(No Model.)

3 Sheets—Sheet 1.

R. H. H. HUNT.

FULLING MILL.

No. 280,929. Patented July 10, 1883.

Fig. 2.

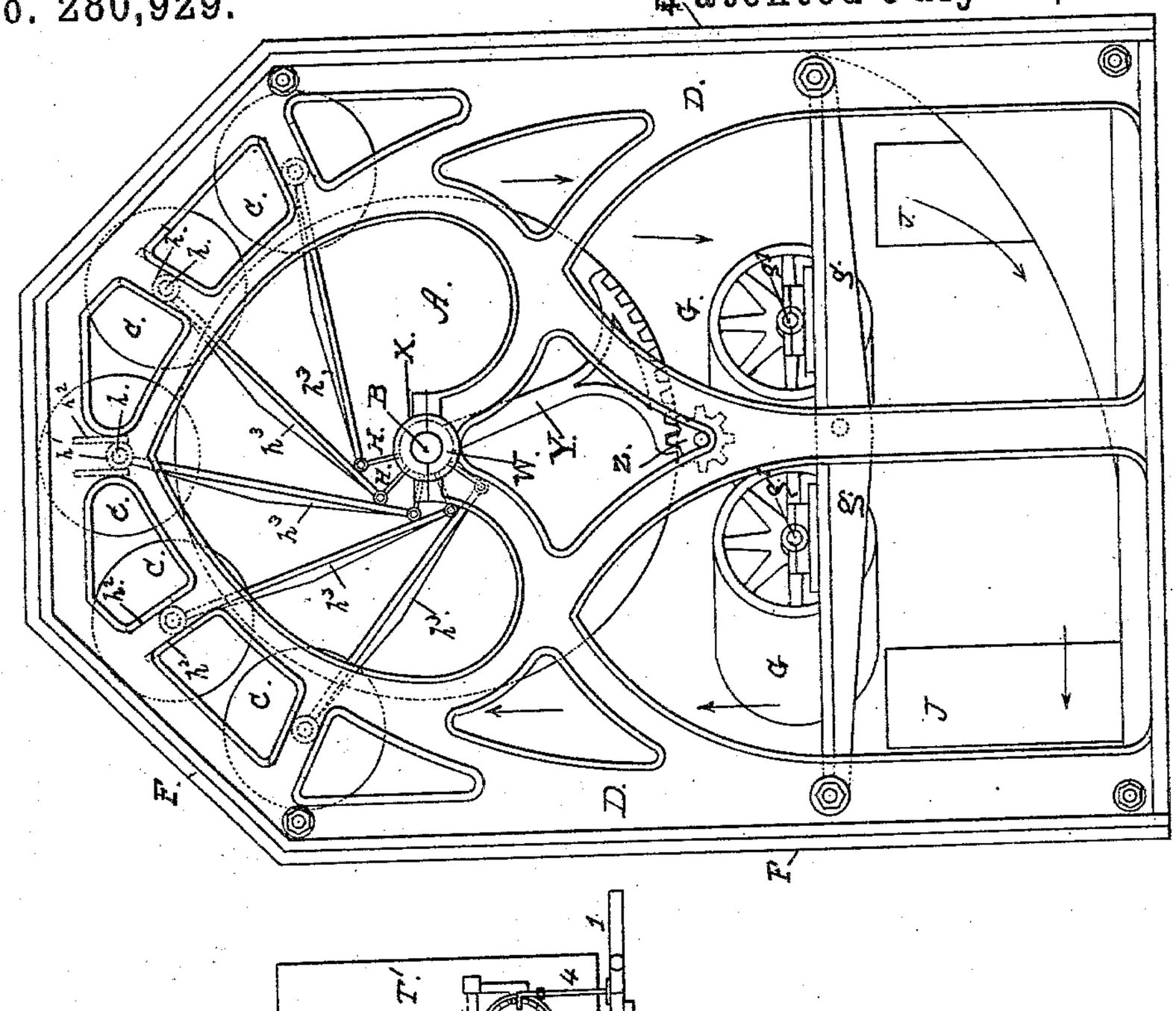


Fig. 1.

Witnesses:
Wm Voit
Geo. Vincent

Inventor:
Robert H. H. Hunt,
By his Atty., Edward G. Dobson

(No Model.) 3 Sheets—Sheet 2.

