(No Model.) 2 Sheets—Sheet 1.

H. N. GROSSELIN, FILS.

MACHINE FOR NAPPING CLOTH.

No. 377,151. Patented Jan. 31, 1888.

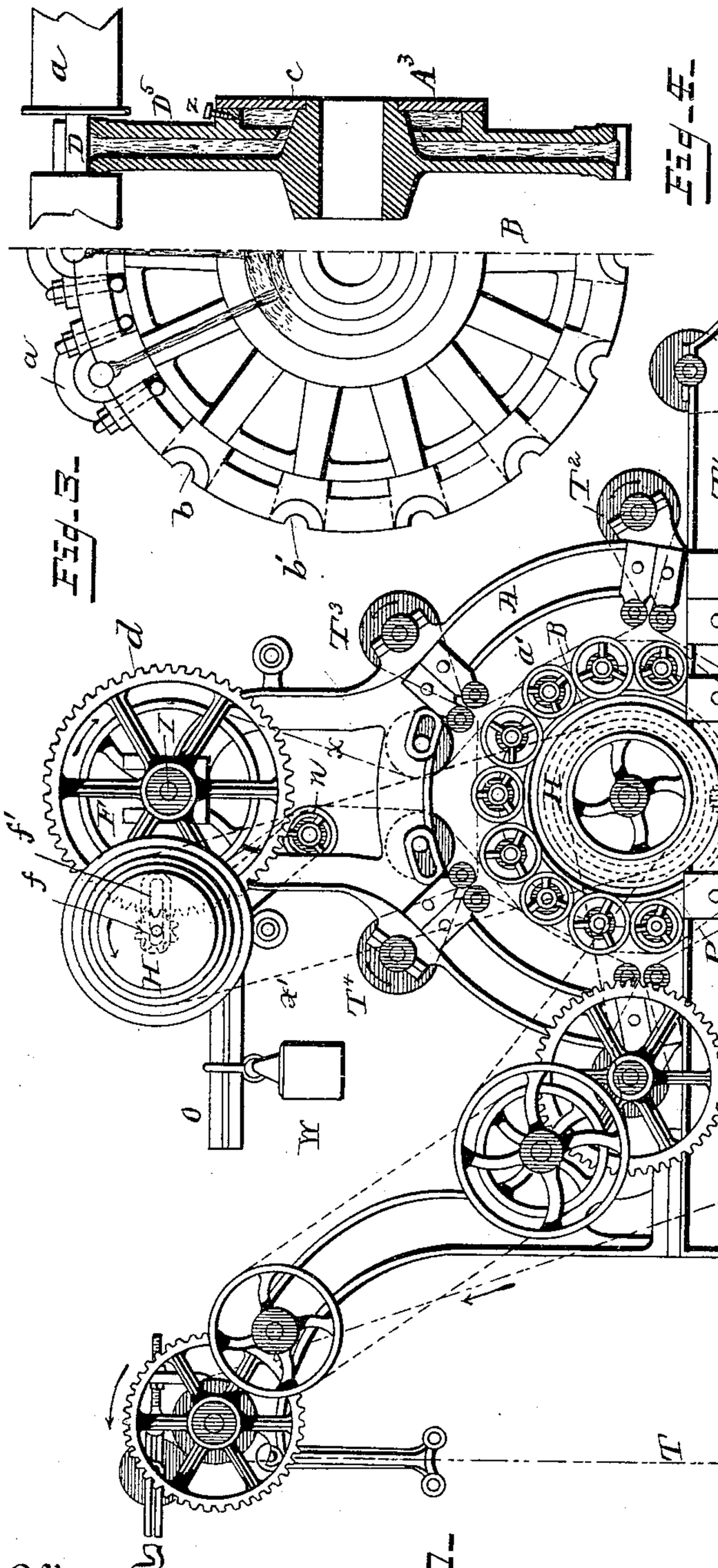

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

(No Model.)

