(No Model.)

E. W. CLARK.

MACHINE FOR FORMING SEAMLESS TUBES.

No. 454,030. Patented June 16, 1891.

Fig. 1

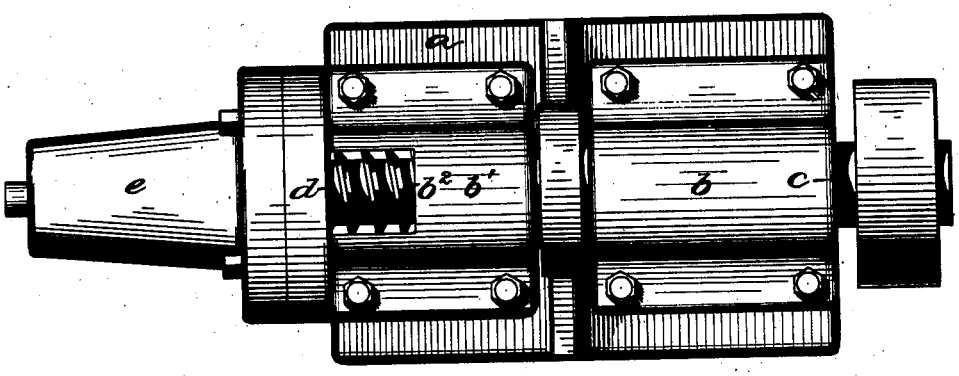


Fig. 2

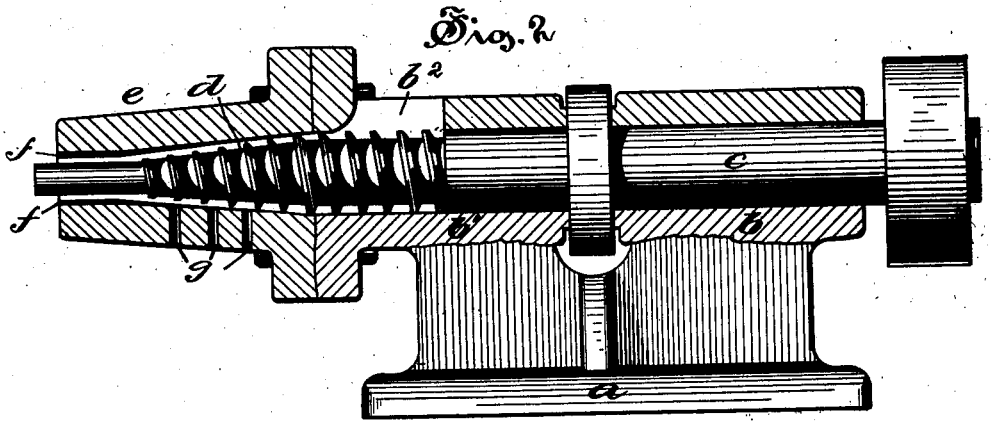
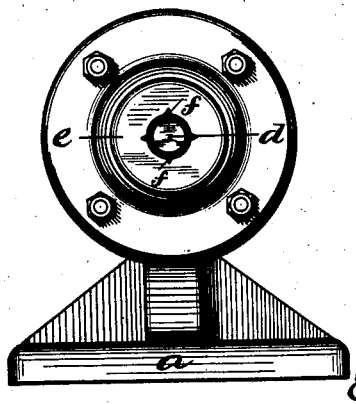


Fig. 3



Witnesses:
Geo. K. Kaul
Wm. Musser.

Inventor,
Edred W. Clark, by
Harry P. Williams
Atty.

UNITED STATES PATENT OFFICE.

EDRED W. CLARK, OF HARTFORD, CONNECTICUT.

MACHINE FOR FORMING SEAMLESS TUBES.

SPECIFICATION forming part of Letters Patent No. 454,030, dated June 16, 1891.

Application filed October 20, 1890. Serial No. 368,639. (No model.)

To all whom it may concern:

Be it known that I, EDRED W. CLARK, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Forming Seamless Tubes, of which the following is a full, clear, and exact specification.

The invention relates to the class of machines for forming seamless tubes of indefinite length, and the object is to provide a machine for forming such tubes of fibrous material, so that they will be more firm and homogeneous than prior tubes formed of this material.

To this end the invention resides in a machine which transforms fibrous material beaten into a pulpy, pasty, or semi-liquid state into a light seamless tube with the fibers so intertwined and laced as to produce a firm, strong, homogeneous texture throughout the entire length of the tube.

