(No Model.)

2 Sheets—Sheet 1.

A. BORIOS.

LAPPING MACHINE.

No. 566,372. Patented Aug. 25, 1896.

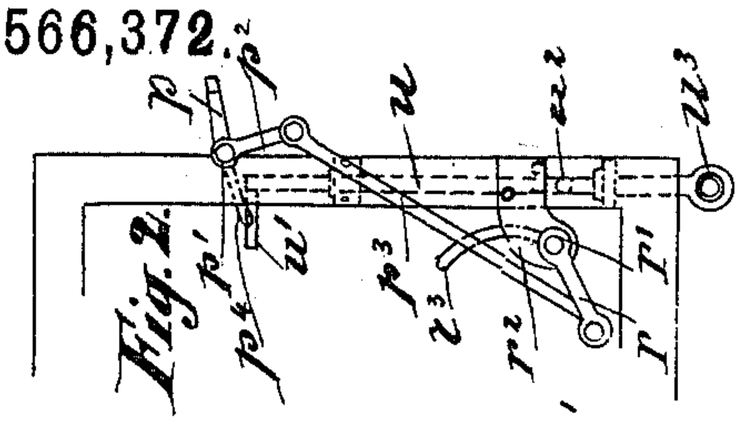

Fig. 2.

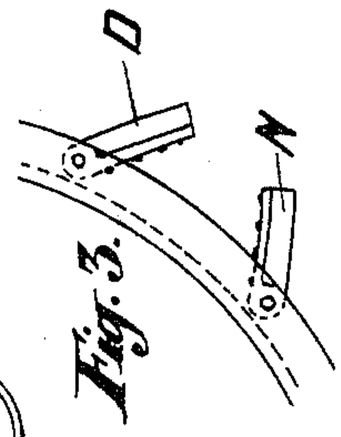

Fig. 3.

