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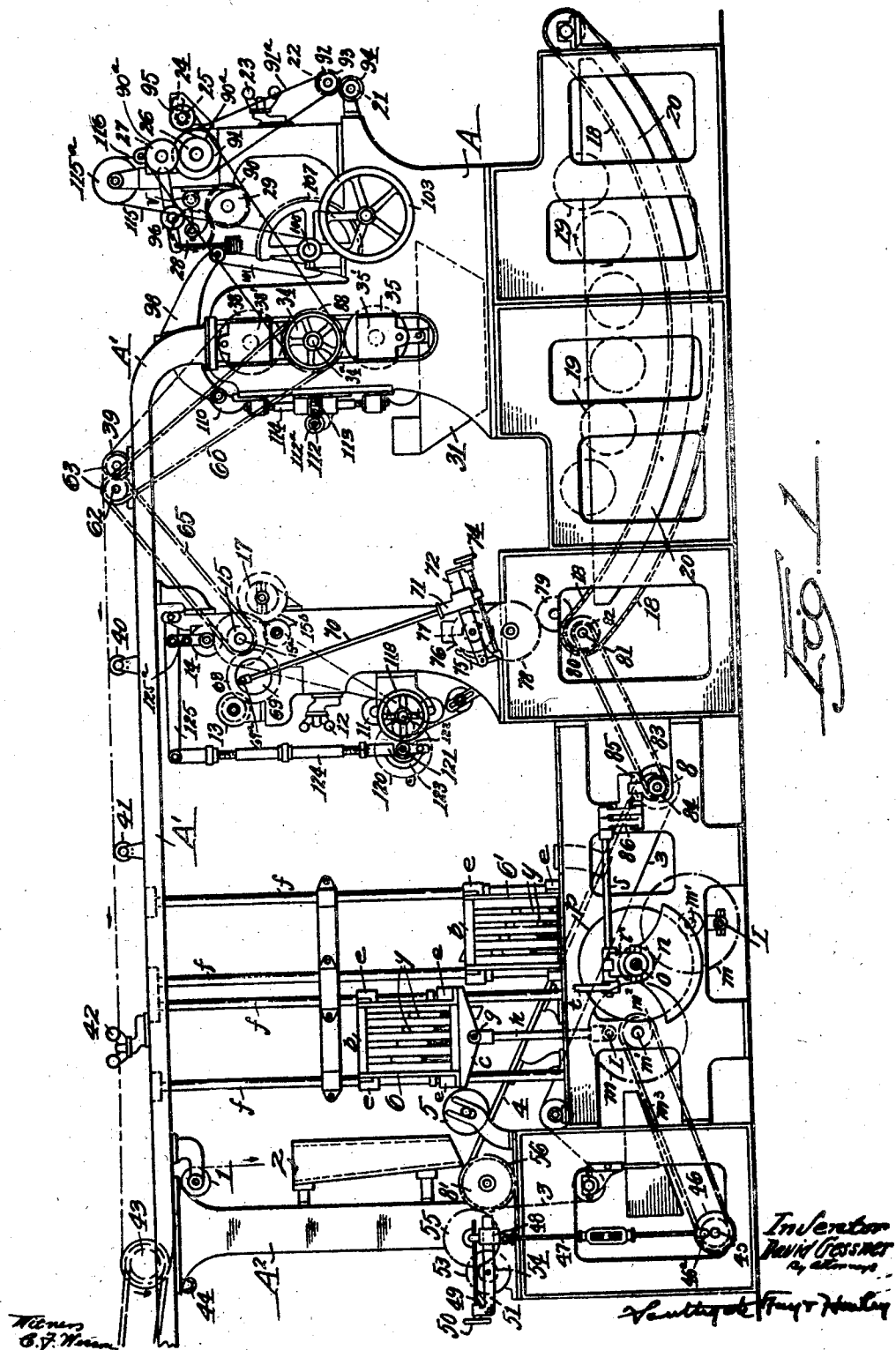
D. GESSNER

1,832,377

MACHINE FOR USE IN FINISHING WOOLEN OR WORSTED FABRICS

Filed Nov. 26, 1926

8 Sheets-Sheet 1



Nov. 17, 1931.

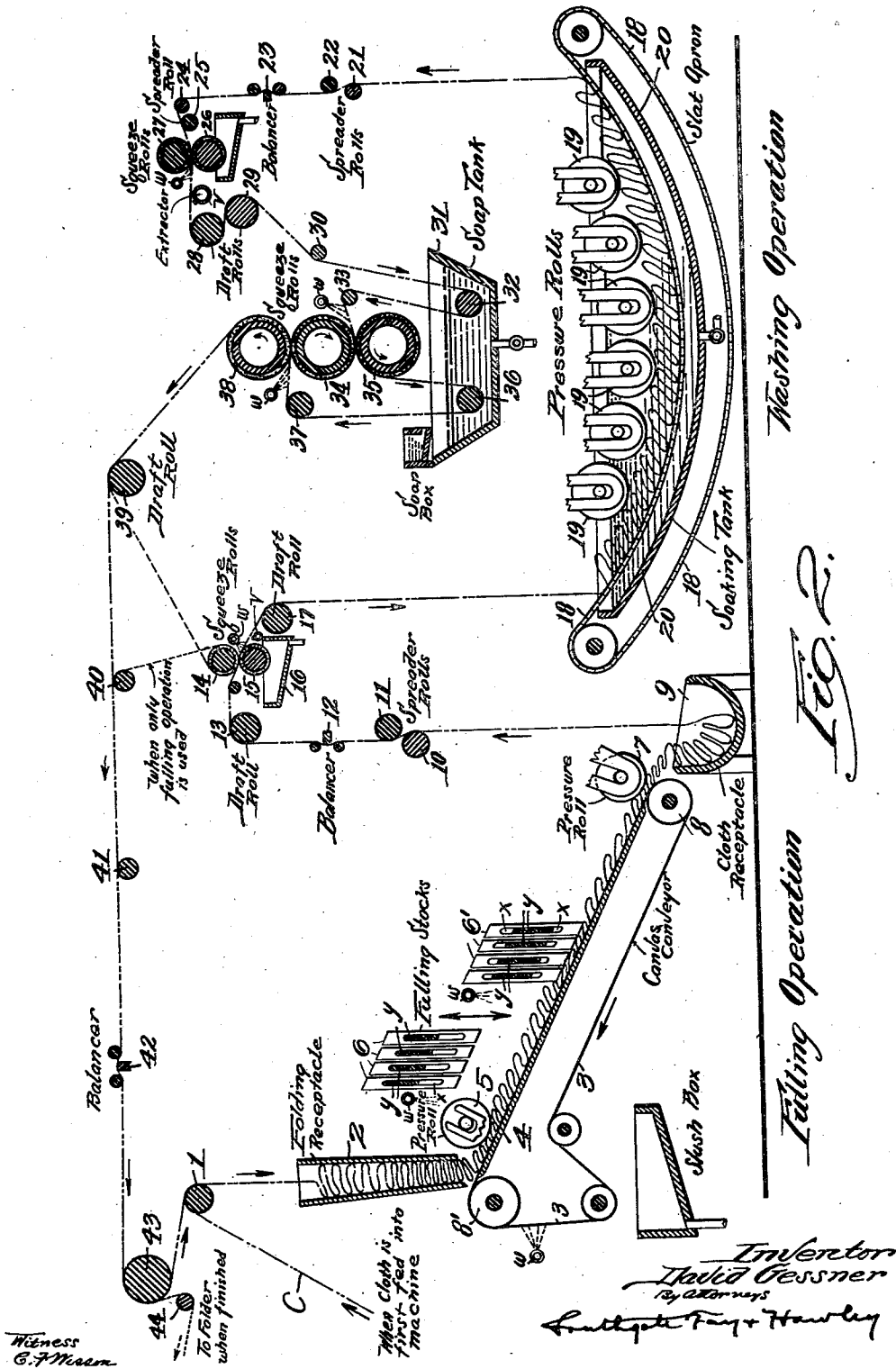
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8 Sheets-Sheet 2