Referring to the accompanying drawings, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation with part cut in central section. Fig. 3 is a view of the front end of the machine.

In the views, the letter *a* indicates the base, which is preferably cast to shape of iron or steel. In a box *b* upon the upper surface of the base is formed a bearing for a spindle *c*, which is adapted to be rotated in the bearing by a pulley and belt or any common form of driving-gears. To the front end of this spindle, which is supported by the box *b'* adjacent to the box *b*, is secured a mandrel *d*. This mandrel, which is usually formed integral with the spindle, is tapering for a portion of its length, and is provided with a thread of any suitable form and pitch, a portion of this thread being preferably formed upon a parallel part of the mandrel which lies beneath an opening b^2 cut through the top of the box *b'*.

A die or shell *e* is secured, preferably by means of bolts, which pass through flanges upon the parts, to the front end of the box *b'* around the mandrel. The opening through the die tapers for a portion of its length substantially parallel with the tapering body portion of the mandrel, and is substantially parallel near the front end, where it encircles the substantially parallel smaller end of the mandrel. The threads at the smaller end of the tapering portion of the mandrel are made gradually smaller, so that they will not fill up the space in the opening in the die, along which for a short distance small longitudinal grooves *f* are cut, and to which a number of transverse perforations *g* from the exterior are bored to permit the escape of the liquid expressed from the substance under compression to form the tube.

The fibrous material, as paper, asbestus, or any similar fibrous substance, mixed with any suitable sizing or binding material from which the tube is to be formed, is beaten up with a liquid into a pulpy, pasty, or semi-liquid condition and conducted by any suitable means, as a funnel, tube, or pipe, through the opening b^2 to the revolving mandrel. The thread upon the mandrel carries the material along spirally down the tapering portion of the die, which, as the opening decreases in size, compresses the material and reduces it in diameter, the water and moisture expressed by the compression escaping through the perforations provided for that purpose. When the forward end of the tube being formed reaches the reduced portion of the mandrel and opening in the die, it has become compressed and hardened to the desired degree, and is preferably prevented from rotation by the expansion of a portion of its surface into the grooves, while the rear end, which is in a spongy and soft condition, is being added to by the soft pulp which comes down the incline of the mandrel. As the fibrous material is brought down the mandrel and reduced in diameter by the rotation of the thread it is laid or built onto the end of the tube spirally, so as to cause the fibers to interlace and form a firm structure.

Fibrous matter is of such nature that the fibers will not interlace and form a firm texture by simply reducing the diameter of the mass and adding to the end soft matter by direct compression, and the essential feature of my process is the continuous building up of the tube by fibers under a rotary strain as

well as forward compression, which causes the fibers to intertwine and lace, whereby a light and strong tube of indefinite length can be produced, which, when formed of electrical non-conducting fibrous material, as asbestus or the like, can be used for insulating wires or other electrical apparatus.

The front or reduced end of the mandrel may be made square or any other desirable shape in cross-section to form the interior of the tubes of varying shapes without substantially modifying the machine or changing the process which is my invention.

By greatly reducing the size of the thread upon the tapering portion of the mandrel a more homogeneous mass results than where the threads completely fill the tapering portion of the shell, as the threads do not cut in the compressed mass of fibers, which are very nearly dry when they reach the reduced portion of the mandrel. When the threads of the mandrel extend to the walls of the shell the entire length of the tapering portion, the fibers are pressed between the threads which separate the spirals thus formed, and these spirals after thus compressed will not adhere together and form a homogeneous or firm tube.

I claim as my invention—

1. In a machine for forming seamless tubes, a base, a die with a tapering opening secured to the base, and a rotary mandrel having a taper substantially the same as the die, supported by the base and projecting into the tapering opening in the die, the said mandrel bearing a thread which decreases in height from the larger to the smaller portion of the mandrel, substantially as specified.

2. In a machine for forming seamless tubes, a base, a die with a tapering opening secured to the base, and a rotary mandrel supported by the base and projecting into the tapering opening in the die, the said mandrel bearing a thread which recedes from the walls of the tapering opening in the die as it passes from the larger to the smaller portion of the mandrel, substantially as specified.

EDRED W. CLARK.

Witnesses:
HARRY R. WILLIAMS,
WM. H. HAND.