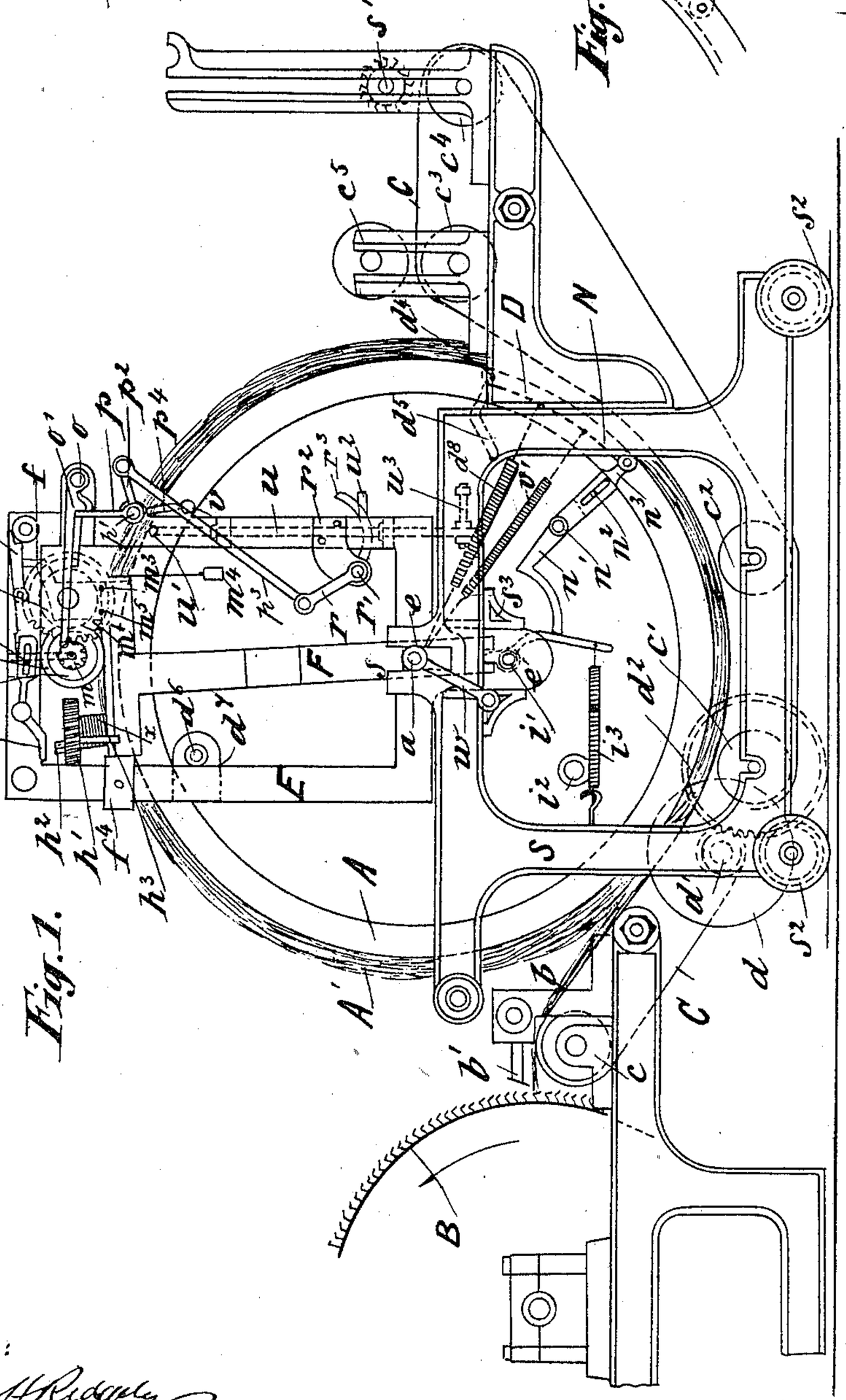

Fig. 1.

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Inventor:

Alphonse Borios

(No Model.)

2 Sheets—Sheet 2.

A. BORIOS.

LAPPING MACHINE.

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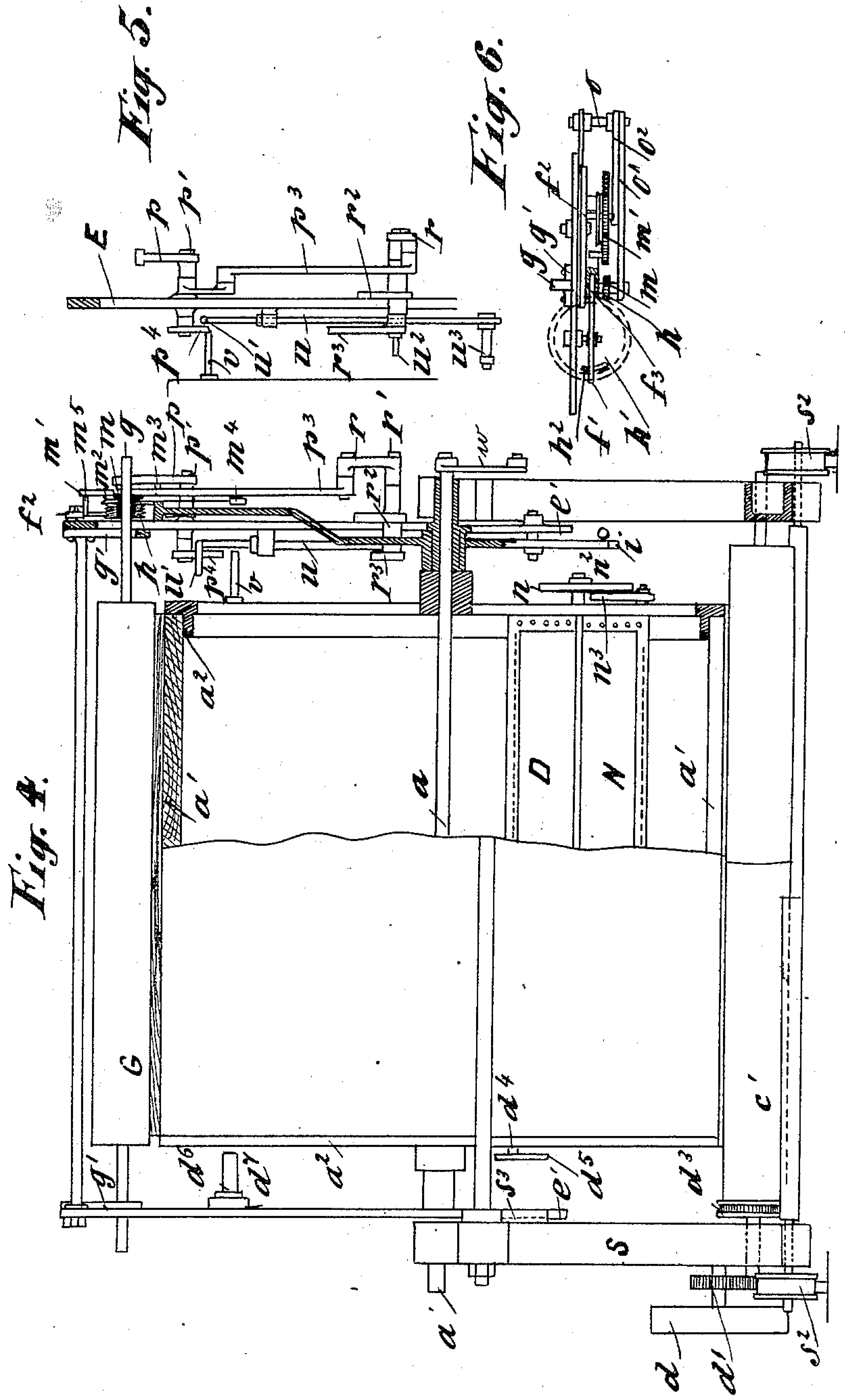