R. H. H. HUNT.

FULLING MILL.

No. 280,929. Patented July 10, 1883.

Fig. 4.

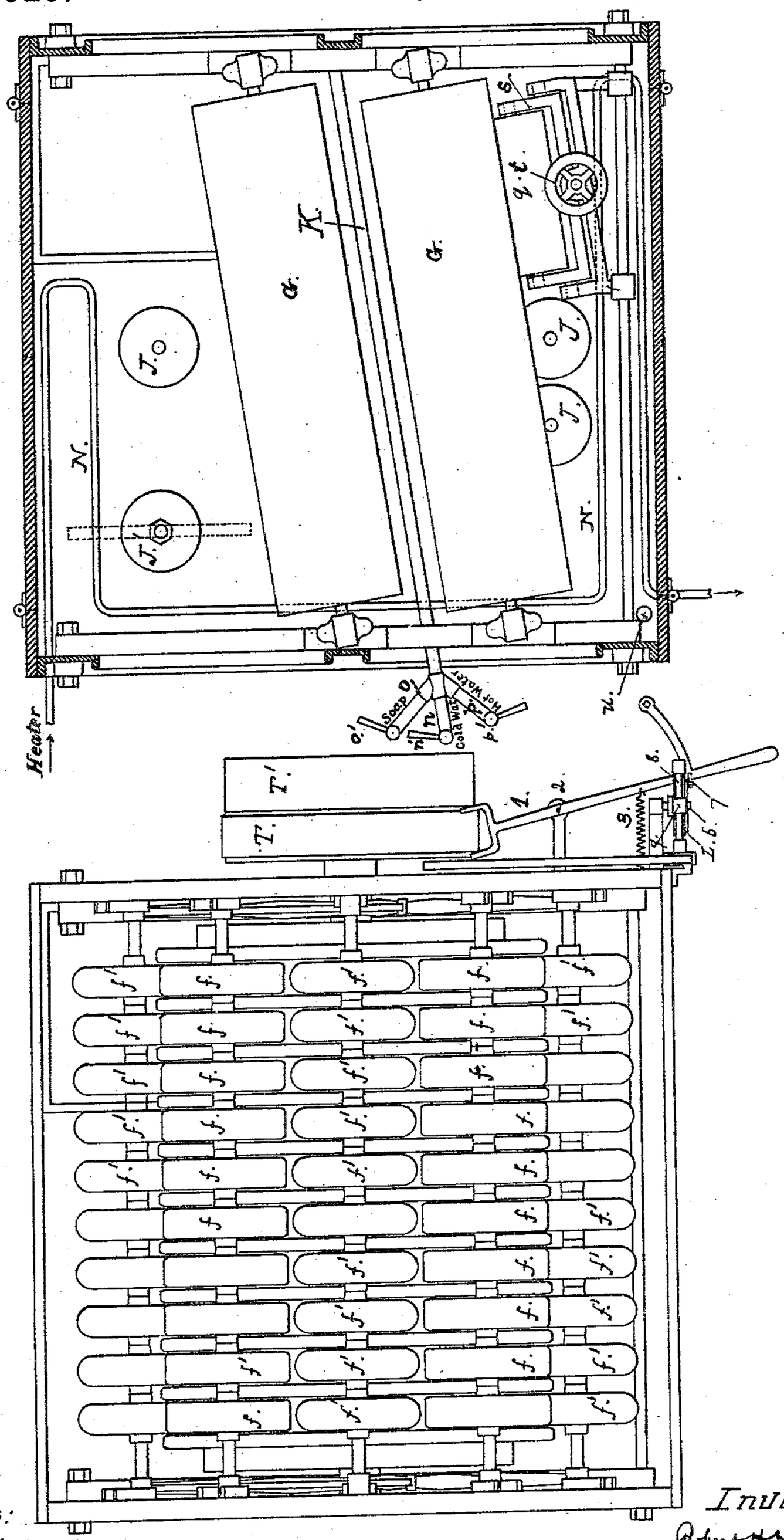


Fig. 3.

Witnesses:
Wm Voit
Geo. Vincent

Inventor:
Robert H. H. Hunt
By his Atty., Edward G. Osborn

(No Model.) 3 Sheets—Sheet 3.

