

Sept. 11, 1951

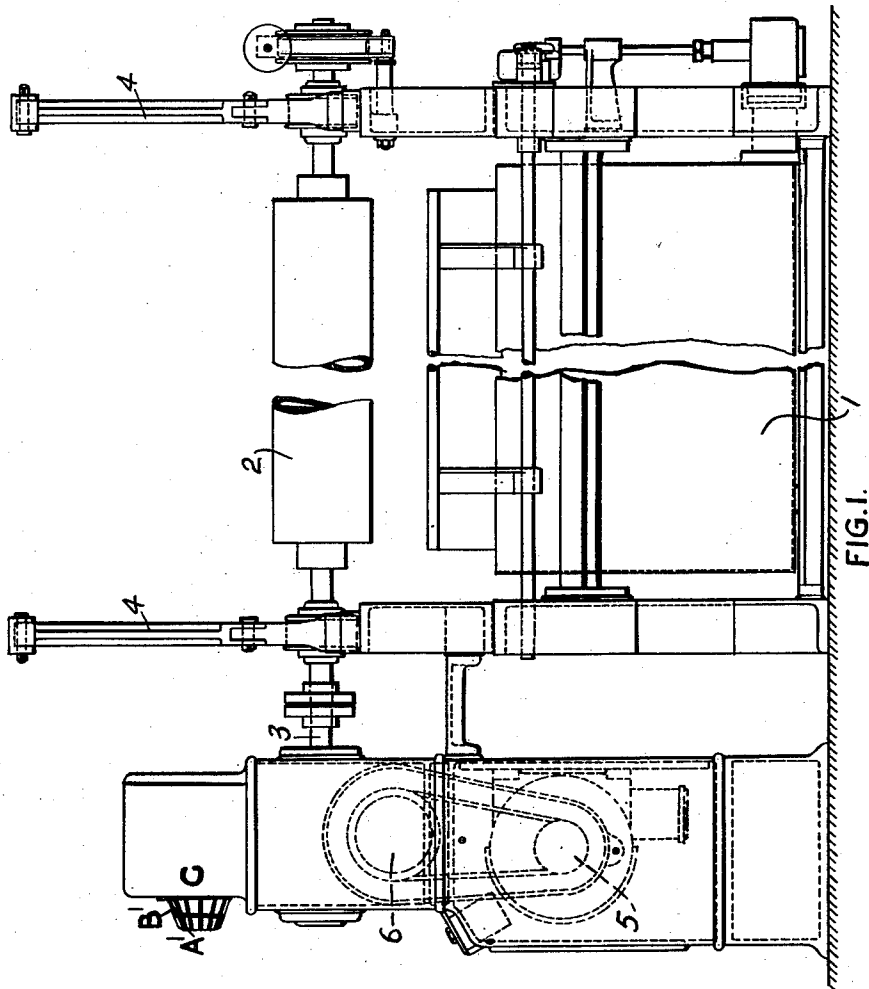
F. LEACH ET AL

2,567,644

MACHINE FOR REVERSELY WINDING WEBS OF FABRICS

Filed July 30, 1947

7 Sheets-Sheet 1



