30, 1890. Serial No. 360,380. (No model.)

To all whom it may concern:

Be it known that I, RICHARD SMITH, a citizen of Canada, residing at Sherbrooke, in the county of Sherbrooke and Province of Quebec, have invented certain new and useful Improvements in Expansible Mandrels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to mandrels, particularly that class termed "expansible"—that is, the diameter is made adjustably variable for the entire length of the mandrel to enable the material—such as cloth or paper—to be wound tightly thereabout, and subsequently permit the mandrel to be withdrawn by contracting or lessening the diameter of said mandrel.

My invention consists in making a mandrel which is termed "hydraulic," since its diameter is regulated by the admission or withdrawal of water or other liquid contained in liquid-tight tubes or vessels which are to be expansible.

The drawings herewith accompanying this specification represent in Figure 1 a side elevation. Fig. 2 is a transverse section of a mandrel embodying my invention. Fig. 3 is a modified form.

In said drawings I have shown a mandrel at 2, composed of wood or metal, and furnished with suitable bearings, upon which it is adapted to turn when paper, cloth, or other materials are to be wound or coiled thereupon.

To enable the diameter to be increased or diminished the surface of the mandrel is formed with grooves 3 3, which are parallel and extend the entire length of the mandrel. Said grooves are preferably sections of circles in cross-section, and each is adapted to receive a length of elastic or expansible tubing 4 4, or cylindrical liquid-tight vessels provided at one end with a filling-orifice 6 and a valve 5, by which the contents of each of said vessels can be retained or discharged.

By reference to Fig. 2 it will be seen that the closed vessels or tubes extend beyond the exterior surface of the mandrel. This construction allows the material to be wound about the mandrel when the closed vessels are in a distended state; but when the same are in a state of collapse sufficient difference in the diameter of the mandrel is produced to allow the latter to be easily pulled out and removed.

The operation is as follows: The mandrel when empty is enlarged, preferably, to its fullest diameter. This is effected by opening the valves at the ends and forcing in the proper quantity of water or fluid, or perhaps air, obtained from some suitable source under pressure. The valves 5 are then closed. Preferably some form of lock-valve is to be used to prevent them from opening, and thus obviate the loss of the contents and collapse of the vessels. When the roll has been adjusted to the proper diameter, the mandrel is mounted in its journals, and the end of the paper or other material to be coiled upon it passed around and secured. The winding process now ensues in the ordinary way. When the roll is of sufficient size, rotation of the mandrel is stopped, the roll of material is removed to a proper storage-place, and the act of withdrawing the mandrel now is to be accomplished. This is very easily done by opening the valves and permitting the expansible vessels to collapse by allowing their contents—air or water—to escape. When the diameter of the mandrel is sufficiently reduced, the mandrel can easily be withdrawn. Conversely, presuming a roll of paper, cloth, or other material from which the winding mandrel has been withdrawn has been shipped to a place of manufacture, where it is to be worked up, and it becomes necessary to introduce a second mandrel, this is easily done by pushing the mandrel, with its expansible vessels in a collapsed state, through the bore of the roll, and then by opening the valves and filling said vessels so distend the latter that the desired increase in diameter has been obtained. This act performed, the roll is now fast upon a new mandrel and the material can be easily unwound. By such construction the necessity of shipping a winding shaft or mandrel is avoided, while no difficulty exists in withdrawing it, because the difference between the diameters of the mandrel when

in its expanded and its contracted state is so great.

In the drawings, Fig. 3 represents the vessels arranged obliquely, since this position or when spirally placed will produce the same effect as when arranged in Fig. 1.

What I claim is—

1. An expansible mandrel composed as follows: a revoluble cylinder and one or more closed expansible vessels secured longitudinally thereto and projecting beyond the periphery of the cylinder, substantially as and for purposes explained.

2. In combination with a revoluble mandrel provided with series of grooves lengthwise thereof, a series of closed expansible vessels secured in said grooves, and the controlling valves which regulate their contents, substantially as described and stated.

3. A revoluble mandrel and a series of oblique or spiral grooves longitudinally therein, combined with a series of closed expansible vessels of a form to fit and be contained in said grooves, and the valves by which the contents of said vessels are received and discharged, as stated and set forth.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD SMITH.

Witnesses:

H. E. LODGE,

FRANCIS C. STANWOOD.