(No Model.)

A. M. THOMPSON.

MOLDING DEVICE.

No. 559,635. Patented May 5, 1896.

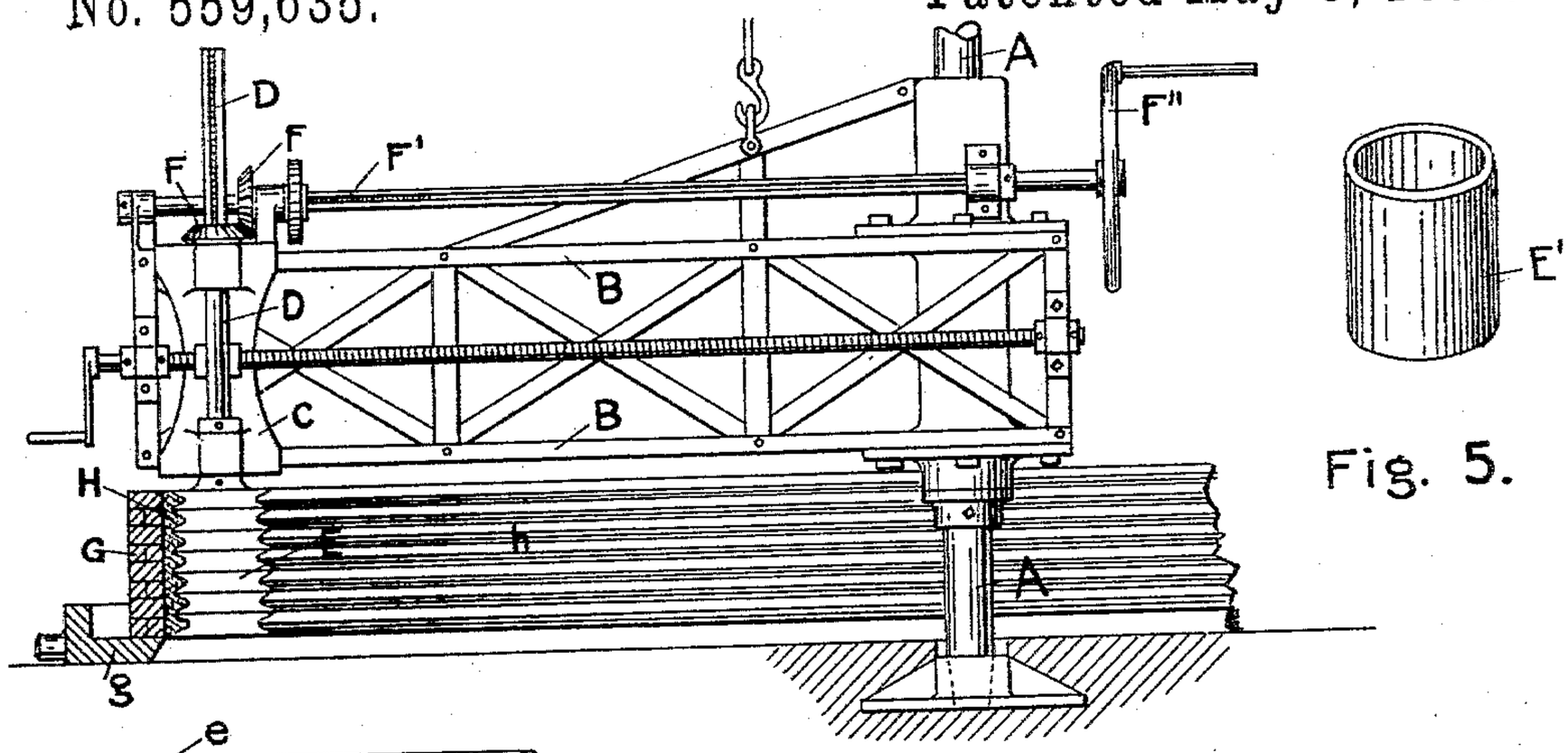

Fig. 5.

Fig. 1.