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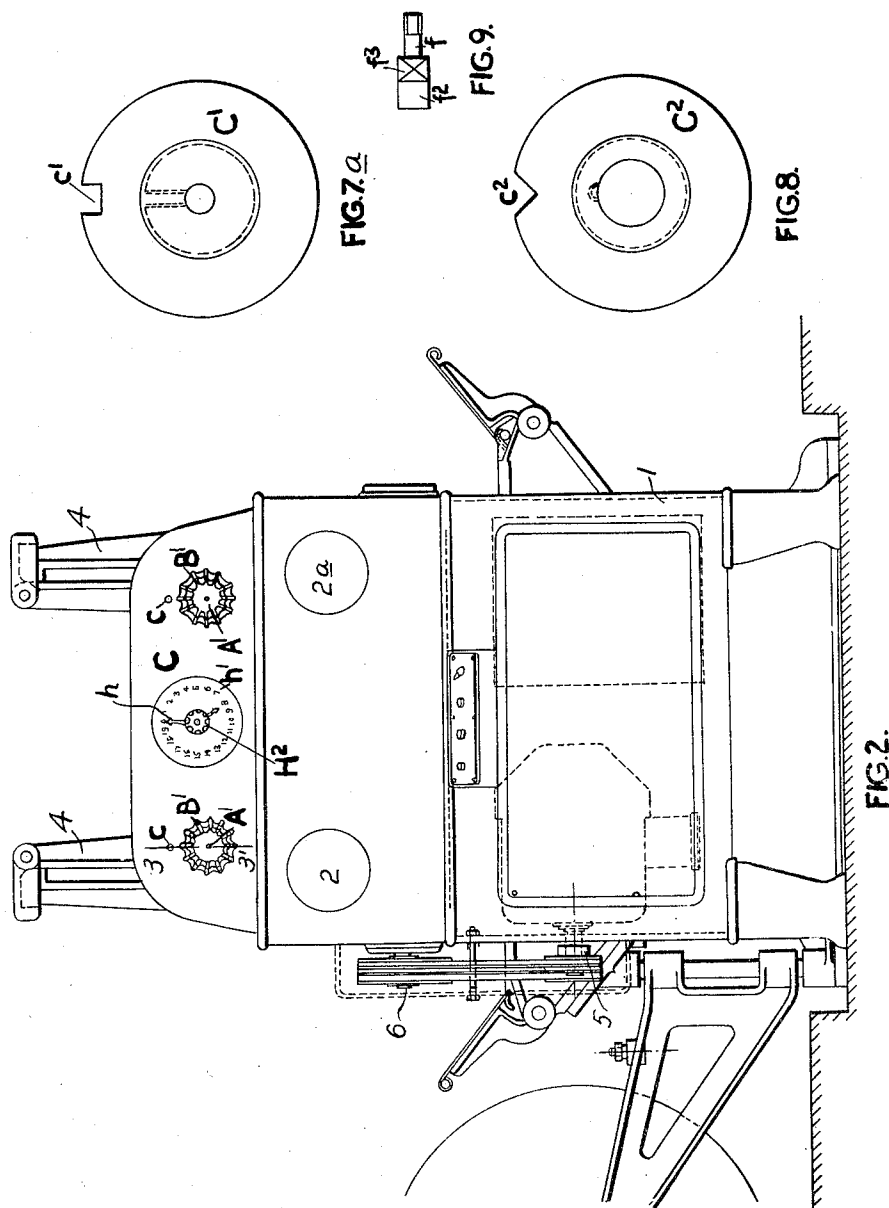
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7 Sheets-Sheet 3