Witnesses:

Inventor:

Alphonse Borios

UNITED STATES PATENT OFFICE.

ALPHONSE BORIOS, OF LA SARRAZ, SWITZERLAND.

LAPPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 566,372, dated August 25, 1896.

Application filed November 18, 1895. Serial No. 569,357. (No model.)

To all whom it may concern:

Be it known that I, ALPHONSE BORIOS, spinner's mechanician, a citizen of the Swiss Republic, residing at La Sarraz, canton de Vaud, Switzerland, have invented a certain new or useful Improvement in Lapping-Machines, of which the following is a specification.

This invention relates to improvements in the lap machines or apparatus for those kinds of carding-engines in which the fleece combed off the doffer is lapped or wound onto a revolving drum in successive layers until the lap thus formed has attained the desired thickness, when it is cut or broken across and rolled or coiled upon a roller for transfer to the following machine.

The improvements consist in the manner or arrangement of parts for rotating the lap-drum and for breaking and coiling the lap automatically when it has attained the desired thickness.

On the drawings herewith, Figure 1 shows a side view of the improved lap-machine; Fig. 2, a side view of part of the lap-breaking mechanism in its operating position; Fig. 3, the lap-breaking doors opened; Fig. 4, a front view, partly in vertical section; Fig. 5, a front view of the parts shown in Fig. 3; Fig. 6, a top view of part of the mechanism.

In the machines hitherto made the lap-drum A, mounted upon shaft a, has been rotated by driving this shaft, in consequence of which the fleece b combed off the doffer B by the comb b' has been lapped or coiled upon the drum A at a continually-increasing speed as the diameter of the outer surface of the lap A′ increased at each revolution, whereby the different layers of fleece lapped onto the drum have a different and irregular tension. They also become at times broken and hang down from the bottom side of the drum and then lay themselves upon it when coming to the top in an irregular lumpy manner, which causes irregularities and defects in the yarns made from such laps. These irregularities are avoided by my improved manner of or arrangement for rotating the drum, which is as follows: I arrange a series of rollers c C′ C² C³ C⁴ around which I pass an endless apron or blanket C. The roller c is preferably supported in bearings fixed to the side frames of the carding-engine. The rollers c' and c^2 are supported in bearings in the lower rail of the frame sides S′ of the lap-machine. The roller c^3 is the lower one of a pair of condensing-rollers, the upper one being c^5, while roller c^4 rotates the lapping-on roller s'. The roller c' is rotated from the carding-engine by means of a pulley d, driven by a belt from the engine, a pinion d', cast or fixed on said pulley, and a spur-wheel d^2, fixed upon one of the pivots of the roller c'. The roller c^2 is driven from c' by means of chain-wheels d^3, Fig. 4, on the end of the rollers and a chain passing round them. The lap-drum A rests upon the apron C and rollers c' c^2, and is rotated by the apron and the lap A′, in consequence of which the circumferential speed of the outer layer of the lap and the tension on the fleece b remain uniform for any thickness of the lap A′ on the drum A. In order to allow the drum to rise as the thickness of the lap increases, the shaft a or a bushing surrounding it is held in slots S in the frame sides S′, so that it can rise and fall therein. The frame of the machine is preferably mounted on wheels s^2, as shown, so that by moving it back the apron or blanket C can be tightened.