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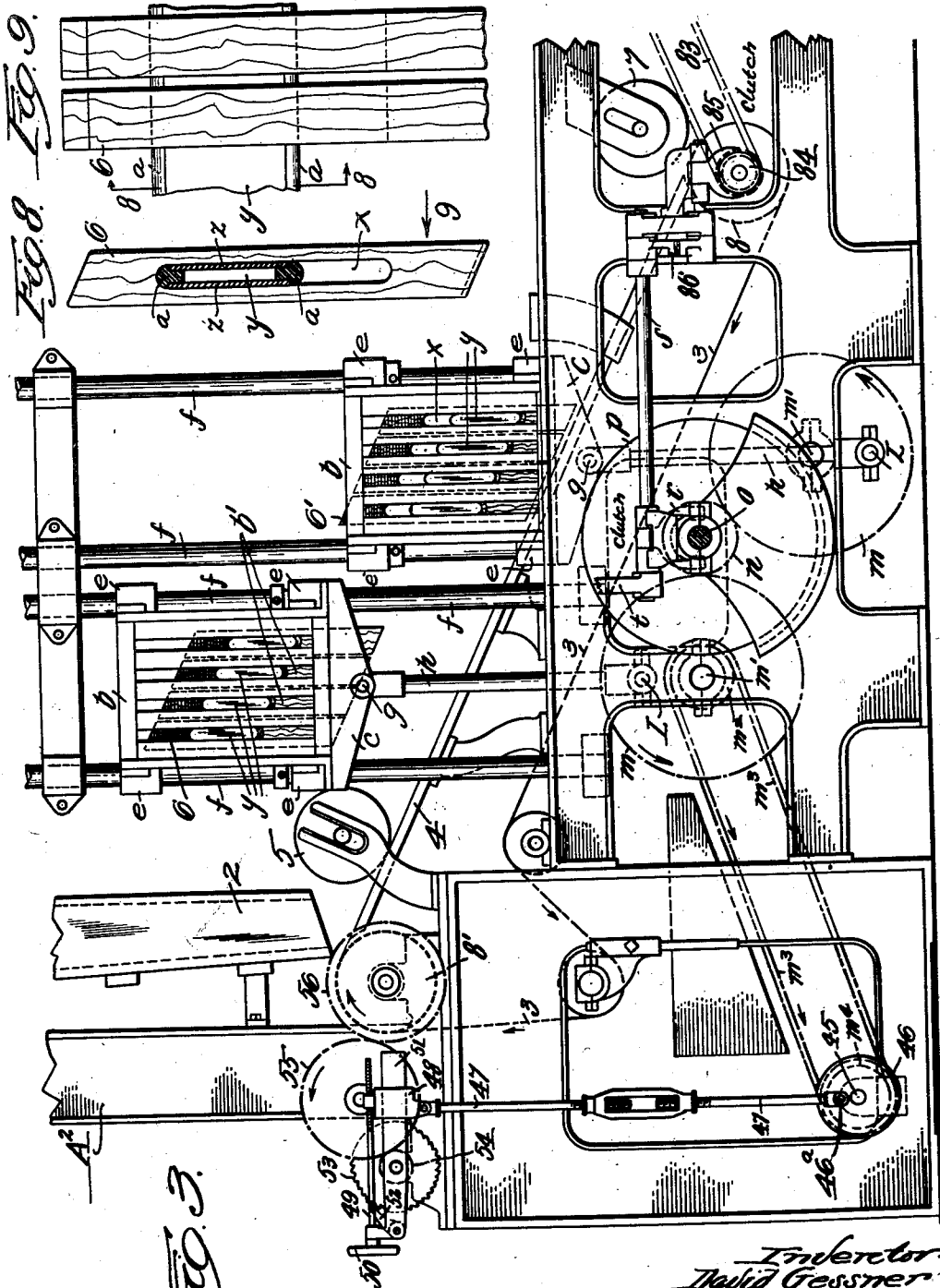
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8 Sheets-Sheet 3



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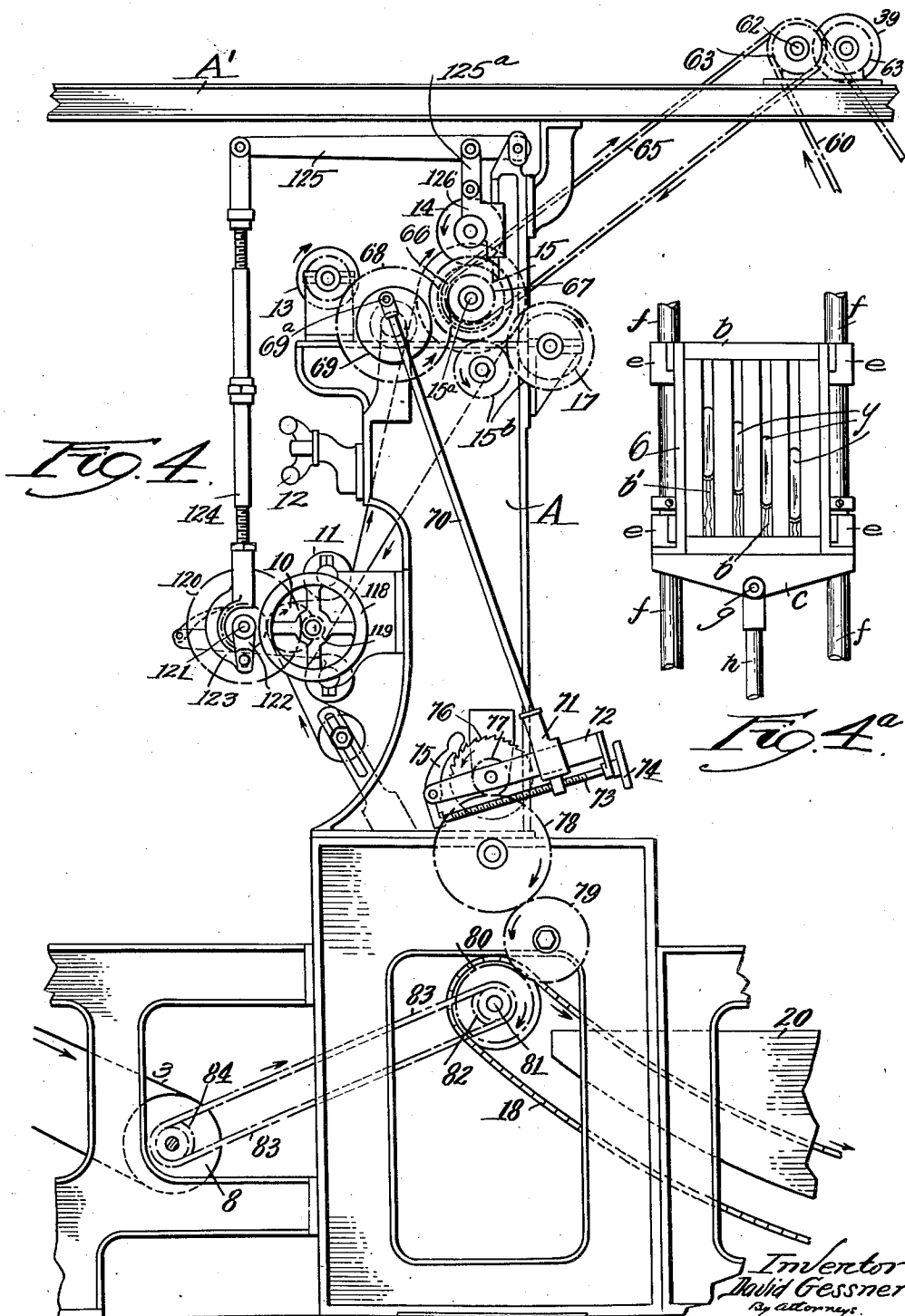
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8 Sheets-Sheet 4