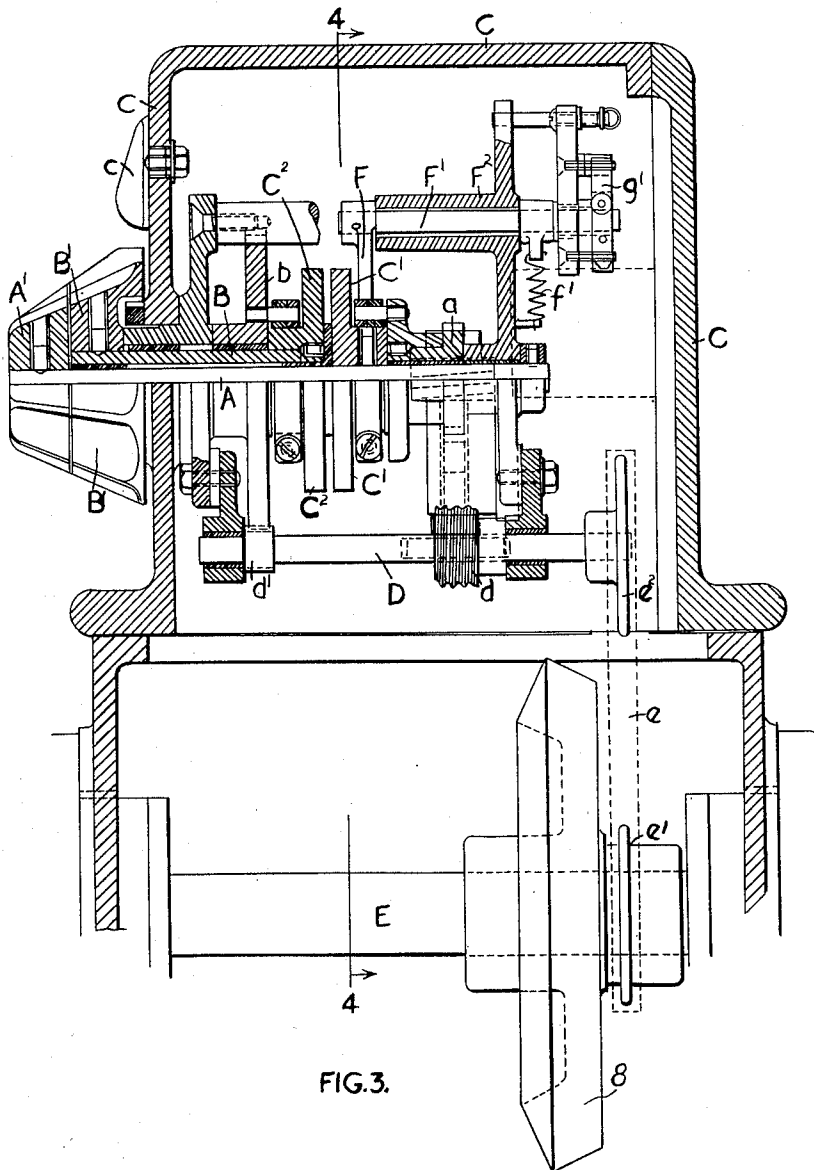


FIG. 3.

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MACHINE FOR REVERSELY WINDING WEBS OF FABRICS

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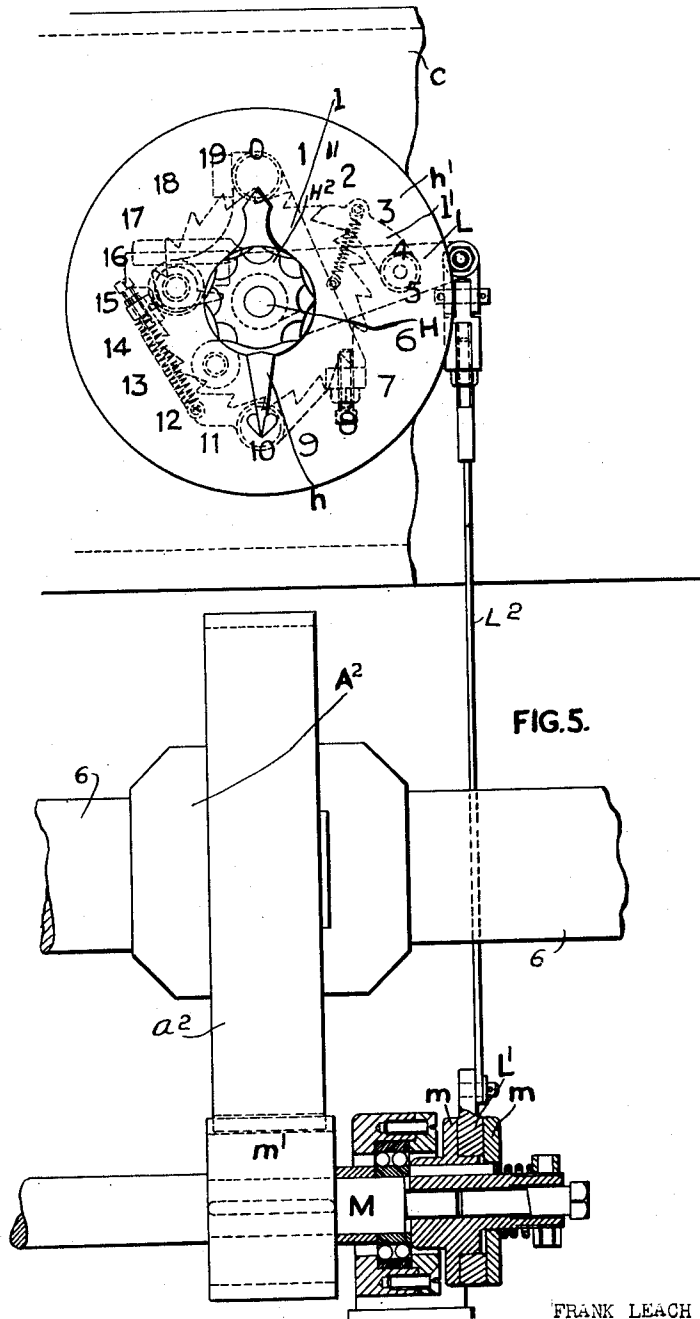
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MACHINE FOR REVERSELY WINDING WEBS OF FABRICS