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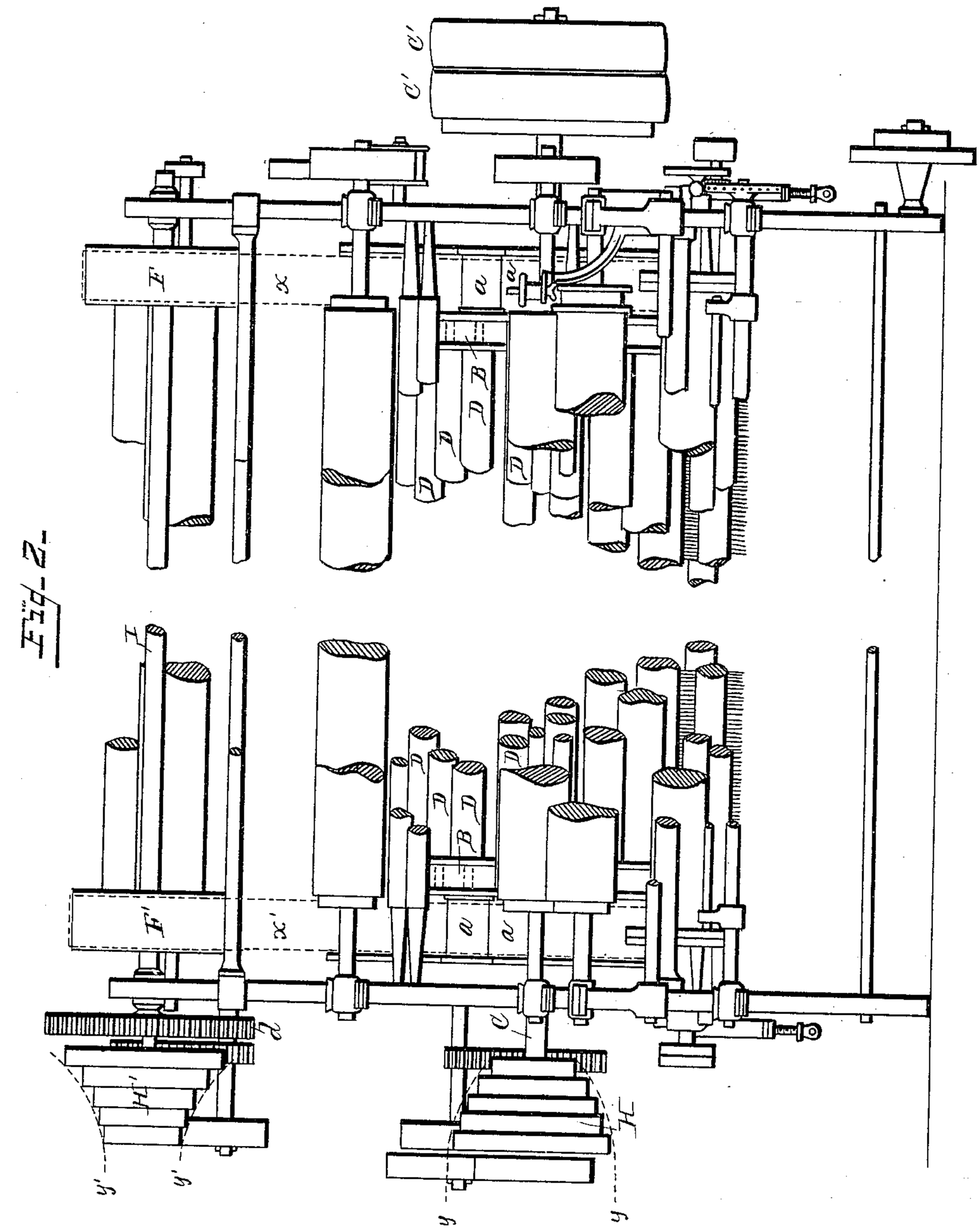

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UNITED STATES PATENT OFFICE.

HENRY NICOLAS GROSSELIN, FILS, OF SEDAN, FRANCE.

MACHINE FOR NAPPING CLOTH.

SPECIFICATION forming part of Letters Patent No. 377,151, dated January 31, 1888.

Application filed July 26, 1886. Serial No. 209,150. (No model.) Patented in France October 2, 1885, No. 171,459; in England December 9, 1885, No. 15,125; in Belgium January 14, 1886, No. 71,616, and in Germany January 21, 1886, No. 36,971.

