Jan. 12, 1937. W. N. HADLEY 2,067,632

CLOTH FINISHING MACHINE

Filed June 7, 1933 3 Sheets-Sheet 1

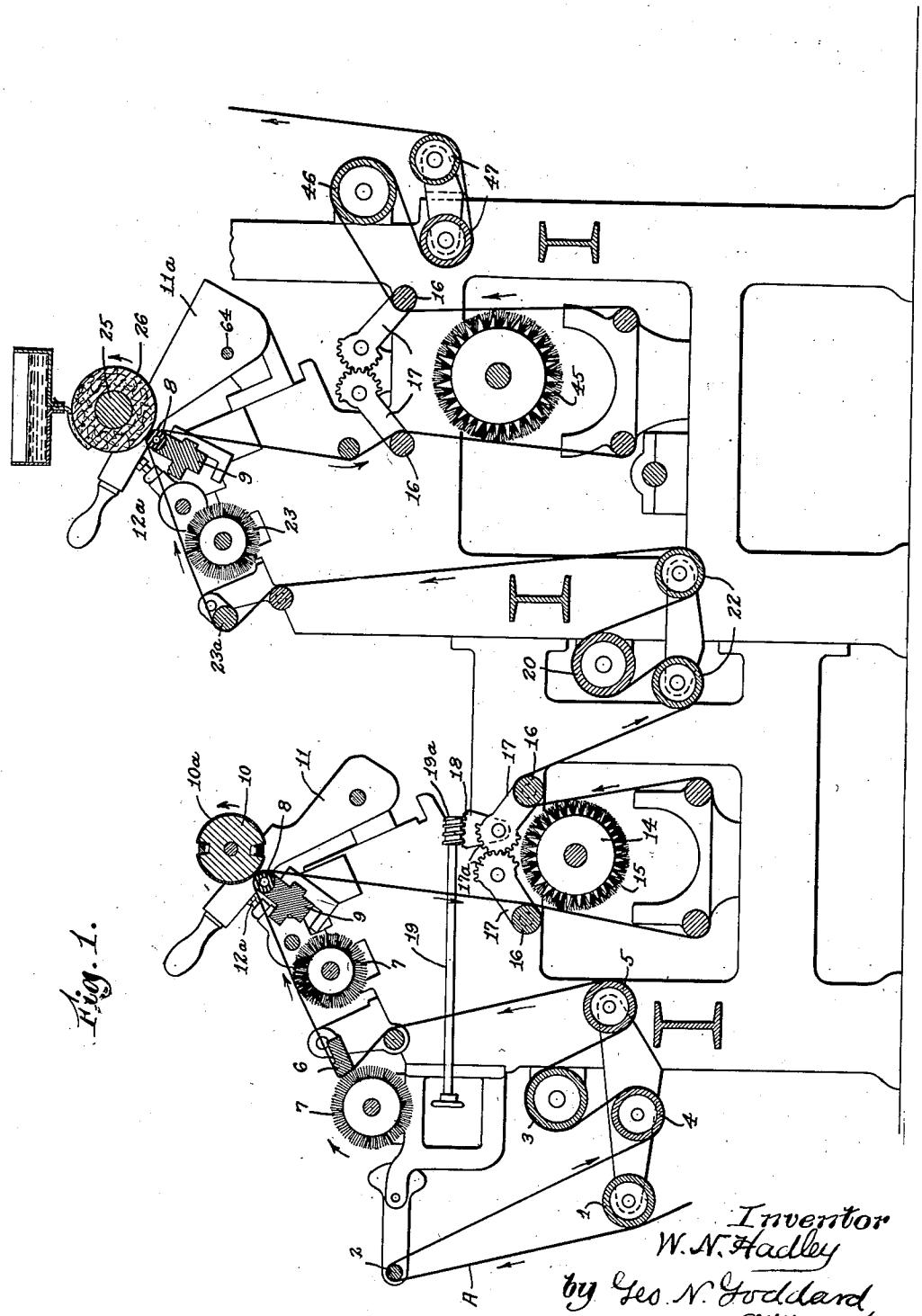

Fig. 1.