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7 Sheets-Sheet 5



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MACHINE FOR REVERSELY WINDING WEBS OF FABRICS

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7 Sheets-Sheet 6

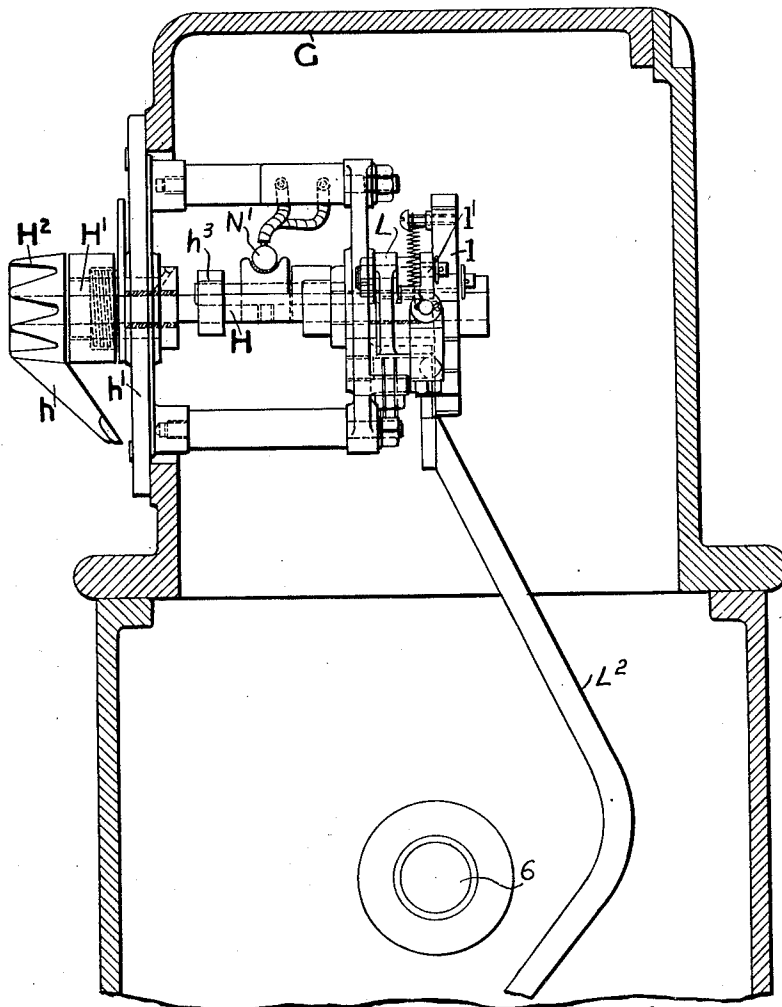


FIG. 6.

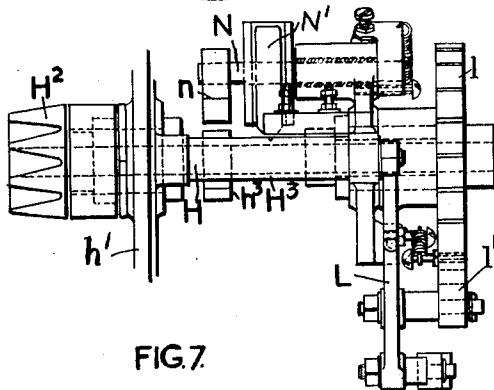


FIG. 7.

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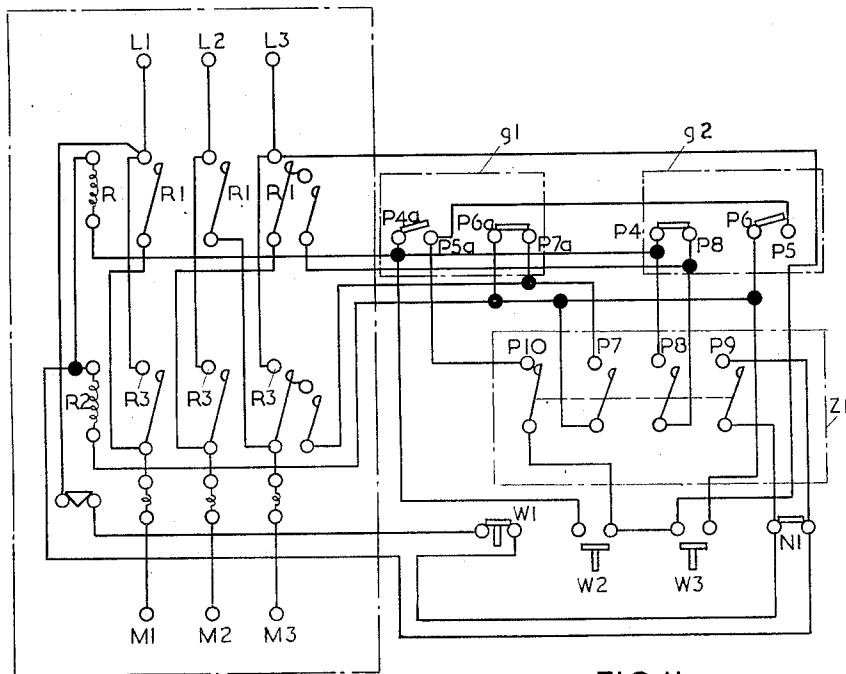