To all whom it may concern:

Be it known that I, HENRY NICOLAS GROSSELIN, Fils, of Sedan, France, a citizen of the Republic of France, have invented certain new and useful Improvements in Machines for Napping Cloth, (for which I have obtained Letters Patent in France, dated October 2, 1885, No. 171,459; in Great Britain dated December 9, 1885, No. 15,125; in Germany dated January 21, 1886, No. 36,971, and in Belgium dated January 14, 1886, No. 71,616,) of which the following is a specification.

This invention has reference to gig-mills; and its object is to allow the action of the cards or metallic teasels to be regulated at will, so that they will scratch with more or less energy, according to whether the cloth is more or less thick or requires a nap more or less close. This object is obtained by employing teasels or cards arranged, as heretofore, spirally upon small rollers having their bearings in rotating drum-heads, so as to revolve with said drum-heads about the axis of the latter, and at the same time the arrangement employed by me is such that the teaseling-rollers may be caused to rotate about their own axes in a direction opposed to that of the rotation of the drum-heads or may be caused to rotate upon their own axes in the same direction as the drum-heads rotate about their axis, and the speed of the rotation of the teasel-rollers can be varied at will, while the forward rotation of the drum remains the same.

My invention also comprises automatically-operating lubricating devices and other features, as will more clearly appear from the following detailed description, in which reference is made to the accompanying drawings, representing one form of the machine in which I have embodied my invention.

Figure 1 is a broken side elevation of the said machine, a number of the rollers, &c., being shown in section; Fig. 2, a broken front view of a gig-mill constructed in accordance with my invention; Fig. 3, a broken end view of one-half of a drum-head; and Fig. 4, a sectional view of the same and an elevation of part of a roller, showing the construction of the lubricator.

The machine is mounted upon a suitable frame, A, and the main feature of the same is a drum formed of two heads, B B, mounted upon a shaft, C, having suitable bearings in frame A and carrying at their circumferences a series of bearings, *b b'*, in which the working-rollers D D, furnished with cards or teasels, as above described, are journaled. These rollers are all at an equal distance from the center of the drum, and each of them carries at each end a pulley, *a*, whose diameter is one-fifth or twenty per cent. greater than that of the roller, measuring from the exterior of the cards. A belt, X, passes round all the pulleys *a a* at one end of the drum and is driven by a pulley, F, mounted on a shaft, I, which is above the drum, a similar belt, X', passing around pulley F' on shaft I and the pulleys *a* at the other end of the drum. The shaft I thus carries two pulleys, F F', to actuate the pulleys of the rollers D D. At the end of the shaft I is a toothed wheel, *d*, driven by a pinion, *f*, keyed to a cone-pulley, H', which has five steps. This cone H' corresponds in its successive steps with another cone, H, on the shaft C of the drum. At the other end of this shaft are pulleys C' C', to which the power is applied. The cone H is therefore the driving-cone, and H' is the driven cone. By means of these two cones the shaft I can be turned at different speeds, and by crossing or uncrossing the belt X^3, which runs from the one cone to the other, the said shaft can at will be rotated in the one direction or the other.

By removing the belt the shaft I can be made immovable by means of a pin or otherwise, or in place of removing the belt the pinion *f* may be disengaged from gear-wheel *d*, for which purpose the bearings of pinion *f* are made movable within a slotted bracket, *f'*. (Shown in dotted lines in Fig. 1.)

O is a weighted lever for giving uniform tension to the belt X. This lever is pivoted to the frame. On one end of the lever is a weight, W, which can be shifted so as to give more or less tension to the belt, as required. On the other end of the lever is a pulley, *n*, which bears against the belt X. Another similar lever, acting as a belt-tightener for belt X', is arranged at the other end of the machine, and the object of the levers O is to keep the belts sufficiently tight. They compensate for the elongation caused by wear or use, and

always cause a perfectly regular amount of adherence to the pulleys *a* of the rollers D, and all slip is thus obviated. When, after a time, the belts become too long, it is sufficient to shorten them, so that the levers O may maintain an approximately horizontal position.