My further improvement consists in the arrangement of means for breaking the lap A′ when it has obtained a sufficient thickness and turning it down upon the apron C, so that it is carried between the condensing-rollers c^3 c^5 and to the lap-roller s', so as to be coiled round the same. For this purpose I arrange in the circumference of the drum A, which may be constructed in any usual way and is shown on the drawings formed of wood lags a', bolted to two cast-iron ends a^2, two flaps or doors N and D, the former of which is turned outward when the lap A′ has attained the desired thickness while the door is opposite the condensing-rollers c^3 c^5, while the door D is lifted once during each revolution when near to the top, in order to break each layer of fleece as it is put on and ease the work of finally breaking the lap by the door N.

The mechanism for opening the doors is arranged as follows: On each side of the machine a square frame E is arranged, formed with a boss e, through which the shaft a

passes. The frames E have extensions e' below the boss, which are guided between brackets s^3, fixed or formed on the frame sides S', or by equivalent means, so that the frames E rise vertically with the drum A. On one side of the drum A a T-headed or swing lever F is fulcrumed upon the boss e, which lever thus also rises and falls with the drum, so that the relative position of parts fixed to the ends of the drum A and the frame E and swing-lever F are not affected by the increase of thickness of the lap A'. Upon the top of the drum a roller G is placed, the shaft of which slides in slotted brackets g', (see Fig. 6,) fixed to the frames E. The rise of the roller G and its rotation by the lap on which it rests control the opening of the door N. The door D is opened at each revolution as soon as it has passed under the roller G. For this purpose one of the pivots d^4, by which the door is supported in the end a^2, is prolonged outside and has a lever d^5 fixed upon it, which in its path encounters a stud d^6 with friction-bowl fixed in a bracket d^7, bolted to the frame E, and is turned thereby, so as to lift the door D and break the lap while it is held down at the joint by the roller G. When the lever d^5 has passed the bowl, a spring d^8 pulls the door down again. Upon the shaft g of the roller G are fixed a worm h and a spur-pinion m. Upon the top of the swing-lever F is fixed a stud on which a worm-wheel h' can turn, and another stud is fixed in the side of an extension f of the swing-lever F, on which a spur-wheel m' is mounted. The lever F extends below its fulcrum and is formed with a fork, into which one end of a lever i' engages, which is fulcrumed on a stud fixed in the extension e' of frame E. The other end of lever i' is in the path of a stud i^2 with friction-bowl, which once during each revolution of the drum encounters the lever i' and moves its lower end to the right, thereby moving the upper end of the swing-lever F to the right. On the top bar of the frame two levers f' f^2 are fulcrumed on studs fixed in the bar, which levers are connected by a stud f^3, fixed in one of them and engaging into a slot of the other or by equivalent means, so that the outer ends of the levers move up and down simultaneously, and the outer ends are weighted, so as to fall down by their weight. The outer end of lever f^2 is formed as a catch for the end of the extension f of the swing-lever F, and when the swing-lever is moved to the right the said end drops down and catches it and holds it. In that position the worm h engages into the worm-wheel h', as shown on Fig. 6, and rotates it. Upon the top of the worm-wheel an inclined projection h^2 is fixed or formed, which after the wheel has moved round a certain distance encounters the outer end of lever f' and lifts it, thereby lifting the outer end of lever f^2, connected to lever f, as described, whereby the swing-lever F becomes liberated and is pulled to the left by a spring i^3, attached to lever i and the frame side, as shown on Fig. 1. The swing-lever moves to the left against a stop f^4, fixed to the frame E, which is so set that when the swing-lever is against the stop the pinion m is in gear with the wheel m', while the worm-wheel h' is drawn out of the worm h, as shown on Fig. 1.