R. H. H. HUNT.

FULLING MILL.

No. 280,929. Patented July 10, 1883.

Fig. 5.

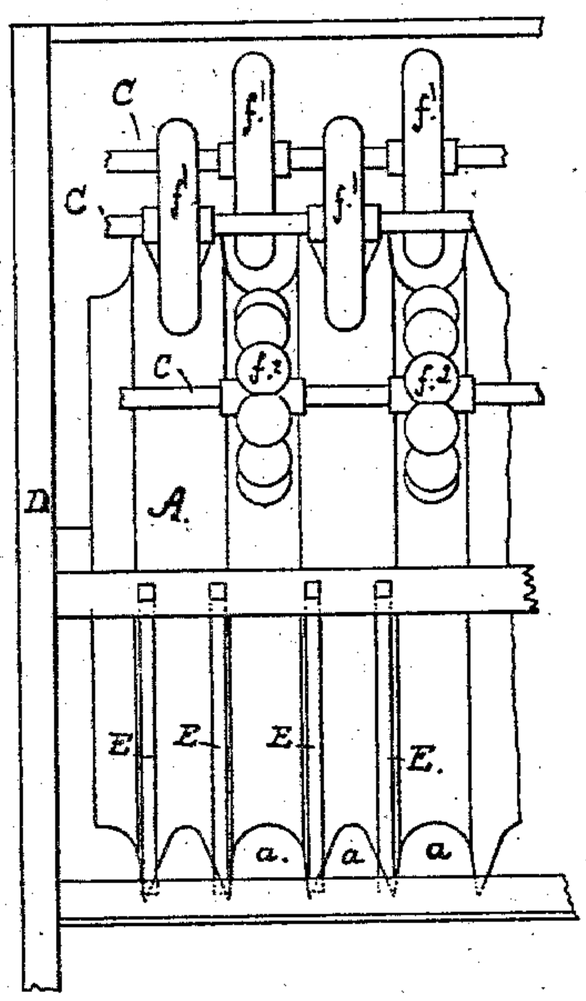


Fig. 6.