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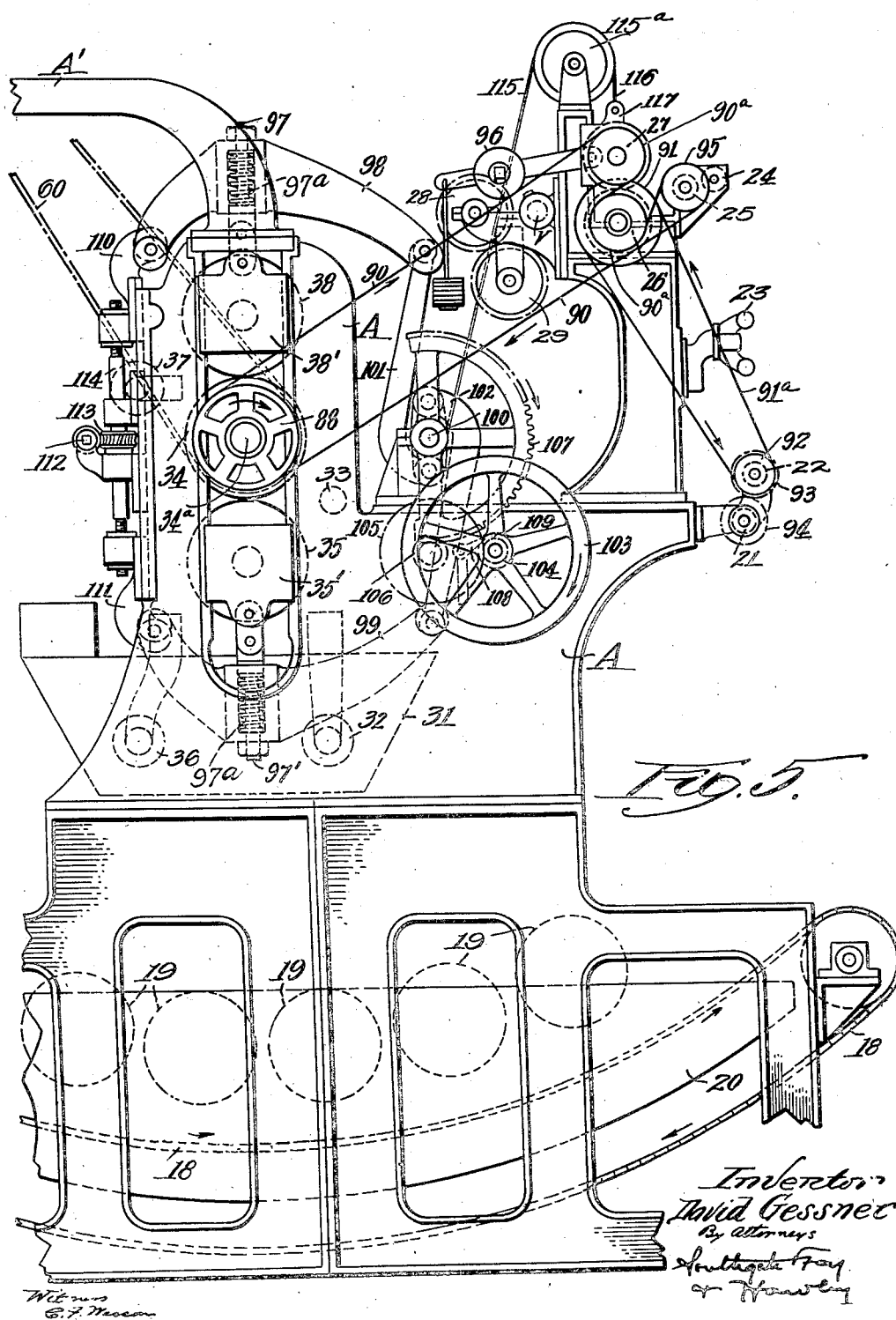
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MACHINE FOR USE IN FINISHING WOOLEN OR WORSTED FABRICS