Inventor
W. N. Hadley
by Geo. N. Goddard
Attorney

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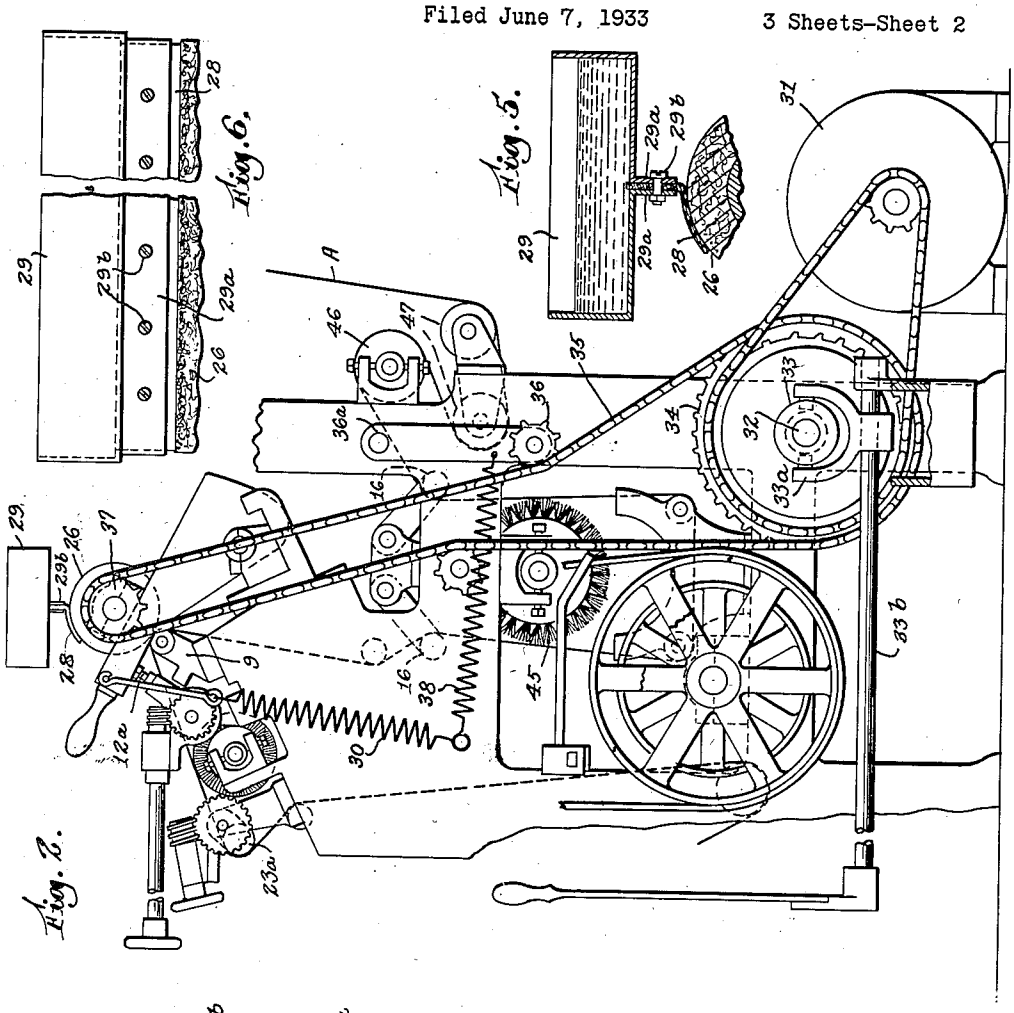

Fig. 2.

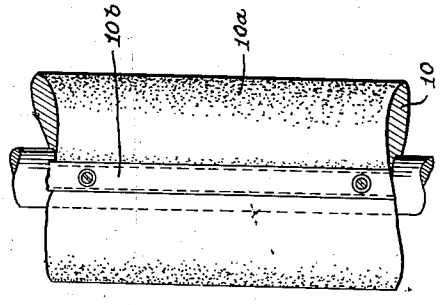

Fig. 3.

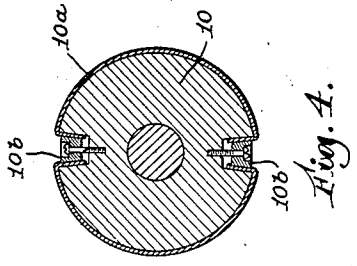

Fig. 4.