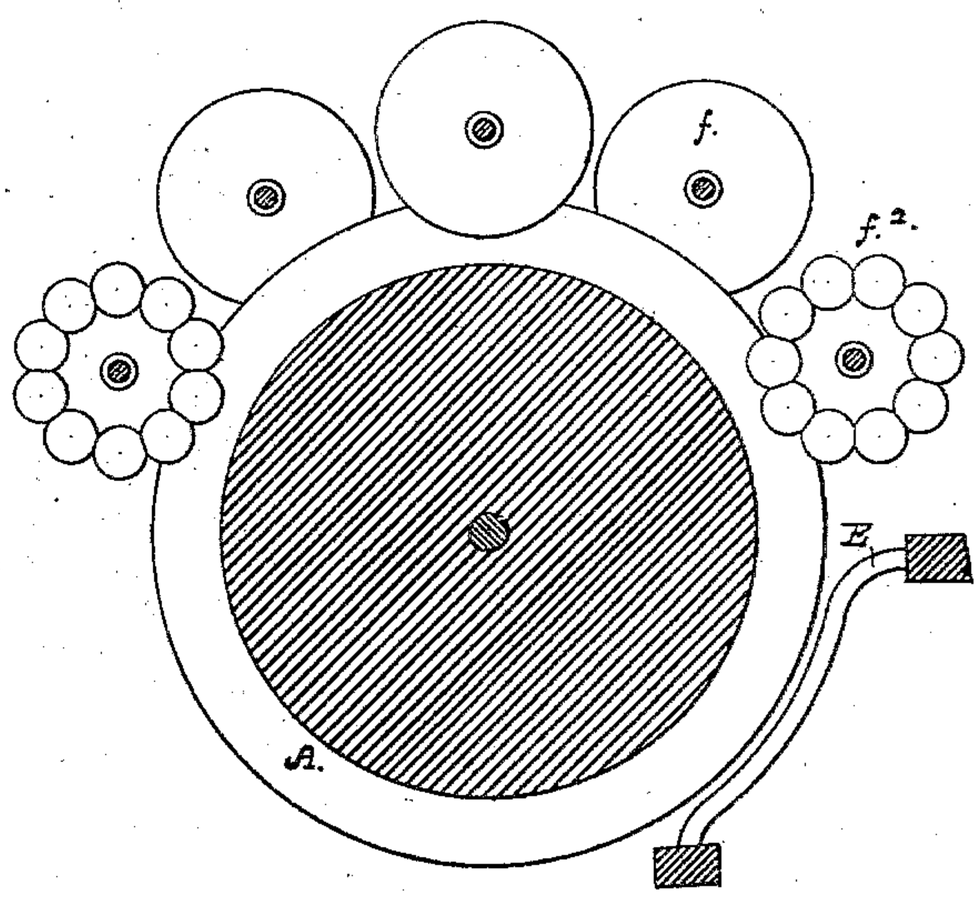
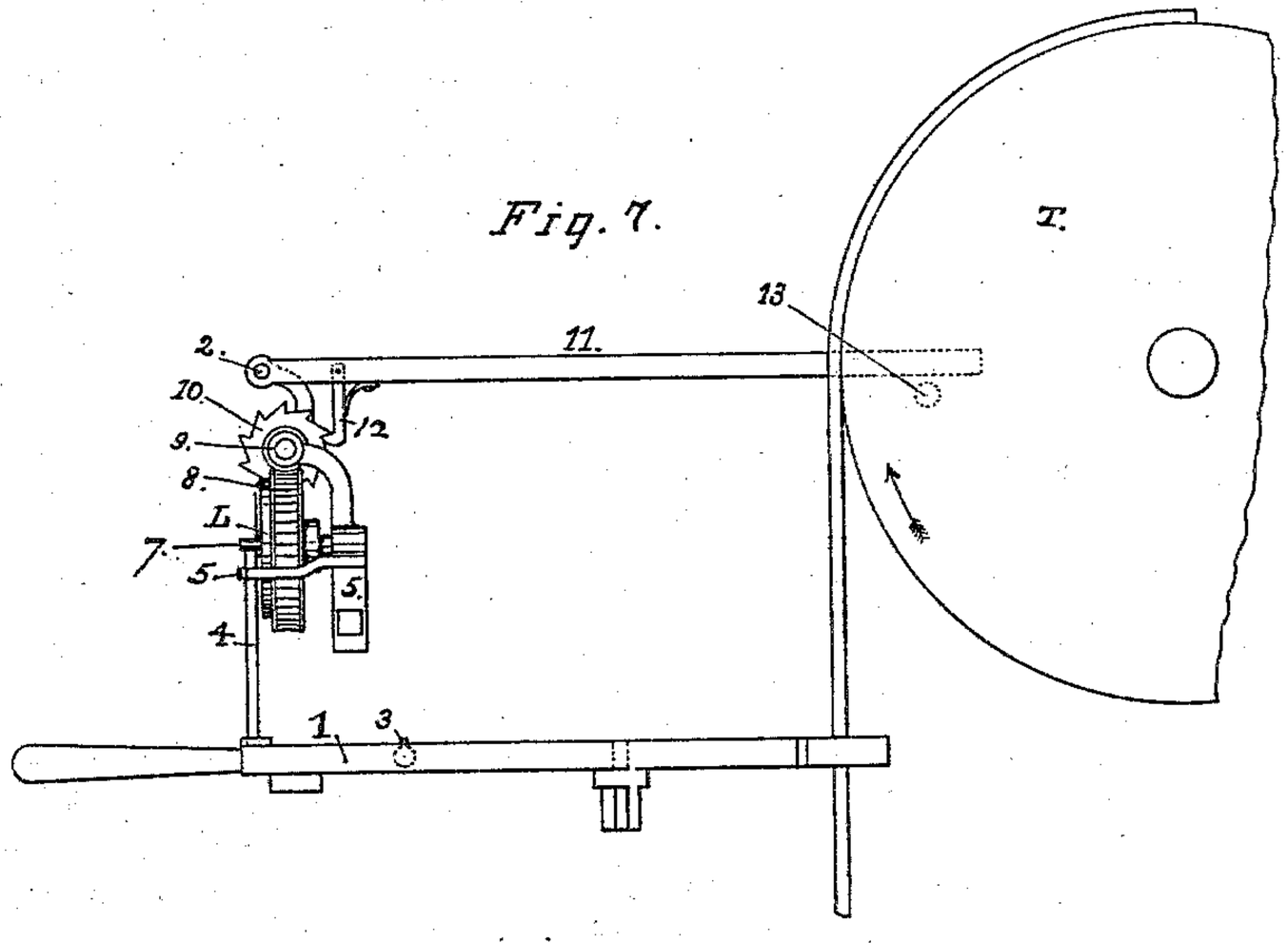


Fig. 7.