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8 Sheets-Sheet 6

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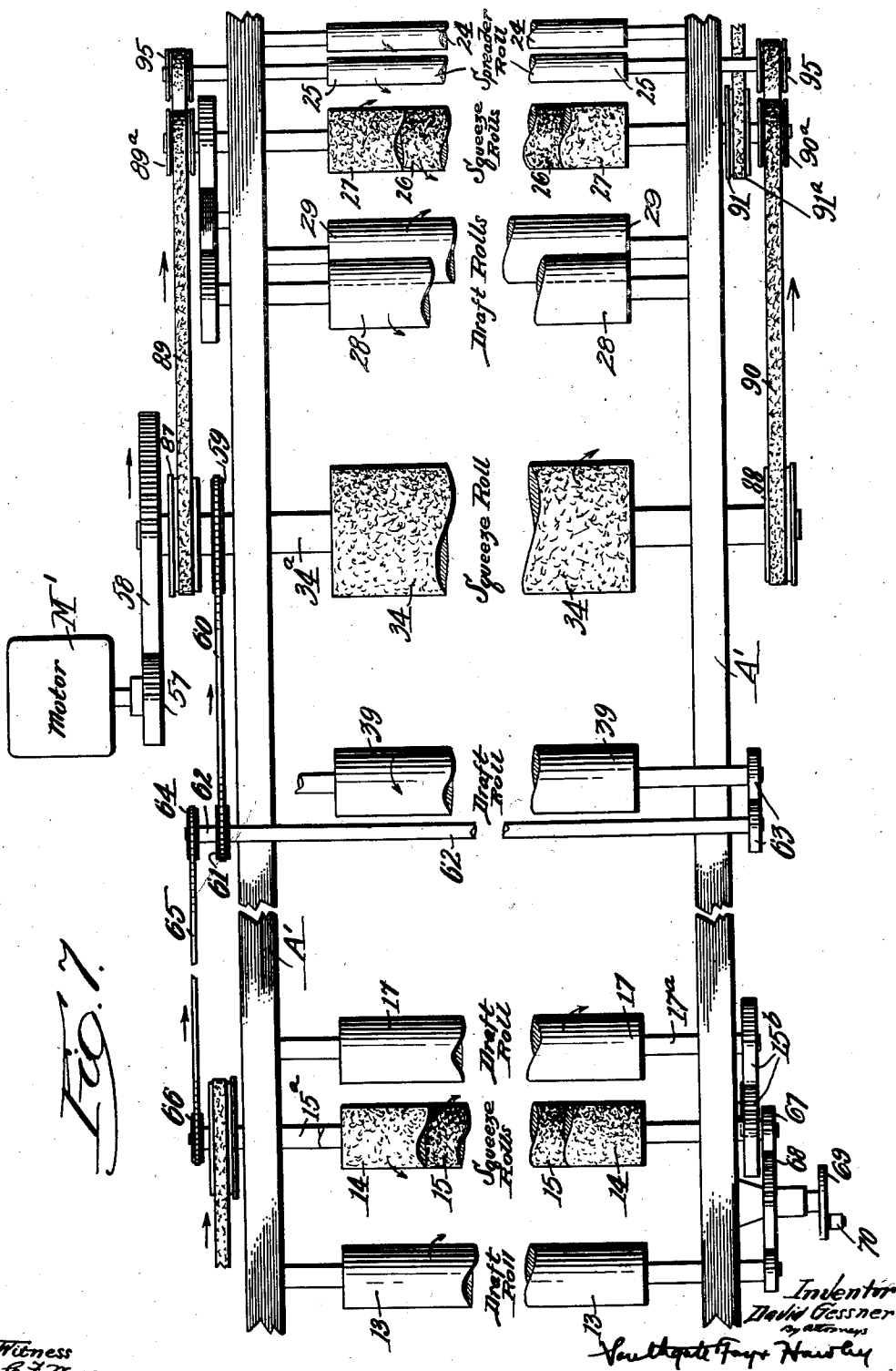
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8 Sheets-Sheet 7



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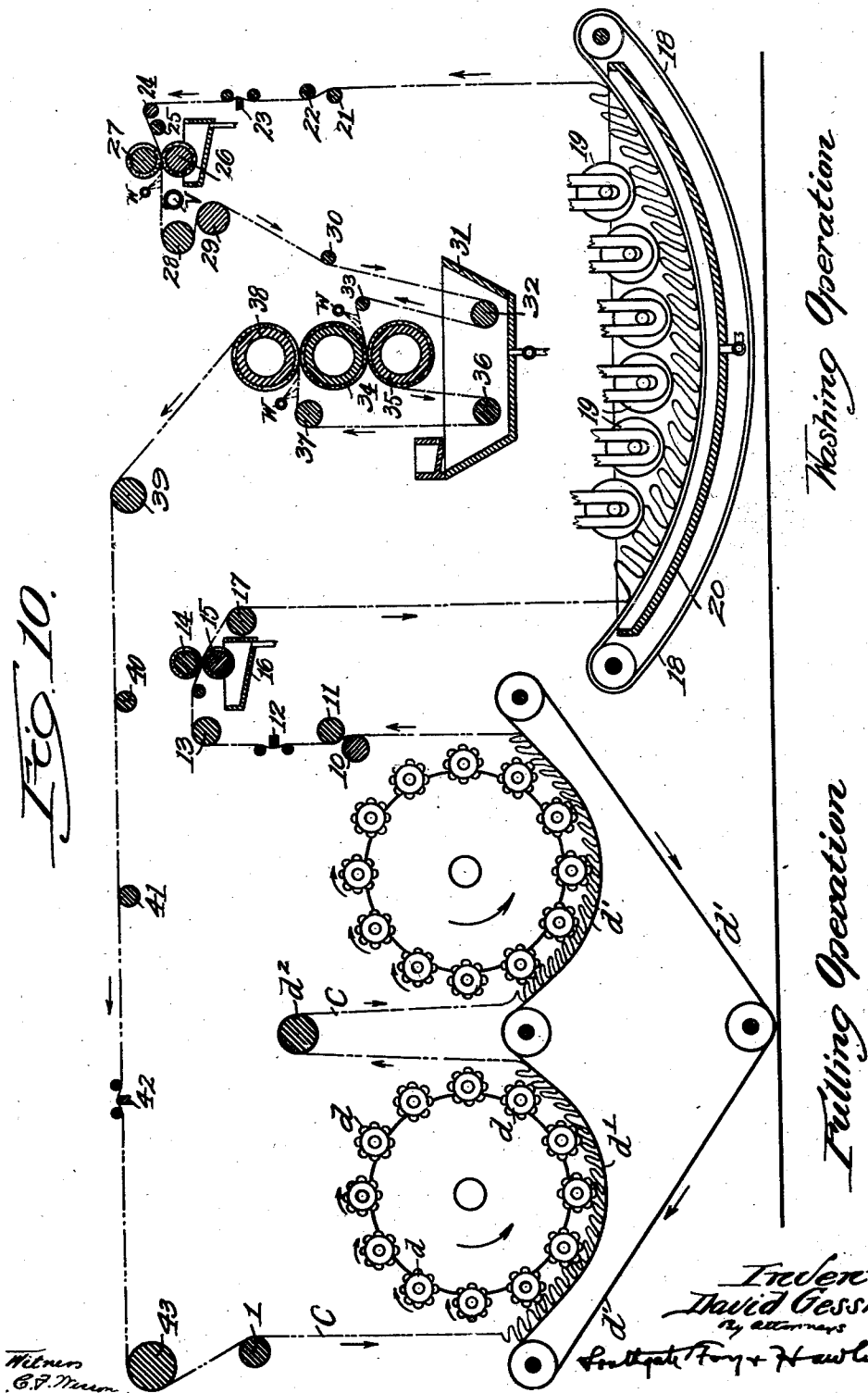
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MACHINE FOR USE IN FINISHING WOOLEN OR WORSTED FABRICS

Filed Nov. 26, 1926

8 Sheets-Sheet 8



UNITED STATES PATENT OFFICE

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MACHINE FOR USE IN FINISHING WOOLEN OR WORSTED FABRICS

Application filed November 26, 1926. Serial No. 150,749.

This invention relates to a machine for use in finishing woolen and worsted fabrics and particularly for performing the fulling and washing operations thereon. It has been customary to handle the cloth for these operations in the form of a rope or twist, which has resulted in the production of wrinkles and streaks in the fabric, and which has also made it necessary to stop the machine whenever it was desirable to inspect the fabric.

One object of my invention is to provide a machine for finishing purposes, in which the fabric is handled at full width, thus fully exposing the fabric to the fulling and washing devices and also presenting the fabric openly to the inspection of the operator. This enables the operator to observe and follow the changes in condition of the fabric as the processes proceed, without stopping the machine or pulling a portion of the fabric out of the machine for inspection as has been heretofore customary.