P is a stationary leather-covered metal ring mounted upon the frame concentrically with the drum. It can be expanded by screws *p* or other devices, so as to exert friction against the inner part of the pulleys *a a* of the rollers D D. When this ring is sufficiently tightened by means of the screw *p*, that connects its two ends, as shown, the leather band that surrounds it presses against the inner face of all the pulleys *a* of the rollers D. The ring thus, as it were, unites and connects all the rollers D and makes their rotary movement regular, and it assists in preventing slip of the belts X X′ at their points of contact with the pulleys *a*. The ring is not absolutely indispensable to the working of the machine, but it renders important service in increasing the precision of the movement of the rollers D. The heads B of the drum are each constructed with a central reservoir, A^3, for distributing oil to the axes of all the rollers D D by means of tubular radial arms or spokes containing cotton wicks D^5, which all meet in the central reservoir. The oil is introduced through a hole, which is normally closed by a screw, Z, as shown in Fig. 4, and the form of the central reservoir should be as shown, and such that the centrifugal force prevents the oil escaping, so that the capillarity alone may act to cause the oil to pass along the tubular arms up to the spindles or journals of the rollers. Without this precaution the oil would be immediately ejected.

Each of the arms or spokes of the frame is opposite a bearing of one of the rollers. The journal of each roller is thus in contact with a cotton wick that passes through the arm or spoke and ends in the annular reservoir A^3, formed around the boss or hub. All the wicks dip in this reservoir, which is full of oil. When the drum is rotating, the oil is kept by the effect of the centrifugal force at the upper part of the reservoir—that is to say, at its outer circumference.

It will be seen by the drawings that the tubular arms extend to the central part of the reservoir. Escape of the oil through the arms is thus prevented and the wicks act by capillarity only, which is sufficient to insure good lubrication.

S is a cleaning-roller fitted with metallic or other brushes, turning more quickly than the cards, and serving to remove the down or woolly matter produced by the work. This roller should lightly take into the cards of the rollers.

$T' T^2 T^3 T^4$, &c., are rollers for drawing the cloth, T T, (shown in dotted lines,) through the machine, and are actuated by belts or otherwise. This last feature has been omitted from the drawings for the sake of simplicity, but will be easily understood by those skilled in the art.

U is a tension device consisting of two levers, U′ U′, one of which only is shown in the drawings, and each is hung to one end of a rod, R, extending laterally across and fixed to the machine. The position of these levers upon rod R is adjustable, and may be fixed by set-screws R′. Between the free ends of levers U′ U′, and mounted therein, extends a rod or roller, U^3, and a similar roller, U^2, is mounted upon rod R.

The cloth passes over rollers U^2 and U^3, and the tension which it receives depends upon the angular position of levers U′ U′, which, as has been explained, may be adjusted at will.

The two regulating-cones H H′ have each a parabolic generatrix instead of a rectilinear one, as in ordinary-speed cones. The driving-cone H has a convex parabolic generatrix, as indicated by dotted lines *y y*, and the cone H′ a concave parabolic generatrix, as indicated by dotted lines *y′ y′*. The sum of the diameters of two corresponding steps of the cones is thus always the same, so that the length of the belt does not change. This arrangement of parabolic cones is very important, because it allows of varying in a regular manner the degree of energy or efficiency of the machine by increasing or decreasing, always by the same amount, in shifting the belt from one set of corresponding steps to another. Two cones with rectilinear generatrices would give very unequal differences. The variation of speed and force with ordinary cone-pulleys is in accordance with the law of a geometrical progression, and the result is that the difference between the fourth and fifth steps, for example, is not the same as between the second and third, while in my parabolic cone-pulley the variation of speed and force proceeds in accordance with the law of an arithmetical progression.

The rollers D D each carry a pulley *a* at each end. It will be noticed, however, that only one-half the number of the pulleys have cheeks or flanges for retaining the belt X and the ring P. The cheeks on the alternate pulleys are dispensed with in order to allow the rollers to be placed as near together as possible, so as to lose no space.

The action of the mill or machine is as follows: The drum always turns with the same speed, carrying with it all the working card or teaseling rollers D D. These rollers come in contact with the cloth and would roll without scratching if the belts X X′ were absent; but, being held or driven by these belts and the ring P, the cards are caused to scratch the surface of the cloth.