Witnesses:
Wm Voit
Geo. Vincent

Inventor:
Robert H. H. Hunt
By his Atty.. Edward S. Dodson

UNITED STATES PATENT OFFICE.

ROBERT H. H. HUNT, OF SAN FRANCISCO, ASSIGNOR OF TWO-THIRDS TO JOSEPH B. McCHESNEY AND WILLIAM A. KNOWLES, BOTH OF OAKLAND, CALIFORNIA.

FULLING-MILL.

SPECIFICATION forming part of Letters Patent No. 280,929, dated July 10, 1883.

Application filed August 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. H. HUNT, a citizen of the United States, residing in the city and county of San Francisco, State of California, have made and invented certain new and useful Improvements in Fulling-Mills; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings.

My invention relates to improvements in machinery for fulling cloth in the process of its manufacture; and it consists in passing a length of cloth in a double or folded condition around a drum or cylinder and between its face and the faces or peripheries of a number of bearing-rollers having independent bearing or working faces to engage with and act upon each fold or turn of cloth on the drum, the operation being such that the cloth is pressed, rolled, and kneaded or worked by the rollers while running upon and being carried around by the drum.

It consists, also, in carrying and guiding the length of cloth in a number of spiral turns around the drum by means of peculiarly-arranged guide-rollers.

It consists, also, in forming a drum with cloth-carrying grooves and in guiding the cloth from one groove to the other in a continuous manner from end to end of the drum, so that its ends being joined together it is carried in the form of an endless band or belt many times through the machine.

It consists, also, in means for regulating the slack of the cloth and controlling the amount of shrinkage.

It consists, also, in combining with the fulling-drum, stop-motion to throw off the power and stop the machine at the end of any required number of revolutions.

The following description fully explains the nature of my said improvements and the manner in which I proceed to construct, apply, use, and operate them, the drawings being referred to by figures and letters—that is to say:

Figure 1 is a front elevation of my improved mill, one-half of the case being thrown open to expose the interior. Fig. 2 is an end elevation with the outer wood-work of the case removed. Fig. 3 is a top view with the top of the outer case taken off. Fig. 4 is a horizontal section through the outer case just over the diagonal guide-rollers. Figs. 5 and 6 show different forms and application of the bearing-rollers. Fig. 7 is a detail view, showing the construction of the slip-motion.

A represents a large cylindrical drum, supported in horizontal position within a suitable inclosing box or case upon journals B B. Around it are placed a number of rollers, C C, and between its periphery and the faces of these rollers the cloth to be fulled is carried by the rotation of the drum on its axis. The cloth being folded or twisted into a band is laid in regular spiral turns over the face of the drum, and its two ends are joined together, so that an endless belt of cloth is formed. Suitable means are employed to hold and guide the cloth upon the drum and cause it to run in regular spiral turns from one end to the other, so as to pass under and receive the action of all the bearing-rollers. The best form of drum for this purpose is one with a series of channels or grooves, *a a*, around its periphery running parallel with one another and at right angles to its axis. It can be constructed of a number of disks or sections placed together upon a central core or shaft, and held together by any suitable locking device—such as a threaded nut or collar screwed on the shaft against the outside sections—or it can be a single structure with the grooves cast or turned in it. The grooves may be either of rectangular or of semicircular form in cross-section. The object of placing these grooves parallel with one another is to provide for bringing the cloth in proper position and relation with the working-faces of the bearing-rollers C, and to have the shafts of these rollers run parallel with the axis of the drum. The cloth being wound across the ridges and depressions in the drum, the rollers C press it into the depressions *a* and thus work it. The edges of the ridges are not sharp so as to cut the cloth when pressed against them.