FIG. II

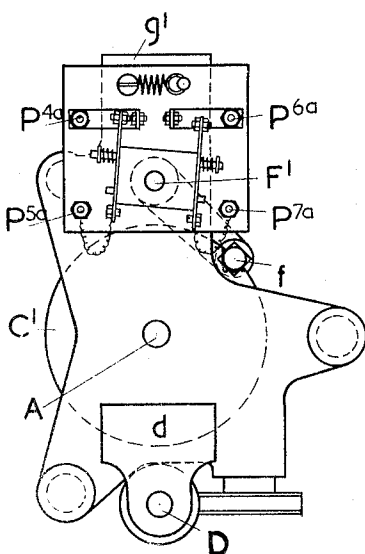


FIG. IO

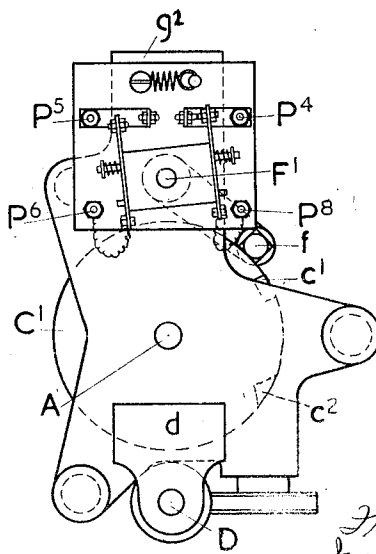


FIG. IOa

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2,567,644

MACHINE FOR REVERSELY WINDING WEBS OF FABRICS

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Application July 30, 1947, Serial No. 764,838
In Great Britain August 3, 1946

4 Claims. (Cl. 242-55)

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This invention relates to machines for the treatment of long webs of fabric or other material having two rollers onto and from which the web is successively wound and unwound and more particularly to improvements in devices for automatically reversing the direction of travel of the web of the kind in which each of the rollers is controlled by a separate mechanism operated from the other roller whereby the total number of revolutions of the rollers during the unwinding of the web from one roller will be exactly the same as the number of revolutions during the preceding winding of the web thereon, reversing being thus effected when the same length of web has been unwound from the roller as had previously been wound thereon even though alteration should occur in the length during its treatment when passing from one roller to the other.

According to the present invention each mechanism of the device comprises two discs arranged side by side and driven from the roller operated by the other mechanism, one disc being driven at a considerably greater speed than the other, each disc being provided with a recess adapted to be entered by stud when the two recesses are in alignment with each other and with the stud, the entry of the stud into the recesses giving an angular movement to member operating a pair of switches, one of which stops the drive to one roller and starts the drive to the other roller.

The invention is illustrated in and will be described with reference to the accompanying drawings which show its application to the rollers of a tensionless dye jig. In these drawings:

Fig. 1 is a front elevation of a dye-jig showing the two reversing mechanisms applied thereto;

Fig. 2 is a side elevation thereof;

Fig. 3 is a vertical section through one of the reversing mechanisms;

Fig. 4 is a transverse section on line 4-4 Fig. 3;

Figs. 5, 6 and 7 are respectively a front elevation, side elevation and plan of an automatic stop motion for stopping the machine after the web has been traversed through the machine a predetermined number of times;

Figs. 7^a and 8 are face views of the two discs C¹ and C² respectively,

Fig. 9 is an elevation of the stud *f*.

Figs. 10 and 10^a are front views in the direction of the arrow Fig. 3, of the control switches *g*¹ and *g*² showing the stud *f* in the notches in Fig. 10 and out of the notches in Fig. 10^a, and

Fig. 11 is a circuit diagram of control switches of the machine.