A further object is to construct a machine for fulling and washing fabrics which may be run at relatively high speed, resulting in greater production, and which by its full width operation will eliminate the fulling and washing wrinkles which are unavoidable with the rope form of machine.

My improved machine is primarily designed to perform progressive fulling and washing operations upon a fabric and to permit repetition of such operations as many times as may be desirable. The machine is also so designed that a fabric may be run continuously in the fulling operation only of the machine, or through the washing operation only, and so that it may make a single passage or repeated passages through either or both parts of the machine. While I have shown only a single fulling unit and a single washing unit, the number of units may be increased as desired to meet any conditions of operation that may arise.

Further objects of my invention are to provide improved fulling devices and improved washing mechanism, together with suitable driving and controlling mechanism therefor.

My invention further relates to certain arrangements and combinations of parts which

will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention and a modification thereof are shown in the drawings in which

Fig. 1 is a front elevation of my improved machine;

Fig. 2 is a diagrammatic longitudinal sectional elevation, particularly illustrating the travel of the fabric through the machine and the cooperation of the several parts thereof;

Fig. 3 is an enlarged front elevation of the fulling mechanism;

Fig. 4 is an enlarged front elevation of the drive for the washing mechanism;

Fig. 4a is a front elevation of one of the sliding frames for the fulling stocks;

Fig. 5 is an enlarged front elevation of additional portions of the washing mechanism;

Fig. 6 is a plan view of the drive for the fulling mechanism;

Fig. 7 is a plan view of the drive for the washing mechanism;

Fig. 8 is a sectional front elevation of the fulling stocks, taken along the line 8—8 in Fig. 9;

Fig. 9 is a side view of the fulling stocks, looking in the direction of the arrow 9 in Fig. 8; and

Fig. 10 is a view similar to Fig. 2 but showing a modified construction of the fulling mechanism.

General construction

The general construction and operation of the machine is best illustrated in Fig. 2, which shows the cloth C as entering the machine by passing over a carrier roll 1. The cloth is then deposited in a folding receptacle 2 which tapers at its open lower end and thus retards the cloth and causes it to take a laterally folded position.

A transporting apron 3, preferably of canvas, is mounted to travel over a downwardly-inclined, fulling table 4, and this apron receives the folded cloth as it is delivered from the lower end of the folding receptacle 2. A pressure roll 5 rests freely upon the folded cloth adjacent the mouth of the receptacle 2

holding the cloth in engagement with the apron 3, and preventing downward movement of the cloth at a faster rate of travel than that of the apron.

Fulling stocks 6 and 6¹ are mounted above the inclined table 4 and are vertically reciprocated to pound the cloth against the table 4 as the cloth travels slowly downward with the apron 3. A second pressure roll 7 is positioned at the lower end of the table 4 and also acts to retard the movement of the cloth relative to the apron 3. The apron 3 is mounted upon suitable guide rolls and also has driving rolls 8 and 8¹, either of which may be positively and intermittently rotated to advance the apron or conveyor as will be hereinafter described.

After the cloth leaves the apron 4, it is deposited loosely in a cloth receptacle 9 having a concave supporting surface, from which receptacle it is drawn upward between spreader rolls 10 and 11, through a balancer or aligning device 12, and over a draft roll 13 to squeeze rolls 14 and 15. The spreader rolls 10 and 11 and the balancer 12 act to straighten out the cloth and remove the lateral folds therefrom. The squeeze rolls 14 and 15 remove a large amount of water and dirt from the cloth, which material falls into a slush box 16 and is drained away from the machine.

The cloth then passes downward over a draft roll 17 and is deposited in folds on a second conveyor or apron 18, preferably made of slats joined together in parallel relation. The apron 18 and the cloth deposited thereon are pressed downward by a series of pressure rolls 19 into the water contained in a shallow trough or soaking tank 20. The pressure rolls 19 press lightly upon the upper surface of the folded cloth but exert sufficient pressure to prevent the cloth and apron from floating in the water, causing them to travel through a curved path adjacent to the concave bottom of the tank 20.

After passing through the tank 20, the cloth is drawn upward between spreader rolls 21 and 22 and through a balancer 23. The cloth then passes over a small carrier roll 24 and is drawn over a spreader roll 25 by squeeze rolls 26 and 27 which remove a large amount of the soapy water therefrom. The cloth is then drawn around draft rolls 28 and 29, past the guide roll or bar 30, and into a soaping tank 31.

The cloth passes under an idler roll 32 in the tank, thence over a bar or guide roll 33 and between squeeze rolls 34 and 35, and then passes downward a second time under a second idler roll 36 in the soaping tank 31, being then drawn upward over a guide roll 37 and between squeeze rolls 34 and 38. Upon leaving the squeeze rolls, the cloth passes to a draft roll 39, over guide rolls or carriers 40

and 41, through a balancer 42 and over a draft roll 43.

From this point the cloth may be removed from the machine by passing around the guide roll or bar 44 on its way to a suitable folder, or it may be returned for further treatment by passing from the draft roll 43 to the carrier roll 1 and thus back into the folding receptacle 2.

If it is desired to use the fulling mechanism only, passing the cloth repeatedly through the fulling mechanism without using the washing mechanism, the cloth may be guided directly from the squeeze rolls 14 and 15 to the guide roll or carrier 40, as indicated in dotted lines in Fig. 2. Similarly when the washing mechanism only is to be used, the cloth may be carried from the draft roll 39 direct to the squeeze rolls 14 and 15, as also indicated in dotted lines in Fig. 2.

It will thus appear that my improved machine may be utilized in several different ways and that the cloth may be passed rapidly through the fulling mechanism only or through the washing mechanism only or may be passed rapidly through the fulling and washing mechanisms alternately, or may be given a single passage through the fulling or the washing mechanism, or both, being thereafter delivered from the machine.

It will be understood that the soaping tank 31 is commonly emptied before the final passage of the cloth through the washing mechanism, so that the soap may be substantially eliminated from the fabric before delivery from the machine. Spray pipes *w* are provided at different points in the machine for flushing the fabric as it passes through the machine, and extractors *v* are provided for removing the dirt and water therefrom.

Having described the general construction and operation of my improved machine, I will now describe the construction of the several parts in detail.

Fulling stocks and operating mechanism therefor

The construction of the fulling stocks 6 or 6¹ is best shown in Figs. 3, 8 and 9. Each fulling stock comprises a substantial piece of hard wood, preferably white oak or beech, having vertically extending slots or openings *x* formed therein. Cross bars or carrier boards *y* extend through the openings *x*, each cross bar being composed of flat side pieces *z* connected at their top and bottom edges to half round bars *a*.

The fulling stocks 6 and 6¹ are arranged in loosely parallel relation on the cross bars or carrier boards *y* and lost motion is provided in the slots *x*, so that each stock 6 or 6¹ has independent vertical movement relatively to its cross bar or carrier board. Each series of fulling stocks extends the full working width of the machine, so that every por-

tion of the cloth is engaged by the fulling stocks as it passes downward along the fulling table 4. The lower ends of the stocks are bevelled to correspond to the inclination of the table, as best shown in Figs. 3 and 8.

The bevelled lower ends of the fulling stocks are preferably grooved or corrugated to increase the fulling effect. When grooved in the direction of the length of the cloth, as shown in Figs. 8 and 9, the grooves increase the shrinkage in width of the cloth.