The machine can be given three different degrees of regulation by the shaft I:

First. If the shaft I be rendered immovable, it will follow that as the diameter of the pulleys *a a* is one-fifth greater than that of the rollers D D, as hereinbefore described, the

cards or teasels would under these conditions drag or scratch the cloth to the extent of twenty per cent. of the path traversed by the outer circumference of the drum A. This degree represents the mean energy or efficiency of the machine.

Second. In order to diminish this energy, the cone H′ is driven by an uncrossed belt. The shaft I thus rotates in the reverse direction to the drum and the cards scratch so much the less, as the speed of the shaft is the greater. Supposing the belt to be placed on the smallest step or diameter of the upper cone, H′, the shaft I will have its maximum speed, which gives to the cards their minimum energy — that is to say, permits each tooth to act through, say, about four per cent. of the course traversed by the drum A. It will readily be understood that by modifying the speed of the shaft I the energy or action of the cards is modified. The progression obtained by the employment of the parabolic cones is 4, 8, 12, 16, &c. The ratio of the progression can be modified as required if the kind of cloth necessitates it.

Third. In order to obtain a degree of energy or efficiency greater than the mean twenty per cent., the upper cone, H′, is driven by a crossed belt, the shaft I therefore turns in the same direction as the drum A, with the result that the energy or amount of scratching increases progressively, and that five additional degrees are obtained, the maximum of which is represented by the greatest speed of the upper cone, H′.

What I claim, and desire to secure by Letters Patent, is—

1. In a gig-mill, the combination, with a rotary drum consisting of heads, a shaft, and a series of card or teaseling rollers journaled upon said heads and provided with pulleys at their projecting ends, of a driving-belt applied to each set of said pulleys, and devices, substantially as described, for driving said belts with varying speeds and in different directions, as described, whereby the cards are rotated simultaneously each about its own axis and about the axis of the drum, substantially as described.

2. In a gig-mill, the combination, with a drum composed of heads, a shaft, and the working card or teaseling rollers D D, of a shaft, I, cones H H′, belt X^3, pinion *f*, gear *d*, pulleys F F′, belts X X′, and pulleys *a a*, substantially as described.

3. In a gig-mill, the combination, with a drum composed of teaseling-cards or working-rollers D D, heads, and a shaft, of pulleys *a a* at the projecting ends of said rollers and of greater diameter than the rollers, a driving-belt in operative relation to each set of pulleys, and devices, substantially as described, for driving said belts with varying speeds and in different directions, substantially as described.

4. In a gig-mill, the combination of a rotary drum composed of a shaft, heads, and a series of teaseling-cards or working-rollers journaled upon the heads, with pulleys attached to the projecting ends of the rollers, with a friction-ring mounted concentrically with each set of pulleys and in contact with the interior sides of the same, and an actuating-belt for each set of pulleys bearing upon the exterior surface of the same, and driving means for said belts, substantially as described.

5. In a gig-mill, the combination of a rotary drum carrying a series of independently-rotating teaseling-rollers, with a driving-shaft provided with a convex parabolic step-pulley, a driven shaft provided with a concave parabolic step-pulley, a belt connecting the two pulleys, and means, substantially as described, for transmitting motion to the teaseling-rollers, substantially as and for the purpose described.

6. In a gig-mill, the combination of a rotary drum composed of a shaft, heads, and a series of teaseling-rollers journaled upon the outer circumferences of the heads, said heads each being formed with a central annular oil-reservoir around the hub thereof, and radial channels leading from the reservoir to the journals of each teaseling-roller, substantially as described.

7. In a gig-mill, the combination of a rotary drum composed of a shaft, heads, and a series of teaseling-rollers supported in journal-boxes upon the circumference of the heads, said heads each being provided with a central annular oil-reservoir around the hub thereof, radial channels from the reservoir to the journal-boxes extending to within close proximity of the hub, but communicating with the reservoir, with a removable plug in the outer wall of the reservoir, and a wick in each channel, substantially as described.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

HENRY NICOLAS GROSSELIN, FILS.

Witnesses:

JOHN L. FRISBIE,
United States Consul.

LEÔN LAMOTTE.