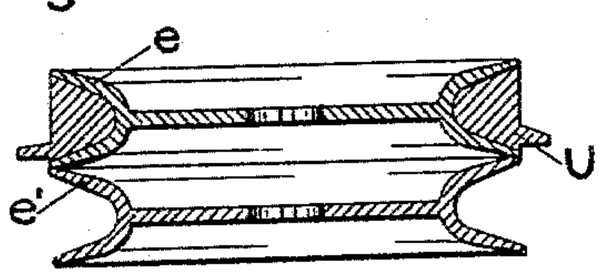

Fig. 4.

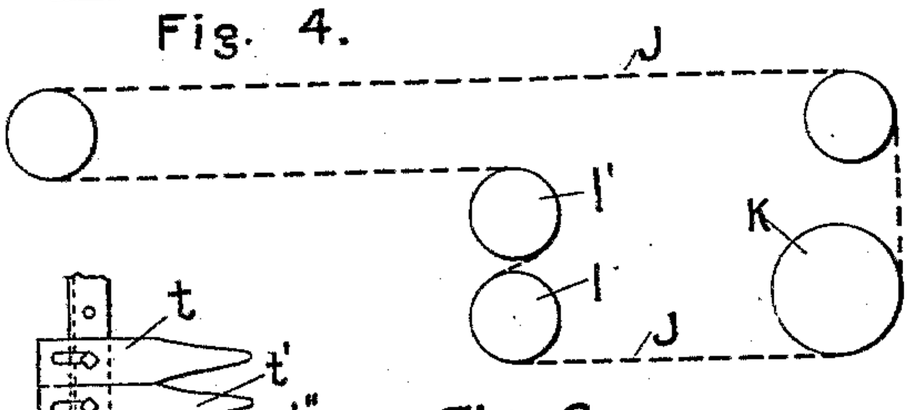

Fig. 6.

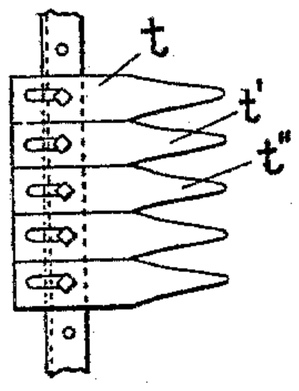

Fig. 3.

Fig. 2.

Witnesses
John Petersen.
F. C. Field

Inventor
Alexander M. Thompson.

By his Attorney
C. G. Ewart.

UNITED STATES PATENT OFFICE.

ALEXANDER M. THOMPSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LINK-BELT MACHINERY COMPANY, OF SAME PLACE.

MOLDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 559,635, dated May 5, 1896.

Application filed January 19, 1894. Serial No. 497,427. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER M. THOMPSON, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Molding Devices, of which the following is a specification.

My improvements relate to devices for foundry-molding, and have for their object the formation of finished surfaces without using corresponding patterns.

My invention may be said to consist, primarily, in employing a rotating roller to form part of the mold, and, secondarily, in certain details of construction and operation more fully explained in the specification.

To enable those skilled in the art to which my improvements relate to understand and practice the same, I will now proceed to describe my invention more fully, referring to the accompanying drawings, which form part of this specification, and in which similar letters designate similar parts throughout the several views.

Figure 1 is a cross-section showing a simple manner of using my roller for the formation of a grooved sheave-surface, said roller being secured to an arm revolving about an axle which is concentric with the mold. Fig. 2 is a similar cross-section showing my roller applied to a molding-machine in which the roller is rotated with its axis in a stationary position, while the mold rests on a rotating table which brings different parts of the sand surface successively into contact with the roller. Figs. 3, 4, 5, and 6 show details of construction, as explained hereinafter.

In Fig. 1, A is a central axle, on which is mounted a swinging arm or framework B, having a movable plate C, arranged with journal-bearings to carry shaft D, which is shown provided with a ridged or grooved roller E and means for rotating it, such as gears F, shaft F′, and hand-wheel F″. G is a "wall" serving as a flask, usually circular, and in this case concentric with axle A, formed of bricks and built up on ring or plate *g*. H is a sand composition, which is preferably loam. *h* represents the grooved surface of the loam after the ridged roller has been applied.