Inventor
W. N. Hadley
by Geo. N. Goddard,
Attorney

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CLOTH FINISHING MACHINE

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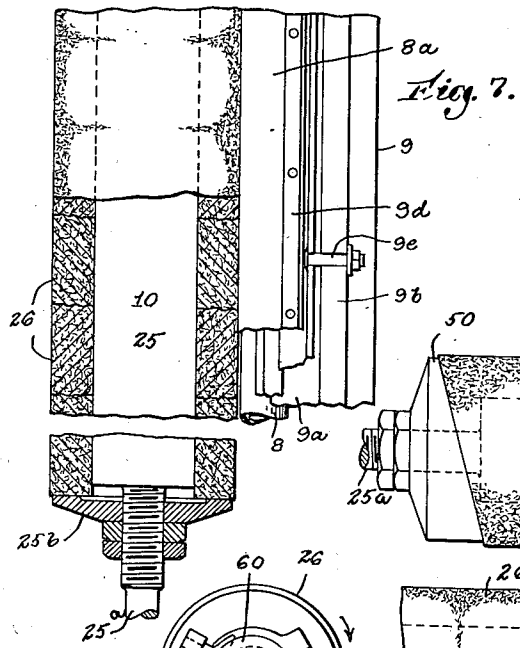

Fig. 7.

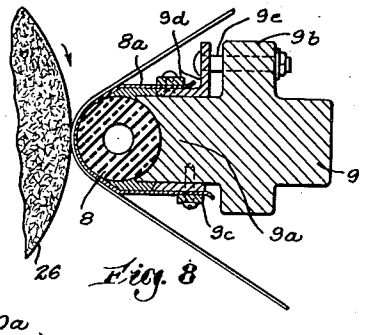

Fig. 8

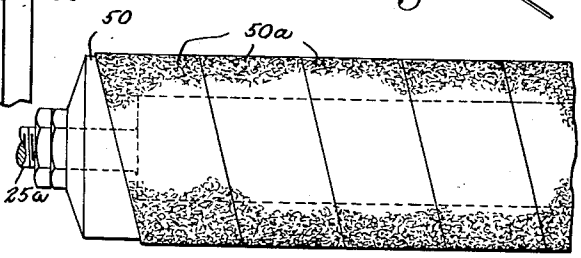

Fig. 11.

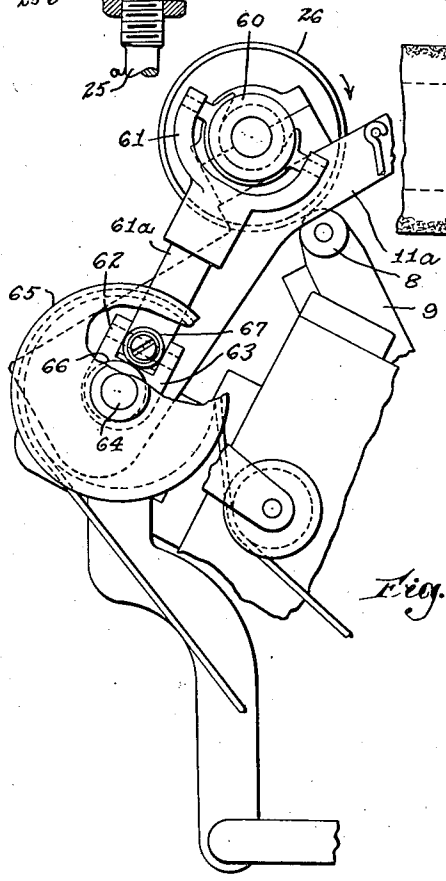

Fig. 9.

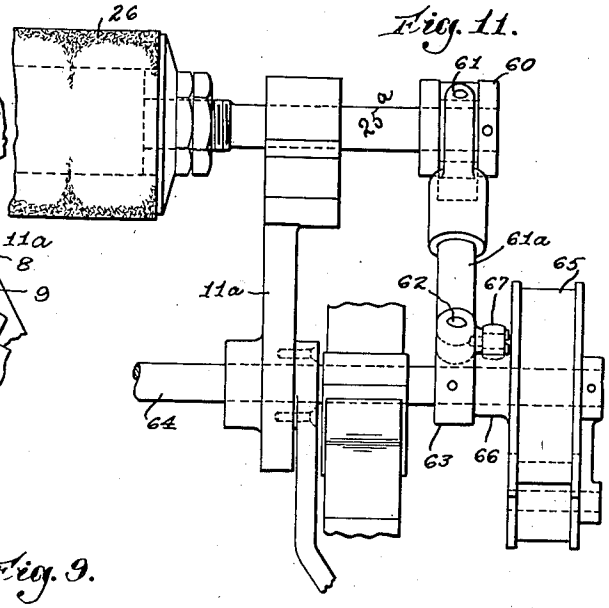

Fig. 10.