To the boss of the worm-wheel h' a helical spring x is connected, attached at its other end to the swing-lever F, and when the wheel is disengaged the spring moves it backward till the peg h^3, fixed in the wheel, catches against the side of swing F. The spur-wheel m' is now rotated by the revolution of the roller G until the stud or bowl l^2 again encounters the lever i and moves the swing-lever F again to the right.

On a stud o, fixed in a bracket bolted to the frame E, two latch-levers o' and o^2 are fulcrumed, both of which when down engage a broad catch-lever p, the disengagement of which causes the opening of the door N in the manner hereinafter described. The longer latch o' extends over the shaft of the roller G, and as the lap A' becomes thicker and the roller G rises it is lifted up and liberates the lever p when the lap has attained the desired thickness; but as this rise might be occasioned by a local thickness or irregularity of the lap caused by irregular feeding of the carding-engine or otherwise, and thus the lever p be liberated before the lap has attained the average thickness required, the second latch o^2 is arranged, the lifting of which depends on the number of revolutions made by the roller G. When the drum A is empty, the roller G will make a less number of revolutions than when the lap has attained the desired thickness. For instance, if the diameter of the drum A is forty inches and that of the roller four inches the latter will make ten revolutions for one of the drum A when the drum is empty. When the lap has attained a thickness of, say, two inches, the diameter of the drum and lap driving the roller G will be forty-four inches and the roller make eleven revolutions for one of the drum. In consequence of this, as the worm h will remain in gear with the worm-wheel h' for the same number of revolutions of the roller in all cases, the pinion m and wheel m' remain in gear for a greater number of revolutions as the thickness of the lap increases. For instance, if after the worm h has been put into gear with the worm-wheel h' the latter has to move round for eight teeth till the incline h^2 lifts the lever f' and disengages the swing-lever F the pinion m will gear with wheel m' for two revolutions of the roller G if the drum A is empty for the above size of drum and roller, but for three when the lap has attained the thickness of two inches, before the bowl i^2 shifts the swing-lever again and disengages the wheel and pinion in the manner before described. If the wheel m' has four times the diameter of the pinion m, it would make half a revolution in the former and three-

quarters of a revolution in the latter case before it is moved out of gear with the pinion. This is utilized to disengage the latch o^2 and liberate the lever p when the lap has reached the desired thickness in the following way: In the side of the wheel m' a peg m^3 is fixed, which lifts the latch o^2 when it comes against it. To the back of the wheel a band-pulley m^2 is fixed, to which a band with weight m^4 is attached and passed round the same, so that it pulls the wheel round as a clock-finger moves when the wheel is out of gear with the pinion m till a stop m^5 rests against the extension f of the swing-lever F. When the wheel m' is put into gear with pinion m, it revolves in the opposite direction. While the drum is empty or partly filled the wheel makes less than three-quarters of a revolution and the peg m^3 does not encounter the latch o^2 before the wheel and pinion are disengaged again, and only when the lap has attained the desired thickness and the roller G makes the additional revolution for each revolution of the drum the wheel m' will make three-quarters of a revolution and the peg m^3 will encounter the latch o^2 and lift it, so as to liberate the lever p. This lever is thus not liberated until both the latches o' and o^2 are both lifted, one by the rise of the roller G and the other by its increased rotation caused by the increase of the diameter of the lap on the drum, the latch o^2 preventing the disengagement of the lever p through irregular local accumulations of lap lifting the latch o' and the latch o' preventing the disengagement if from some cause the latch o^2 is lifted prematurely by the mechanism operating the same.