In Fig. 2 the arm B′, which carries the roller, is shown as extending rigidly from an upright or standard A′, and the roller is rotated by a wheel I, which is driven by a belt J from wheel K. The flask G′ (shown as made of iron in this case) is carried by ring or plate *g*′, which rests on a rotating table L, preferably driven by gear M and pinion N. The shaft O, to which the pinion is secured, is rotated in either direction by double clutch P, mounted on a feather in the shaft, and this is engaged at will with the clutch-hubs on bevel-gears Q and Q′, which are driven by gear Q″ on shaft R. S and S′ are shown as tight and loose pulleys mounted on shaft R to drive the whole machine. The connection with roller E is through gear Q, whose hub is connected with that of wheel K, both being free to revolve loosely on shaft O. The connection with the rotating table is through the clutch P and either gear Q or Q′, as explained above. The shaft which carries roller E is mounted in bearings secured to a plate or frame which can be raised or lowered in guides or moved back and forth on arm B′.

Cleaners T are shown secured to the framework which carries the roller. These cleaners when used for grooved rollers are preferably formed in separate pieces *t t′ t″*, &c., as shown more in detail in Fig. 3, so that they can be removed individually to leave only as many in position as are required for the number of grooves to be molded. This removal makes room for the stopping-off piece U, (shown in Fig. 4,) to be secured to the roller for limiting the number of grooves in action on the loam and finishing the top edge of the sheave in such cases. Fig. 4 also shows a method of forming a grooved roller out of separate pieces, as *e e′*. E′ in Fig. 5 is a cylindrical roller which is fitted down over the grooved roller or otherwise secured to a roller-shaft for use in forming smooth surfaces in a mold or preparing surfaces for the application of a grooved roller.

The diagram view in Fig. 6 illustrates a form of take-up found convenient in the arrangement of the machine shown in Fig. 2, whereby wheels I and I′, mounted in the movable framework which carries the roller-shaft, will permit motion lengthwise of arm B′ without disturbing belt J in its office of trans-

mitting power from wheel K to wheel I. Belt J is preferably a detachable link belting readily removed when the roller is to be raised out of the flask.

Heretofore in molding circular articles without a pattern it has been customary in foundry practice to mix molding-sand and other ingredients into a preparation called "loam," of suitable consistency to admit of having the exterior surface of the mold formed in it by "sweeping up," as it is termed. The sweep for smooth-face pulleys was generally a straight-edged board attached at right angles to a swinging arm which projected horizontally from an upright shaft in the center of the mold. To form the grooves of sheaves the straight edge of the board was notched out into a shape corresponding with the desired conformation of the grooves, or supplied with a notched iron strip to stand the wear, and as the grooves of sheaves designed for the transmission of power by multiple ropes require considerable depth compared with their width it was impossible to sweep up the surface in one operation in fresh loam because this broke the grooves down. It was therefore necessary to smooth the surface off with a straight edge and allow it to dry and harden and then attack it gradually and repeatedly with the notched edge, scraping out the grooves roughly and repairing them with a slick and fresh loam wherever pieces broke out unevenly. This was often such a laborious and expensive process as to make it desirable to employ some sort of a pattern, which led to the extensive use of core-boxes and plates for the formation of cores in segments which are put together into the form of a complete circular sheave-surface, and set into core-prints provided for them in ramming up the sand in the ordinary way around a sort of blank pattern.

The objections to the use of cores are numerous, among which is the practical impossibility of preventing the segments becoming more or less out of true with each other and with the circles of the grooves they are supposed to form, and this necessitates turning off a lot of useless metal in the machine-shop and compels the making of the rims with extra thickness to allow for the irregularities of molding. In no case, however, so far as I am aware, has any one succeeded prior to my invention in sweeping up grooves or even plain surfaces in sand or loam molding with sufficient accuracy and smoothness to require no subsequent finishing for rope or belt transmission work.

With my device the action of the roller in the fresh loam seems to be such a combination of compressing and slicking as to overcome all tendency to break down the grooves, even though they are made with full depth in the first operation. In the methods which I have shown for applying my invention I prefer to have the speed of the roller greater than what would be the speed of traction if the roller simply moved by reason of its contact with the loam, as there is less tendency for the material to cling to the roller and leave holes in the surface of the loam. Also it is especially desirable in the first operation of compressing the material or forming the grooves to have the roller rotate in the direction of its traction, as the results are more uniformly successful than when the reverse motion is used at the start. After grooves have been formed by the first application of a ridged roller it is comparatively unimportant whether the relative motion is direct or reverse for the slicking effect. It is, however, preferable to have the roller rotated about its own axis in the same direction at all times if the cleaner is used on only one side, and the changes in relative direction just mentioned will be understood as those brought about by the movements of the swinging arm in the type shown in Fig. 1 or the movements of the rotating table in the type shown in Fig. 2.