To lay a length of cloth in a spiral manner

around the drum I place beneath it two horizontal guide-rollers, G G, under which the cloth from one groove at one side of the drum is carried across to the opposite side to enter the next groove. These rollers are placed diagonally with respect to the axis of the drum to give this oblique or spiral turn to the cloth. They are mounted in adjustable side bars, *g g*, so that they can be raised and lowered to regulate the slack of the cloth, for which purpose the bars *g*, supporting their journals *g' g'* are movable vertically at one end, and can be set up or down, as required, to bring the rollers nearer to or farther from the drum. Instead of two guide-rollers, a single one of larger diameter could be employed. This would take up more room beneath the drum, however, and in practice would not operate so well in conjunction with the other washing apparatus of the mill as would the arrangement of the two rollers.

The rollers C C, placed around the drum, are mounted in adjustable bearings to regulate and change their pressure and contact with the cloth. The bearings of all the rollers are moved and set together and with a uniform movement. Such a means of adjustment is shown in Figs. 1 and 2, and consists of boxes *h' h'* for the roller-shafts *h* held in sliding bearings h^2 in the sides of the machine, and each box connected by means of rods h^3 with arms or spokes H of stiff spring-steel projecting from a sleeve or hub, X. The hub X is loose and capable of turning freely upon a box, *w'*, through which the shaft of the drum runs, and a segment-arm, Y, projecting from the hub, gears with a pinion, Z. This mechanism is duplicated at the opposite side of the machine; and the two pinions Z Z are mounted on a single shaft extending across the machine, so that by means of a wrench or crank-handle the pinions Z can be turned and rotation of the hubs X effected in either direction. Movement of this hub in one direction will therefore set up the roller-boxes *h'* and in the opposite direction will draw them down. The faces of these rollers are formed of independent bearing-surfaces *f f*, and are produced either by forming the roller of a series of projecting disks separated by collars of smaller diameter fixed upon a central shaft, or by casting or forming them integral with alternate projecting rims and grooves. The distances between the projecting faces will be equal to the distance between the cloth-carrying grooves when combined with such a drum, so that each turn of cloth will have a disk or face bearing upon it across the entire length of the drum. Different shapes and forms are given to these working-faces to produce different action and effect upon the cloth, and I do not limit my invention to any particular form or construction, as it may be found that one shape or kind is better than another on different kinds, thicknesses, or grades of cloth to be treated. Those shown at F, with flat edges or working-faces, have a regular pressure across the folded cloth on the drum, and those at *f*, with convex rims, will bear more upon and along one line or portion of the cloth and have a tendency to turn or twist the cloth, particularly if the groove in the drum is concaved instead of flat, while those at *f'* with knobs or protuberances, as at f^2, will produce a kneading action to felt or work the fibers together. These rollers are placed in regular order with their working-faces in line, as in Figs. 1 and 2, or they are arranged to work alternately, as in Figs. 5 and 6, the faces of one roller working in different grooves from those of the next roller, and a gang of such rollers being arranged around the periphery of the drum, the cloth in its movement around the drum is brought many times in contact with these differently-formed roller-faces during its progression along the drum from one end to the other. By uniting the two ends of the cloth to give it the form of an endless band, a length of cloth can be kept in continuous movement and subjected to the operation of the bearing-rollers as long as required.

In connection with the diagonal guide-rollers G, I employ a set of stationary bars, E, to guide the cloth. These are placed at regular distances apart along the lower portion of the drum, at one side, for the purpose of keeping the turns of cloth separated and causing them to run in regular lines over the drum. There are also other rollers placed beneath these rollers at the bottom of the case to control the direction of travel and the tension of the cloth. These consist of the upright guide-rolls J, one of which is mounted in adjustable bearings to form a tension device, so that its position can be shifted to and from the other roll, and a less or greater amount of tension thereby produced on the length of cloth. This enables the amount of shrinkage to be controlled and adjusted, as desired. For this adjustment the shaft of the roller is set in a slotted bearing in the bottom of the case to be movable to and from the center.