The liberation of the lever p causes the door N to be opened in the following way: The lever p is fixed upon a shaft p', supported on the frame E and carrying at the back a lever p^4 and at the front a lever p^2, which is connected by a rod p^3 to another lever r, fixed on a shaft r', which is supported in a bracket r^2, bolted to the frame E, and carries at the back end a curved lever r^3. When lever p is liberated, these levers and rods drop by their weight. At the back of frame E a vertical shaft u is supported in suitable bearings on a collar on the shaft. This shaft is formed with two pins u' and u^2 and has fixed to it at the bottom end a pin u^3 with friction-bowl. When the lever p is held by the latches o' o^2, the pin u' projects toward the drum A and the pins u^2 and u^3 are at right angles thereto and project to the right, as shown on Figs. 1 and 4. When the lever p is liberated, the lever p^4 drops against the pin u', and in that position is in the path of a bowl v, which seizing it turns it into the position shown on Fig. 2, and thereby causes the shaft u to make a quarter-turn, whereby it assumes the position shown on Figs. 2 and 5. The bowl on the pin u^3 is then in the path of a lever n, fulcrumed upon a stud n', fixed in the side of the drum, a pin n^2, fixed in the lever n, engaging into a slot of a lever n^3, fixed upon one of the pivots of the door N. As the end of the lever n encounters the bowl n^3 it is turned thereby and the door N is opened outward when it is about opposite to the condensing-rollers c^3 c^5, and breaks the lap A' and lays its end down on the apron G, so that the lap passes with the apron between the condensing-rollers and is coiled onto the lap-roller s'. The breaking of the solid lap would require too great an effort to be effected satisfactorily, and for this reason the other door, D, is arranged and operated as hereinbefore described, so that the lap has only a slight cohesion at the breaking-point when finally broken. After the lever n has passed the bowl on pin n^3, a spring v', attached at one end to the door N and at the other to the shaft a, closes the door again. Finally a bowl on lever w, fixed on the shaft a, encounters and lifts the lever r and returns it to the position shown on Figs. 1 and 4, when the latches o' o^2 drop over the lever p and hold it in its original position. At the same time the curved lever r^3 presses against the pin u^2, and turns the shaft back by a quarter-turn into the position shown on Fig. 1. The lapping on of the fleece upon the drum then proceeds until the rise and increased rotation of the roller G again cause the liberation of the lever p and the breakage and enrollment of the lap in the manner hereinbefore described. The studs i^2, v, and n' are fixed in the arms of the drum ends or in brackets bolted thereto, the arms having been omitted on the drawings for the sake of clearness. The details of the mechanisms described may be varied and replaced by their equivalents.

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

1. In a lap-machine, the combination, with a revoluble lap-drum, of two spring-controlled doors D and N pivoted to the periphery of the said drum, a lever connected to the door D, a stationary tappet operating to turn the said lever and open the door D at intervals, a roller G resting on the lap, lever mechanism connected to the door N, and tappet mechanism controlled by the roller G and operating to open the door N when the lap attains a prearranged average thickness, substantially as set forth.

2. In a lap-machine, the combination, with a revoluble lap-drum, of a spring-controlled door N, the swing-lever F pivoted concentric with the said drum, a pivoted lever i' operated by the lower end of the lever F, a tappet secured to the drum and operating the lever i' at intervals, thereby turning the lever F to the right on its pivot; the pivoted catch-lever p; two latch-levers of unequal length normally engaging with the lever p, the longer latch-lever being operated by the rise of the roller G; intermediate driving mechanism carried by the lever F, and connecting the shorter latch-lever with the roller G, and operating to raise the shorter latch-lever

when the roller G has completed a prearranged number of revolutions; a pin w^3 and intermediate lever mechanism controlled by the lever p, said pin being turned outward by gravity when the lever p is liberated; and lever mechanism connected to the door N and arranged in the path of the said pin when the same is turned outward, whereby the door N is opened when the lap has attained the desired average thickness, substantially as set forth.

ALPHONSE BORIOS.

Witnesses:
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OTTO H. MAY.