The cloth to be treated passes through a tank 1 the cloth being wound alternately from one roller 2 onto the second roller 2^a and vice versa

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as it is drawn backwards and forwards through the tank 1 the rollers 2, 2^a being driven through differential gearing A² mounted on a lay shaft 6 and driving shafts 3 to enable each roller 2, 2^a to be rotated at differing speeds according to the diameter of the cloth thereon. The rollers 2, 2^a are mounted in end frames 4 of the machine. A motor 5 drives the lay shaft 6 on which is also mounted bevel wheels 7 engaging bevel wheels 8 one on each shaft E.

Each reversing mechanism consists of a shaft A on which a sleeve B is rotatably mounted, the shaft A having a disc C¹ and the sleeve B having a disc C² secured thereon, the two being side by side as shown in Fig. 3. A second shaft D having its axis parallel to the axes of the shaft A and sleeve B is driven through a chain *e* and sprocket wheels *e*¹ and *e*² (or other gear) from the roller shaft E, a worm *d* drives through a double worm gearing a worm wheel *a* secured to the shaft A and the pinion *d*¹ drives a gear wheel *b* secured on the sleeve B, the sleeve B being thus rotated at a much greater speed than the shaft A. The shaft A and sleeve B both extend to the outside of the casing C housing the gearing, and each carries on its outer end a setting wheel A¹ and B¹ respectively by which it can be manually rotated. Each setting wheel carries a pointer or other indicating means co-operating with a fixed pointer *c* on the casing.

A notch or groove *c*¹, *c*² is formed in each disc C¹, C², see Figs. 7^a and 8, these notches or grooves being so positioned that when the shaft A and sleeve B are rotated by their operating wheels A¹, B¹ to the zero position the two notches or grooves *c*¹, *c*² will coincide. The notch or groove *c*² in the disc C² on the sleeve B, i. e. the fast running disc, is of V shape in cross section and the notch or groove *c*¹ in the disc C¹ on the shaft A, i. e. the slow running disc, is rectangular in cross section.

A stud *f* mounted on a radial arm F affixed to a short shaft F¹ arranged above the shaft A and sleeve B and having its axis parallel thereto, rests on the peripheries of the two discs C¹ and C² being kept in contact therewith by the weight of the arm preferably assisted by a spring *f*¹. When the notches or grooves *c*¹ and *c*² in the two discs are in alignment, they also coincide with the stud *f* so that the latter will fall into the notches or grooves. The stud has two different cross sections, the portion *f*² over the fast running disc C² in which the groove *c*² is of V shape being circular and the portion *f*³ over the slow running disc C¹ in which the groove *c*¹ is rectangular being square.

The shaft F¹ is rotatably mounted in a bearing F² and its angular movement controls two switches *g*¹, *g*² one of which starts the drive of the roller 2 from the shaft E by which the shaft A and sleeve B are rotated and the other

starts the drive of the other roller 2a. The reversing mechanism may be operated manually by switches W¹, W² and W³. The switch W¹ is a control switch for starting and stopping the machine and the switches W² and W³ for controlling the direction of rotation of the motor 5 to determine which roller 2 or 2a is driven. When manual operation is desired three contacts P⁷, P⁸ and P⁹ of a four pole switch Z¹ are closed and contact P¹⁰ is open. The switch N¹ is then short circuited.

For automatic control the four pole switch Z¹ is operated to open the three contacts P⁷, P⁸ and P⁹ and close the contact P¹⁰. This operation short circuits the switches W¹, W² and W³ and puts the switch N¹ in circuit.

The operation will be described with reference to automatic control as shown in Fig. 11.

Current is supplied from lines L¹, L², L³ to motor connections M¹, M², M³ through a contactor box. To start the motor 5 in one direction contacts P⁵ and P⁶ of switch g² are closed to energise a starting solenoid R in the contactor box to close contacts R¹. The motor will continue to run until the cloth is wound off the first roller 2 onto the second roller 2a when the slots in the discs C¹, C² will be in line. The stud f then drops into the notches c¹ and c² and the contacts P^{6a} and P^{7a} of switch g¹ are opened and its contacts P^{4a} and P^{5a} are closed and the machine comes to rest and restarts in the reverse direction by virtue of the closing of the solenoid circuit R² of the lower contacts R³ since the second pin f controlling the drive to the roller 2 will also have fallen into its notches on the second discs C¹, C² to close the contacts P⁵ and P⁶ of the switch g². The machine will continue to run and reverse as each reversing mechanism returns to the zero position until the switch N¹ is operated to break the circuit.