The ends of the cross bars or carrier boards γ extend into vertical slots in lifter frames or cages b , where they rest upon supports b^1 corresponding in height to the inclination of the table 4. The lifter frames b and supports b^1 are mounted upon base members c having bearing portions e vertically slidable upon guide rods f fixed to the main frame of the machine.

A lifter rod h , Fig. 3 is pivoted at g to each base member c and extends downward to a crank pin L mounted in the side face of a gear m , meshing with a pinion n on a driving shaft o . The shaft o (Fig. 6) has a fly wheel p fixed thereon and may be connected by a clutch r and through a gear u to a driving motor M .

The clutch r is controlled by a clutch shaft s having an operating handle t by which the motor M may be engaged with the shaft o to operate the lifter frames b whenever desired by the operator. Two sets of lifter frames and operating mechanism therefor are provided, as clearly shown in Fig. 3, and the parts are so timed that one set of fulling stocks will be rising while the other set is descending. The lost motion connections between the lifter frames b , the cross bars γ , and the stocks 6 and 6^1 permit the stocks to strike against the cloth and to rest freely momentarily thereon before beginning their next upward movement.

I preferably use four carriers γ in each lifter frame b and usually about 20 fulling stocks are strung along upon each cross bar or carrier board, thus making 80 stocks in each set, and causing 80 independent blows to be delivered to the folded cloth on the table 4 every time one of the lifter frames b descends.

Apron feed

The feeding mechanism for the apron or conveyor 3 is operated from the motor M by connections which will now be described. The gears m which operate the lifter rods h are keyed to a supporting shaft m^1 (Fig. 6) which is connected through a sprocket m^2 , a chain m^3 and a sprocket m^4 to a shaft 45 having a crank disc 46 secured to the outer end thereof. A connecting rod 47 (Fig. 3) is pivoted on a crank pin 46^a in the disc 46 and is pivotally connected at its upper end to a block 48 slidable on a feed lever 51. The block 48 may be adjusted along the lever 51 by

a threaded rod 49 and hand wheel 50. A feed pawl is mounted on the lever 51 and engages a ratchet wheel 53 having a pinion 54 meshing with an idler gear 55, which in turn engages a gear 56 secured to the supporting shaft of the apron driving roll 8¹.

The lever 51 is pivoted to swing about the axis of the ratchet wheel 53 and the pinion 54.

Through this connection from the fulling stock operating mechanism, the apron 3 is given a slow intermittent advance movement whenever the fulling mechanism is in operation. The rate of movement of the folded cloth down the inclined table 4 is comparatively slow and may be adjusted to varying rates of feed by means of the handle 50.

Washing mechanism drive

I will now describe the means by which the several parts of the washing mechanism are driven. Referring to Fig. 7, a motor M^1 is connected through a pinion 57 and gear 58 to the shaft 34^a upon which the squeeze roll 34 is mounted, the roll 34 being thus continuously rotated.

A sprocket 59 on the shaft 34^a is connected by a chain 60 to a sprocket 61 on a cross shaft 62, which shaft is connected by gears 63 to rotate the draft roll 39, (Figs. 7 and 2). The shaft 62 is supported by frame members A^1 extending lengthwise of the machine and mounted upon upright frame members A and A^2 , Fig. 1.

A second sprocket 64 is connected to the shaft 62 and is connected by the chain 65 to a sprocket 66 on a rotatable shaft 15^a which supports the squeeze roll 15. The shaft 15^a is also connected through suitable gearing 15^b, as indicated in Figs. 4 and 7, to the shaft 17^a supporting the draft roll 17.

A pinion 67 on the end of the drive shaft 15^a engages a gear 68 having a disc 69 rotating therewith. The disc 69 has a crankpin 69^a connected by a rod 70 and sliding block 71 to a pivoted feed lever 72, of similar construction to the feed lever 51 previously described. The block 71 may be adjusted along the lever 72 by threaded rod 73 and hand wheel 74 and the lever is provided with a pawl 75 engaging a ratchet wheel 76.

The wheel 76 carries a pinion 77 which is connected through intermediate gears 78 and 79 to a gear 80 fixed on the conveyor shaft 81, thus providing an intermittent feed for the apron or slat conveyor 18 which carries the cloth through the soaking tank 20. The shaft 81 (Fig. 4) is also provided with a sprocket 82 connected by a chain 83 to a sprocket 84 loose on the journal shaft of the roll 8 which supports the lower end of the apron 3.

A clutch 85 is provided for connecting the sprocket 84 to the shaft of the roll 8 and this clutch is operated through segmental gears 86 (Fig. 6) from the clutch shaft s

previously described, which also controls the clutch *r* by which the fulling mechanism is operated. The parts are so arranged that when one clutch is engaged, the other clutch is disengaged.

I have thus provided means by which the apron 3 may be intermittently actuated by the mechanism which drives the fulling stocks or may be intermittently actuated by the mechanism which drives the conveyor 18. The apron 3 will thus be fed forward whenever either the fulling mechanism or the washing mechanism is in operation, and both connections are controlled by the single operating handle *t*.

Squeeze roll drive

I will now describe the driving connections for the squeeze rolls 26 and 27 and the driving rolls 28 and 29. For driving these elements, I provide pulleys 87 and 88 (Fig. 7) near the opposite ends of the squeeze roll shaft 34^a, which pulleys are connected through belts 89 and 90 to pairs of pulleys 89^a and 90^a mounted on the supporting shafts of the squeeze rolls 26 and 27. The belts 89 and 90 also travel over pulleys 95 on the ends of the journal shaft of the spreader roll 25. A belt tightener 96 is provided for each belt 89 and 90, by which the belts are tightened and exert pressure to force the upper squeeze roll 27 downward against the squeeze roll 26.

The lower squeeze roll 26 also carries a pulley 91 (Fig. 7) connected by a belt 91^a to a pulley 92 on the end of the supporting shaft of the spreader roll 22, and the roll 22 is connected through gears 93 and 94 with its co-operating spreader roll 21 (Fig. 5).

Squeeze roll adjustment

I have made special provision for adjusting the squeeze rolls 35 and 38 toward and from the center squeeze roll 34 and for separating the squeeze rolls when desired. The squeeze roll 34 rotates in fixed bearings, while the rolls 35 and 38 are mounted in bearing blocks 35' and 38' vertically movable in a fixed guide-way.

Supporting levers 98 and 99 are yieldingly connected with the sliding bearing blocks by means of eye bolts 97 and 97', extending through the levers and pivotally connected to the sliding blocks. Springs 97^a hold the eye bolts normally seated against the levers, but permit yielding movement of the bolts and sliding blocks relatively thereto.

The levers 98 and 99 are connected by reverse toggle members 101 and 102 to oppositely disposed crank arms fixed on a shaft 100. A hand wheel 103 is provided with a pinion 104 connected through an intermediate gear 105 and intermediate pinion 106 to a segmental gear 107 mounted on the toggle actuating shaft 100. Through these connec-

tions, the hand wheel 103 may be utilized to rotate the shaft 100 and act through the toggle members 101 and 102 to move the supporting levers 98 and 99 toward and away from each other.