Inventor
W. N. Hadley
by Geo. N. Goddard
Attorney.

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2,067,632

UNITED STATES PATENT OFFICE

2,067,632

CLOTH FINISHING MACHINE

Wilfred N. Hadley, Winchester, Mass., assignor to Parks & Woolson Machine Company, Springfield, Vt., a corporation of Vermont

Application June 7, 1933, Serial No. 674,683

1 Claim. (Cl. 26—28)

This invention relates to the face-finishing of textile fabrics and is particularly concerned with an apparatus for raising and laying parallel the surface fibers of a face-finished cloth and also for imparting a high gloss or sheen to the surface of the cloth by a suitable polishing or burnishing roll of novel construction.

Heretofore in the course of face-finishing fabrics in the piece, the finishing operations included usually napping and gigging operations for raising and paralleling the surface fibers of the cloth, followed by subsequent lustering operations such as steaming, decating or boiling with further wet brushing or wet gigging, steaming, brushing and pressing. In the process of finishing different kinds of cloth, such for example as broadcloths, meltons, plushes and the like, there are many variations in details of treatment but, generally speaking, finishing operations of this kind have included means such as napping or gigging machines for raising and paralleling the surface fibers as well as means for imparting a luster thereto after gigging.

The machine which forms the subject matter of the present invention is capable of raising and paralleling the fibers and imparting an unusually fine luster to the web of the fabric passed through the machine and of performing these operations more rapidly, economically and satisfactorily with less waste of material than apparatus previously employed and results in imparting to the finished fabric a much higher luster or gloss and a superior softness to the touch.

Generally speaking, the invention comprises in combination with means for feeding the web of cloth, means for raising and paralleling of the fibers consisting of one or more rolls or cylinders provided with a working surface of finely crushed glass, whose minute sharp points have proved to be very effective in raising and paralleling the surface fibers with a minimum waste of the material of the cloth; it also embraces in combination with the cloth feeding means a burnishing or polishing roll provided with a smooth hard felt working-surface, which imparts to the face of the cloth a degree of luster not obtainable in previous face-finishing operations and which is much more lasting or permanent than was imparted by previous means of lustering cloth.

These and other features of the invention will be particularly described in the following specification and will be defined in the claim hereto annexed.

In the drawings I have illustrated a convenient and effective form of construction and arrangement of apparatus for carrying out the desired finishing operations, in which

Fig. 1 is a longitudinal section of a glassing and glossing machine showing the course of the cloth through the machine and illustrating the action of the glassing, glossing and other principal working parts of the machine.

Fig. 2 is a side elevation of the rear portion of the machine in which is located the burnishing roll and the cooperating parts for passing and feeding the cloth thereto, showing the parts more in detail than in Fig. 1.

Fig. 3 and Fig. 4 show, respectively, in plan and in cross section the construction of the glassing element, whose function it is to raise and lay parallel the surface fibers of the fabric.

Fig. 5 and Fig. 6 show, respectively, in central cross section and in front elevation the oil distributing means for applying small quantities of oil to the rapidly revolving burnishing roll.

Fig. 7 and Fig. 8 show, respectively, a plan view partly in horizontal section and a vertical cross section of the burnishing roll and cloth rest construction.

Fig. 9 and Fig. 10 show, respectively, in left hand end elevation and front elevation the details of mechanism for vibrating the burnishing roll axially.

Fig. 11 shows a modified construction of burnishing roll.

In the practice of this invention according to the form thereof illustrated in the drawings, I have adopted a general arrangement of framework and parts somewhat similar to the multiple cloth shear construction illustrated in Patent No. 1,672,780, but it will be understood that various forms of arrangement and construction may be used containing the principles of this invention.