At the start of the winding of the web onto the first roller of the machine preparatory to treatment of the web the operating wheels B¹ and A¹ of the sleeve A and the shaft B of the mechanism driven from that roller are set in the zero position so that the stud f is located in the grooves c¹c² of the discs C¹C². When the roller is rotated to wind the cloth onto the roller the V shape of the groove c² on the fast running disc C² co-operating with the circular portion f² of the stud f immediately raises the latter out of both grooves and the discs continue to rotate at their different speeds until the whole length of cloth is wound onto the roller. The speed ratio between the shaft A and sleeve B is such that the disc C¹ on the shaft will not make one revolution whilst the web is being wound onto the roller, so that during this operation the grooves c¹ and c² will not be in alignment in a position which also coincides with the stud f.

After the web has been wound onto the roller its end is threaded through the machine and secured to the second roller thereof and the operating wheels B¹ and A¹ of the sleeve B and shaft A driven from the second roller are set to zero. The machine is then started and the rotation of the fast running disc C² of the second reversing mechanism immediately raises the stud f of the latter out of the grooves c¹ and c² of the discs C¹C². The machine will now continue to run in the same direction, winding the web onto the second roller and off the first roller until the discs C¹ and C² of the first mechanism have returned to the zero position with the two grooves c¹c² thereof in alignment and coinciding with the stud

f which then falls into the grooves and operates the switches g¹ and g².

It will be evident that the discs C¹ and C² must rotate exactly the same number of revolutions when the web is being wound off the roller as they have rotated whilst it was being wound thereon so that the switches will not be operated until all the web is wound off and the actuation of the switches is entirely controlled by the length of the web.

On reversal of travel of the web the discs C¹ and C² of the second mechanism have been rotated from their zero position by an amount corresponding to the length of web wound onto the second roller which if any stretch or shrinkage has occurred may be longer or shorter than the original length of the web but when the second roller is being unwound the stud f of the second mechanism will not fall into the grooves c¹ and c² of the discs thereof until the latter have returned to their zero position i. e. when exactly the same length of web has been wound off the roller as had been wound onto it.

So that the machine may be automatically stopped after the web has been traversed backwards and forwards through the machine for any desired number of times means are provided for this purpose as shown in Figs. 5, 6, and 7.

The mechanism shown in Figs. 5, 6 and 7 comprises a shaft H on which is mounted a sleeve H¹ carrying a wheel H² having a finger or pointer h co-operating with a graduated scale on a disc h¹ on the outside of the casing C in which the mechanism is housed. The shaft H is arranged between the two reversing mechanisms as shown in Fig. 2 and is at right angles to the axis of the drive such as the shaft 6 of the differential A² driving the two rollers 2, 2a.

The inner end of the shaft H carries a ratchet wheel l having the same number of teeth as the number of graduations on the scale h¹ over which the pointer h moves. A pawl l¹ is carried on an arm L pivotally connected by a rod L² to disc L¹ frictionally driven by spring controlled clutch plates m mounted on a shaft M driven from the differential A² through the gear wheel a² and pinion m¹ and actuates the pawl l¹ of the ratchet wheel l.

The disc L¹ is held with an amount of pressure on the shaft M insufficient to prevent rotation of the shaft inside the disc but sufficient to move the disc to swing the arm L over at each reversal of the rotation of the shaft M. The ratchet wheel l is thus rotated one tooth each time the drive to the roller is reversed.

The wheel H² which carries the indicating pointer h is mounted on the shaft H so that it rotates therewith but can be turned by hand in relation thereto.

The sleeve H³ carries a cam h³ adapted to engage a cam or projection n on a pivoted shaft N the movement of which operates a switch N¹ controlling the starting and stopping of the machine when operating automatically.

When the pointer h¹ is in the zero position the cam h³ is in the position to allow the switch N¹ to be open to stop the machine. Thus to control the number of reversals of the machine, the wheel H² is set to bring the pointer h to the desired number on the scale on the disc h¹ and consequently when the ratchet wheel l has been moved the same number of teeth the pointer h will have returned to its zero position and the machine will be stopped.

Manually operated switches are also provided

for starting, stopping and reversing the machine.