With the arrangement shown in Fig. 2 I form the outer surface of molds rapidly and economically, removing them to the drying-ovens as fast as they are finished and putting in new flasks readily, to have molds formed up for other pulleys or sheaves of the same size or different sizes at will. The flasks are made of various diameters and depths to suit the range of work to be done, and the rings or plates, as g', are preferably arranged so as to accommodate several different diameters of flasks on each size of ring. The roller mechanism is easily moved up out of the way when molds are to be changed, as explained above, and an adjustment of the position of the roller-shaft lengthwise of the arm B′ will accommodate a variety of diameters of sheaves.

It is of course easy to arrange in any well-known manner for driving the various parts of the machine simultaneously or independently, and the device can be operated by hand or power, as may be most convenient.

To form molds having different conformations of grooves, I use different rollers provided with ridges or grooves to correspond; but to form molds with different numbers of grooves of the same conformation I prefer to use one long roller, which is provided with enough ridges for the largest number of grooves ordinarily required, and arrange stopping-off pieces about as shown in Fig. 4 at U, to limit the formation of grooves as desired, employing flasks of suitable depth to give a proper loam surface on which to operate. Where more grooves are wanted in the mold than the size of the roller will make in one operation, one set of grooves can be formed first and others afterward by raising or lowering the roller-shaft and using one or more of the first-formed grooves as a gage to determine the proper relative location of the others above or below in the flask.

A ridged or grooved roller can of course be formed of separate small sheaves, as suggested

in Fig. 4, or of disk-like pieces, making the separation at any desired point, such separate sheaves or disks being slipped over the shaft in as large or small a number as may be desired, and various methods of rotating the roller may be adopted; but the arrangements shown and described are such as I prefer and have thus far successfully practiced. The roller should be formed of a hard and smooth material to prevent as far as possible any tendency of the loam to cling to it, while the cleaners may be of any desired material, arranged transversely to the surface in such a manner as to insure a supply of smooth surface for the slicking action of the roller on the loam. The flasks may of course be formed in any well-known manner and of any desired material. The circular iron flasks generally used in my method of molding are less expensive in several respects than those ordinarily employed, and the thin coating of loam required makes quite a saving in material when compared with the quantities of core-sand needed for the old methods.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a molding device, the combination of a flask provided with a surface of sand composition, a grooved roller, and means for rotating said roller in contact with said sand surface at a higher rate than the natural speed of traction against said surface would be.

2. In a molding device, the combination of a flask provided with an inner coating of a sand composition, a grooved roller, and means for rotating said roller in contact with said sand composition in the direction of the traction and at a higher rate of speed.

3. In a molding device, the combination of a substantially circular wall having an interior sand surface, a standard, a swinging arm mounted on the standard, a roller carried by said arm in contact with said interior sand surface, and means for rotating the roller, substantially as described.

4. In a molding-machine, the combination of a rotating table, a flask carried thereon and provided with a substantially circular sand surface concentric with said table, and a rotating roller applied in contact with said sand surface, substantially as shown and described.

5. As an improved device for molding the grooves of grooved pulleys, a roller or series of disks arranged in a molding-machine to rotate in the direction of its traction to compress the material and means to rotate the roller at a higher velocity to slick the surface, substantially as set forth.

6. As a device for making grooves in sand-molds, a roller provided with circular ridges and a stopping-off piece, a swinging arm supporting said roller, and means for mechanically rotating the roller, substantially as described.

7. In a sand molding-machine, the combination of a substantially circular sand surface, a standard, an adjustable arm mounted on the standard, a roller mounted on the arm, and means for adjusting the roller vertically and horizontally with relation to the arm, and means for rotating said roller, substantially as described.

ALEXANDER M. THOMPSON.

Witnesses:
WM. JUSTEMA,
WM. F. BARRETT.