The operation of the machine is best illustrated in Fig. 1, while reference may be had to other figures of the drawings for more particular details actually employed in this particular construction of machine. The course of the cloth through the machine, where it is subjected to the operation of the different working parts, is indicated by line A and, as so indicated, the cloth enters the machine usually from an underneath scray, being guided over the front guide roll 1, the upper guide bar 2 and around the first feed roll or cylinder 3 against which it is tensioned by the advance tensioning idler roll 4 and the rear idler roll 5, whence the cloth passes upwardly around the adjustable guide rest 6 which presents it to the revolving bristle brush 7 to brush

off lint, flocks or other foreign matter on the surface of the fabric. From the rest or support 6 to the work rest 8 the cloth passes by another revolving stiff bristle brush 7, which clears foreign matter from the face of the fabric. Opposite, and in juxtaposition to, the cloth rest 8, which is of yielding construction as will be later explained, is located a glassing roll or cylinder 10 which is rotated at high speed and which is covered with a surface layer of paper coated with fine particles of glass, as indicated at 10a. Further details of this roll will later be described. This glassing cylinder is mounted in a pivotal head or frame 11, which permits it to be lifted away from the cloth rest for threading through the fabric piece, while it is normally held against an adjustable stop screw 12a by tension springs similar to tension springs 30 shown in Fig. 2 of the drawings.

The rapidly revolving glassing roll, which carries the fine particles of glass, is not to be confused with the sand covered roll that has been used in some cloth finishing machines heretofore, because the sand coated roll has an abrasive effect and acts to grind off the surface fibers, whereas the glassing roll with its fine, sharp points of glass acts to partly raise and lay in parallelism the surface fibers wthout removing them from the fabric.

From the cloth rest 8, which supports the cloth against the rapidly revolving glassing roll, the web of cloth A passes down by a revolving drum 14 provided with peripheral wire bristles 15 and travels up on the rear side of the wire brush, in both courses being guided to properly present its surface to the wire brush by guide rods or rollers 16, which are mounted in pivotal frames or arms 17 having intermeshing sector teeth 17a to secure simultaneous adjustment. Compounded with one of the sector arms 17 is an additional sector arm 18, which is engaged by a worm 19a meshing into the sector worm of arm 18 and secured to a manually controlled, forwardly extending shaft 19 so that the operator of the machine can readily adjust the guide members 16 to properly present the surface of the cloth to the revolving brush 15. This brushing of the upper surface of the cloth beats out any lint, flock or other foreign matter carried by the face of the cloth and the cloth then passes around another feed roller 20 with which it is held in tensioned engagement by means of the tensioning rolls 22. The cloth then passes upwardly around an adjustable rest or cloth supporting bar 23a rearwardly in a plane tangential to the revolving clearing brush 23 and passes around the yielding cloth rest 8, which is of the same construction as that which supports and presents the cloth to the glassing roll.

At this point a pivotal frame or head 11a, similar to the previously described pivotal head 11, is arranged to support the burnishing roll, which comprises a cylindrical core or roll 25, preferably of wood covered with a thick layer of hard compact felt 26, whose details of construction will be later explained. Since this burnishing roll should be driven at high speed, say 1500 or 2000 R. P. M., I prefer to employ a separate driver which, in this case, is shown as comprising a driving motor 31 which drives a countershaft 32 by means of a sprocket chain connection, on which is mounted a sprocket wheel 34 connected to the drive shaft by any suitable clutch connection 33 under the control of the shipper fork 33a and the shipper shaft 33b. A sprocket chain 35 connects the driving sprocket 34 with a sprocket 37 on the end of the burnishing roll shaft. Any slack in the sprocket chain 35 is taken up by the idler sprocket 36 mounted on a swinging arm 36a and yieldingly drawn against the rear stretch of the sprocket chain 35 by means of the tensioning spring 38.

I have found it advantageous to make a slight application of oil to the felt burnishing roll 26 since this is effective to prevent burning or overheating of the felt. It will be understood, however, that the development of a substantial heat is very desirable for securing the highest luster to the surface of the cloth and it is for this reason that the burnishing roll 26 is driven at a substantially high speed. Any desired mode of applying the oil may be employed but in this case I have shown a transversely extending tank or reservoir 29, whose medial portion is provided with a delivery nozzle comprising downwardly extending, slightly spaced flanges 29a bounding the bottom delivery slot and clamped together with greater or less pressure upon an interposed feed wick 28, which overlaps the periphery of the felt roll 26 over a small arc of its circumference. Clamping bolts 29b are passed at intervals through the lips or flanges 29a and the interposed felt wick 28 in order to regulate the flow of oil down the wick. The tighter the bolts 29b are clamped, the less will be the rate of flow or seepage of the oil through the wick.