We claim:

1. An automatic reversing device of the character described for a machine for treating long webs of fabric and having two rollers onto and from which the web is successively wound and unwound, said reversing device including two drive mechanisms, each drive mechanism driving one of the two rollers and comprising two rotatable discs arranged side by side; two trains of gearing driving the said discs from the roller operated by the other drive mechanism, the ratios of the said trains of gearing being such that one disc is rotated at a considerably greater speed than the other disc and each disc having a recess on its periphery, the discs being capable of being rotated to bring the recesses into alignment; a stud adapted to enter the two recesses when they are in alignment with each other and with the stud; an arm carrying the stud on the end thereof; a rotatably mounted member to which the arm is affixed; and a pair of switches, one of which is adapted to start the drive mechanism of one roller and the other to start the drive mechanism of the other roller, the switches being operated when the stud enters into the recesses in the discs through the consequent angular movement of the arm imparting a rotary movement to the rotatably mounted member.

2. An automatic reversing device of the character described for a machine for treating long webs of fabric and having two rollers onto and from which the web is successively wound and unwound, said reversing device including two drive mechanisms, each drive mechanism driving one of the two rollers and comprising two rotatable discs arranged side by side; two trains of gearing driving said discs from the roller operated by the other drive mechanism, the ratios of the said trains of gearing being such that one disc is rotated at a considerably greater speed than the other disc and each disc having a recess on its periphery, the discs being capable of being rotated to bring the recesses into alignment; a stud adapted to enter the two recesses when they are in alignment with each other and with the stud; an arm carrying the stud on the end thereof, the recess in the faster running disc being of V-shape and the portion of the stud engaging the V-shaped recess being substantially circular so that upon commencing of rotation of the discs the stud will be lifted out of the recesses; a rotatably mounted member to which the arm is affixed; and a pair of switches, one of which is adapted to start the drive mechanism of one roller and the other to start the drive mechanism of the other roller, the switches being operated when the stud enters into the recesses in the discs through the consequent angular movement of the arm imparting a rotary movement to the rotatably mounted member.

3. An automatic reversing device of the character described for a machine for treating long webs of fabric and having two rollers onto and from which the web is successively wound and unwound, said reversing device including two drive mechanisms, each drive mechanism comprising two rotatable discs arranged side by side; a shaft on which one disc is secured; a sleeve surrounding said shaft and rotatable in relation thereto, on which sleeve the other disc is secured; two trains of gearing driving the shaft and sleeve respectively from the roller operated by the other drive mechanism, the ratios of the said trains of gearing being such that one disc

is rotated at a considerably greater speed than the other disc and each disc having a recess on its periphery, both discs being capable of being rotated to bring the recesses into alignment; a stud adapted to enter the two recesses when they are in alignment with each other and with the stud; an arm carrying the stud on the end thereof; a rotatably mounted member to which the arm is affixed; a pair of switches, one of which is adapted to start the drive mechanism of one roller and the other to start the drive mechanism of the other roller, the switches being operated when the stud enters into the recesses in the discs through the consequent angular movement of the arm imparting a rotary movement to the rotatably mounted member; means secured to the shaft by which it can be rotated manually; and means secured to the sleeve by which it can also be rotated manually, whereby the shaft and sleeve can be rotated to bring them to zero position with the recesses in the discs and the stud in alignment before the commencement of operation of the machine.

4. In a machine for treating long webs or fabric, having two rollers onto and from which the web is successively wound and unwound, the combination of a reversing device, and an automatic stop motion device effective to stop the machine after the occurrence of a predetermined number of reversals of the travel of the web between the rollers, said reversing device including two drive mechanisms, each drive mechanism comprising two rotatable discs arranged side by side; a shaft on which one disc is secured; a sleeve surrounding said shaft and rotatable in relation thereto, on which sleeve the other disc is secured; two trains of gearing driving the shaft and sleeve respectively from the roller operated by the other drive mechanism, the ratios of the said trains of gearing being such that one disc is rotated at a considerably greater speed than the other disc and each disc having a recess on its periphery, both discs being capable of being rotated to bring the recesses into alignment; a stud adapted to enter the two recesses when they are in alignment with each other and with the stud; an arm carrying the stud on the end thereof; a rotatably mounted member to which the arm is affixed; a pair of switches, one of which is adapted to start the drive mechanism of one roller and the other to start the drive mechanism of the other roller, the switches being operated when the stud enters into the recesses in the discs through the consequent angular movement of the arm imparting a rotary movement to the rotatably mounted member; means secured to the shaft by which it can be rotated manually; and means secured to the sleeve by which it can also be rotated manually, whereby the shaft and sleeve can be rotated to bring them to zero position with the recesses in the discs and the stud in alignment before the commencement of operation of the machine.

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