The hand wheel 103 is provided with a toothed disc 109 adapted to be engaged by a locking pawl 108 by which the hand wheel may be locked in any desired angular position, thus holding the levers 98 and 99 in corresponding fixed position.

The levers 98 and 99 are pivoted on sliding blocks 110 and 111, which may be moved toward and from each other by manual rotation of a worm shaft 112 having a worm 112^a engaging a worm wheel 113 on a vertical shaft 114 connected by right and left hand screw threads with the sliding blocks 110 and 111.

I have thus provided means for moving the squeeze rolls 35 and 38 simultaneously toward or away from the center squeeze roll 34 and for locking the rolls in any desired relation and I have also provided means for adjustably positioning the pivots of the supporting levers 98 and 99.

I have also provided connections by which the squeeze roll 27 may be raised whenever the squeeze rolls 35 and 38 are separated. For this purpose I have provided a belt or chain 115 (Fig. 5) connected at its lower end to the toggle actuating shaft 100 previously described. The belt 115 passes around a guide pulley 115^a and the downwardly extending end portion 116 of the belt or chain is connected with the sliding bearing 117 of the upper squeeze roll 27. It will be understood that similar belts 115 and connections are provided at both ends of the squeeze roll 27.

Through these connections, rotation of the hand wheel 103 in the direction of the arrow shown thereon in Fig. 5 will cause the toggle members 101 and 102 to separate the squeeze rolls 35 and 38 and at the same time the belt or chain 115 will be pulled downward, thereby separating the squeeze rolls 26 and 27 and releasing the pressure thereon.

I have provided additional mechanism as shown in Fig. 4 for raising and lowering the squeeze roll 14 which normally presses downward upon the squeeze roll 15. For this purpose I have provided a hand wheel 118 having a pinion 119 engaging a gear 120 upon a crankshaft 121. The shaft 121 is provided with a crank arm 122 pivotally connected to the offset curved lower end portion 123 of an adjustable connecting rod 124. The rod 124 is pivoted at its upper end to a lever 125 mounted on the fixed frame A and connected by a link 125^a to the sliding bearing 126 of the upper squeeze roll 14. These connections are duplicated at the other end of the roll 14.

In the usual operation of the machine,

the operator first uses the hand wheel 103 to remove pressure from the squeeze rolls 27, 35 and 38, and then uses the hand wheel 118 to relieve pressure from the roll 14.

Spraying and extracting devices

Spray pipes *w* (Fig. 2) are provided in different parts of the machine for spraying water upon the fabric as desired at various points in its travel through the machine. I have also provided extractor tubes *V*, each of which comprises a hollow pipe or tube having a longitudinally extending nozzle which may be turned into or out of engagement with the fabric as it is drawn past the extractor tube. The extractor tubes are connected to a suitable air exhauster, so that suction may be exerted on the cloth to extract moisture and dirt therefrom as the cloth passes over the extractor tubes.

Fulling roll mechanism

In Fig. 10, I have shown a modified construction of the fulling mechanism, in which I have replaced the vertically movable fulling stocks by corrugated fulling rollers *d*, mounted about the periphery of a supporting cylinder or drum and acting upon the cloth as it is drawn thereunder by the conveyor *d'*. The supporting cylinders are positively rotated but the corrugated rollers are preferably freely rotatable in their bearings.

A feed roll *d''* is preferably provided between the two fulling cylinders or drums, so that the cloth *C* may be drawn thereover, thus unfolding and smoothing out the folds formed under the first drum and providing a new set of folds to be subjected to the action of the second drum.

This form of my invention is not claimed specifically herein as it forms part of the subject-matter of a continuation application filed by me and issued as Patent No. 1,806,342 on May 19, 1931.

General operation

In the usual operation of the machine, the cloth is first thoroughly soaped and is then fed into the fulling mechanism where it is acted upon by the fulling stocks shown in Fig. 2 or the fulling rolls shown in Fig. 10. The cloth is fed slowly past the fulling devices, so that a very effective fulling action is attained. If it is desirable to prolong the fulling operation, the cloth may be led from the squeeze roll 14 to the carrier roll 40 and thus repeatedly returned to the fulling mechanism, or it may be alternately passed through the fulling mechanism and the washing mechanism, receiving a fresh supply of soap, if desired, as it passes through the soap tank 31 after leaving the soaking tank 20.

After the fulling operation has been completed, water will be sprayed against the fabric from the various spray pipes *w* positioned in different parts of the machine.

If the cloth, after fulling, is thus supplied with water and again passed through the fulling mechanism, the fulling device will act as additional washing mechanism, squeezing the water from the cloth and assisting in the extraction of soap therefrom. This action is also much assisted by employing the extractor tubes *V* immediately behind the squeeze-rolls, which tubes are under strong air suction and extract a large amount of dirt and impurities from the innermost parts of the cloth, performing this operation more satisfactorily than it can be accomplished alone by the pressure of the squeeze rolls or the pounding or kneading action of the fulling mechanism.

Having thus described my invention and the operation thereof, it will be evident that I have provided a very effective mechanism for fulling, washing, and cleaning the fabric, and for performing these operations in any desired combinations. Accordingly I do not wish to be limited to the details herein disclosed otherwise than as set forth in the claims, but what I claim is:—

1. A machine for use in fulling and shrinking cloth which comprises a table supporting the cloth at full width in transversely folded and untensioned condition, fulling mechanism effective to beat and full untensioned cloth while thus supported on said table, means to feed the cloth to said table, and additional means to feed the cloth in transversely folded untensioned condition along said supporting table.

2. A machine for use in fulling and shrinking cloth which comprises means to support the cloth at full width in transversely folded and untensioned condition, fulling mechanism effective to beat and full the untensioned cloth while thus supported, washing mechanism, means to feed the cloth through said fulling mechanism, and said washing mechanism successively, means to actuate said fulling mechanism, means to actuate said washing mechanism, and a single control device effective to render either mechanism operative and the other mechanism simultaneously inoperative.

3. A machine for use in fulling and shrinking cloth which comprises means to support the cloth at full width in transversely folded and untensioned condition, fulling mechanism effective to beat and full the untensioned cloth while thus supported, washing mechanism, means to feed the cloth through said fulling mechanism, and said washing mechanism successively, means to actuate said fulling mechanism, means to actuate said washing mechanism, and a single control device effective to render either mechanism operative and the other mechanism simultaneously inoperative, the feeding means for the fulling mechanism being operatively connected for actuation by either actuating means.

4. A machine for use in fulling and shrinking cloth which comprises means to support

the cloth at full width in transversely folded and untensioned condition, fulling mechanism having beating devices effective to beat and full the untensioned cloth while thus supported, means actuated with said beating devices effective to feed the folded cloth through said fulling mechanism when said beating devices are in operation and additional and independent means effective to feed said cloth through said fulling machine to effect a supplemental washing operation thereon when said beating devices are in operative.

5. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, and means to deposit cloth at full width and in laterally extended folds thereon.

6. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, a folding chute positioned above said apron, and means to deposit cloth in laterally extended folds in said chute, said cloth being progressively removed in folded condition from the open lower end of said folding chute by said apron.

7. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron means to vary the rate of feed, means to deposit cloth in full width in laterally extended folds thereon, and means to press said folded cloth against said apron.

8. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, means to deposit cloth in full width in laterally extended folds thereon, and means to press the folded cloth against said apron before and after passing said striker elements.

9. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, means to deposit cloth in full width in laterally extended folds thereon, and means to retard forward

movement of said folded cloth relative to said apron before passing said striker elements.

10. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, means to deposit cloth in full width in laterally extended folds thereon, and means to retard forward movement of said folded cloth relative to said apron after passing said striker elements.

11. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, and means to deposit cloth in full width in laterally extended folds thereon, said table and apron being inclined downwardly in the direction of travel of said cloth.

12. In a machine for use in fulling and shrinking cloth, a fulling mechanism comprising a cloth transporting apron, means to deposit cloth in full width and in a loose untensioned condition on said apron, a plurality of fulling stocks arranged in parallel rows extending crosswise of said apron, each row of stocks being mounted for independent vertical movement, and means to alternately raise and lower each row of fulling stocks as a unitary structure.

13. In a machine for fulling and shrinking cloth, a fulling mechanism comprising inclined means to support a piece of cloth in full width in successive laterally extended folds, means to cause said cloth to travel over said supporting means in a downwardly inclined direction, a plurality of fulling stocks arranged in multiple series across said cloth, additional means to retard the movement of the folded cloth down said inclined supporting means, and automatic means to regularly and alternately raise and lower said series of stocks, thereby causing said stocks to beat said folded cloth against said inclined supporting means.

14. In a machine for fulling and shrinking cloth, fulling mechanism comprising inclined means to support a piece of cloth in full width in successive laterally extended folds, means to cause said cloth to travel over said supporting means in a downwardly inclined direction, a plurality of fulling stocks arranged in multiple series across said cloth, additional means to retard the movement of the folded cloth down said inclined support, and automatic means to regularly and alternately raise and lower said series of stocks, thereby causing said stocks to beat said folded

cloth against said inclined supporting means.

15. In a machine for fulling and shrinking cloth, fulling mechanism comprising inclined means to support a piece of cloth in full width in successive laterally extended folds, means to cause said cloth to travel over said supporting means in a downwardly inclined direction, a plurality of fulling stocks arranged in multiple series across said cloth, additional means to retard the movement of the folded cloth down said inclined support, and automatic means to regularly and alternately raise and lower said series of stocks, thereby causing said stocks to beat said folded cloth against said inclined supporting means, said stocks having an unrestrained lost motion connection with said lifting mechanism.

16. In a machine for use in finishing cloth, a fulling mechanism comprising striker elements, means to actuate said striker elements, a fulling table below said striker elements, a cloth feeding apron movable progressively over said table and below said striker elements, means to feed said apron, means to deposit cloth in full width in laterally extended folds thereon, said table and apron being inclined downwardly in the direction of travel of said cloth, and said stocks being arranged in parallel rows in two separate sets, said rows extending crosswise of said apron, and means to raise and lower said separate sets of striker elements as to cause said sets to alternately engage the cloth.

17. In a machine for use in finishing cloth, fulling mechanism comprising lifter frames, a plurality of cross bars mounted for free vertical motion in said frames, and a plurality of fulling stocks loosely supported on each cross bar.

18. In a machine for use in finishing cloth, fulling mechanism comprising an inclined cloth feeding apron, means to feed said apron, a plurality of fulling stocks having their lower ends bevelled to correspond to the inclination of said apron, and means to raise or lower said stocks.

19. In a machine for use in finishing cloth, fulling mechanism comprising an inclined cloth feeding apron, means to feed said apron, a plurality of fulling stocks having their lower ends bevelled to correspond to the inclination of said apron, and means to raise or lower said stocks, each stock having substantially the same range of rising and falling movement.

20. In a machine for use in finishing cloth, fulling mechanism comprising an inclined cloth feeding apron, means to feed said apron, a plurality of fulling stocks mounted for reciprocation above said apron and means to raise or lower said stocks, each stock being raised to substantially the same distance above the portion of apron directly beneath the same.

21. In a machine for use in finishing cloth,

a center squeeze roll rotatable in fixed bearings, upper and lower squeeze rolls rotatable in movable bearings, and manually operated means to simultaneously separate said movable rolls from said center roll in opposite directions, said manual means comprising supporting levers for said movable rolls, means to adjust the distance between the pivots of said levers, and means to swing said levers toward and from each other.

22. In a machine for use in finishing cloth, a center squeeze roll rotatable in fixed bearings, upper and lower squeeze rolls rotatable in movable bearings, manually operated means to simultaneously separate said movable rolls from said center roll in opposite directions, an additional pair of squeeze rolls, and means to simultaneously separate said additional rolls when said first named movable rolls are separated from said center roll.

23. In a machine for use in finishing cloth, a soaking tank, an apron having a portion of its upper run within said tank, means to feed said apron, means to deposit cloth in laterally extended folds on said apron, and means to prevent said apron and folded cloth from floating in said tank.

24. In a machine for use in finishing cloth, a soaking tank having a concave bottom surface, an apron having a portion of its upper run within said tank, means to feed said apron, means to deposit cloth in laterally extended folds on said apron, and means to cause said apron and folded cloth to follow a submerged path through said tank closely adjacent said concave bottom.

25. In a machine for use in finishing cloth, a soaking tank, an apron having a portion of its upper run within said tank, means to feed said apron, means to deposit cloth in laterally extended folds on said apron, and means to cause said apron and folded cloth to follow a submerged path through said tank, said means comprising a series of parallel rolls resting upon said cloth and equipped for free vertical movement above the apron and cloth and means to keep said rolls at all times spaced from the bottom of said tank.

26. In a fulling and washing machine, means to saturate the cloth with liquor, squeeze rolls to remove the liquor from the cloth, means to thereafter supply clean water to the cloth, and a suction tube having an axially extended nozzle, said tube being pivotally mounted and angularly adjustable about the axis of said tube to swing said nozzle toward and from operative position closely adjacent the cloth as it leaves said water-supplying means and is drawn past said suction tube.

27. In a machine for use in finishing cloth, a fulling mechanism comprising a plurality of cloth engaging fulling elements, an apron effective to support and feed the cloth beneath said cloth engaging elements in a series of transversely extended folds, means to de-

posit the cloth in such transverse folds on said apron, and means to support said apron beneath said elements.

28. In a machine for use in finishing cloth,
5 a fulling mechanism comprising a plurality of cloth engaging fulling elements, an apron effective to support and feed the cloth beneath said cloth engaging elements in a series of transversely extended folds, means to de-
10 posit the cloth in such transverse folds on said apron, an inclined table supporting said apron beneath said elements.

29. In a machine for fulling and shrinking cloth, a fulling mechanism comprising a plu-
15 rality of cloth-engaging fulling elements, means to reciprocate said elements substantially vertically and in substantially straight paths, and a cloth supporting table mounted beneath said fulling elements and substantial-
20 ly inclined to the path of movement thereof, by which table the cloth is supported under said fulling elements transversely folded at full open width and in a loose untensioned condition, said untensioned cloth being as-
25 sisted in its downward travel along said table by the angular application of blows thereto by the descending fulling elements.

In testimony whereof I have hereunto af-
fixed my signature.

DAVID GESSNER.

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