Connected with this cloth-fulling mechanism in the same case, I apply a soaping and washing apparatus, by means of which the two operations of fulling and washing can be performed upon the cloth without removing it from the drum. I propose to make the washing and soaping apparatus the subject of a separate application for patent, and do not claim it in this patent; but I will describe it herein. This apparatus consists of a perforated conducting-tube, K, led into the space between the two guide-rollers G G, and connecting on the outside of the case with hot and cold water and soap-supply pipes *n o p*, provided with suitable controlling-cocks *n' o' p'*. The position of this conductor is directly over the turns of the cloth that pass under and across from one roller G to the other, and its perforations are upon the under side to direct the water or soap against the cloth passing beneath.

A wringer attachment, Q, is placed in such relation to one of the guide-rollers G that it can be thrown into action when required and caused to press against the cloth with greater or less force. It is brought into service during the washing process, and at other times can be set and held out of contact with the guide-roller. This roller *q* is journaled in a swinging frame, *s*, and a set-screw, *t*, to throw it up and down furnishes the means of adjusting the distance between the roll and the diagonal guide-roll. The floor of the case is inclined toward the outlet *u* to direct the water to that point of discharge, and a sieve or strainer bottom, V, is laid across and just over the floor to catch and let the soap and water pass off, but retain the flock or particles thrown off from the cloth. The application and arrangement of these rolls are clearly shown in Figs. 2 and 4 of the drawings.

To make the operation of the machine entirely automatic I connect the driving mechanism with the fulling-drum by means of a stop-motion, which is so constructed that it can be set to disconnect the power and stop the machine when the drum has made a given number of revolutions. This consists of a belt-shifting lever, 1, pivoted at 2 to the outside of the frame in suitable relation to the pulleys T T'. It is moved in one direction to unship the belt by a spring, 3. To hold it out of action and retain the belt on the fast-pulley a catch-rod, 4, movable up and down in the bracket 5, is caused to engage with a hole in the lever 1. To draw up this rod and release the lever 1 a disk, mounted on a shaft, 6, is provided with a stop-pin, 7. This shaft 6 is rotated by means of a pawl-and-ratchet mechanism through the medium of the gear 8, the worm-wheel 9, a ratchet-wheel, 10, on the worm-wheel shaft 11, and the ratchet-lever 12. Movement of this lever is effected once during each revolution of the drum by means of a pin, 13, fixed on the side of the pulley T in line with the end of the lever 12. This construction is shown in Figs. 3 and 7 of the drawings. The proportions of the worm-wheel and tooth-wheel 8 are such that a certain number of revolutions of the drum will produce one revolution of the disk, and the pin 7 will then be brought around beneath the end of the trip-rod and raise it out of the notch in the belt-slipping lever.

The disk L is movable upon the shaft 6, so that at the beginning of operation the pin 7 can be set to engage with the rod 4 at less number of revolutions and stop the machine.

To regulate the temperature within the mill and bring it to any desired degree of heat, I place a coil of pipe, N, within the case just above the floor, and make connection on the outside with a hot-water or steam supply. This pipe may be the ordinary hot-water pipe for supplying the pipe P.

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

1. In a fulling-mill, a drum for carrying and presenting the cloth to the action of fulling-rollers, and means combined therewith for holding and guiding a length of cloth in an inclined or spiral direction upon the drum from one end to the other, substantially as described.

2. In a fulling-mill, the combination, with the drum upon which the cloth is worked, of adjustable guide-rollers, placed diagonally with respect to its axis, whereby the cloth is carried diagonally around said drum, substantially as described.

3. In a fulling-mill, a drum having cloth-carrying grooves, and means for guiding and holding a length of cloth in a spiral layer around the drum within the grooves, substantially as described.

4. In a fulling-mill, bearing-rollers C C for pressing upon the cloth, constructed with independent bearing-faces, substantially as described.

5. In a fulling-mill, the combination, with a drum having cloth-carrying grooves, of bearing-rollers C, having separate or independent bearing-faces for pressing the cloth against said drum, substantially as described.

6. In a fulling-mill, the combination, with the drum having the cloth-carrying grooves *a*, of the diagonal guide-rollers G G, substantially as described.

7. In a fulling-mill, the combination, with the drum having cloth-carrying grooves, of the stationary guide-bars E E, substantially as described.

8. In a fulling-mill, the combination, with the fulling-drums A, of the adjustable tension-rollers J J', substantially as described.

ROBERT H. H. HUNT. [L. S.]

Witnesses:
EDWARD E. OSBORN,
MARY SUTTON.