From the burnishing couple comprising the felt roll and the yielding cloth rest 8, the cloth passes around the adjustable guide rod or roll 16 to present its burnished face to a revolving brush 45 and thereafter upward over the rear adjustable guide 16 to the rear draft or feed roll 46, around which it is guided and tensioned by the rearmost tensioning rolls 47, whence it passes out of the machine to the folder or other cloth-receiving device.

While particular features of construction of the various elements employed in the machine are capable of much variation, there are certain advantageous features of construction employed in particular elements that will now be described more in detail.

In Fig. 3 and Fig. 4 is illustrated the construction employed for removably securing the glass coated sheets 10a to the glassing roll 10. In this case the periphery of the supporting roll 10 is provided wth a plurality of inwardly formed recesses provided with clamping bars or wedges 10b adjustably secured to the roll 10 by means of radial clamping screws. The parts are so related that when the glass coated sheets 10a are applied to the periphery of the cylinder 10, the ends of these strips or sheets are carried into the recesses and folded down in a substantially radial direction so that the clamping or wedge bars 10b, when inserted between them, grips them between the lateral faces of the bar and the opposed walls of the recess in the cylinder. The clamping screws, when turned in, draw the wedge bars with increasing pressure into firm gripping engagement with the inturned portions of the glass coated sheets.

The cloth rest structures which support the cloth for the finishing operations comprise a rigid or stiff beam 9 extending transversely of the machine and having a rearwardly projecting concave flange member 9a and an upwardly projecting flange member 9b. In the concave rear face of the member 9a is secured a somewhat yielding and elastic cloth rest member 8 which, as illustrated in

the present form, comprises a thick walled tube of rubber presenting a convex cloth supporting and yielding surface toward the felt burnishing roll **26**. Around the rear face of the yielding cloth rest member **8** is carried a strip **8a** of flexile material, such as heavy cotton cloth, which is anchored to holding strips or bars **9c** and **9d**. The upper holding bar **9d** is provided with an upward flange through which passes a draw bolt **9e**, which penetrates the flange **9b** of the supporting beam and is adjustable by means of a nut carried on its forwardly projecting end. This flexible covering strip serves a two-fold purpose. It presents a readily replaceable covering for the rubber member of the cloth rest to avoid excessive drag against a bare rubber surface, besides securing the rubber rest in place by means which permit compression or relaxing of the rubber to impart to the cloth rest different degrees of yielding support for the cloth, since adjusting the draft screws **9e** forwardly serves to put the rubber rest under heavier compression, thus decreasing its yielding properties as may be desirable.

The construction of the burnishing roll itself is important for the attainment of the best results. To this end I provide a solid core or cylinder **25** which is covered with a layer of hard felt **26**. The felt covering is preferably applied in the form of thick felt rings or washers **26** snugly fitting over the supporting core or cylinder **25** and then powerfully compressed together between end heads of the roll comprising heavy end heads **25b** slipped over the threaded portion of the roll shaft **25a** and then powerfully compressed against the washers by means of clamping nuts carried by the arbor **25a**. The felt should be of very hard quality and after the washers have been applied and compressed, the surface of the roll should be turned down in a lathe to a true cylindrical form.

While the heavy compression of these washers or rings will ordinarily avoid the leaving of visible lines on the surface of the cloth where two adjacent washers join together, nevertheless any marking in this way of delicate or high gloss fabrics may be prevented either by imparting to the burnishing roll an endwise or axial vibratory movement or by cutting the washers or rings with their side faces oblique to the axis of the roll, instead of perpendicular thereto, as shown in Fig. 11. In that case the end heads **50** may be provided with inclined inner faces to correspond with the obliquity of the washers and, since the line of juncture between two washers in constantly shifting in an axial direction, the obliquely cut washers **50a** cannot leave any longitudinal streaks on the surface of the burnished fabric. The effect, therefore, is very similar to that of vibrating the roll.

Endwise vibration may be imparted to the burnishing roll by any suitable means, but I have shown for this purpose in Figs. 9 and 10 a simple and convenient vibrator means comprising a grooved spool **60** secured to the outer end of the burnishing roll arbor **25**, which spool is engaged by a vibratory fork **61** carried by a vibratory arm **61a** which has a pivoted or fulcral connection at **62** with a collar **63** fastened to a transverse rod **64** carried by the frame of the machine. On this transverse rod is loosely mounted a belt driven idler pulley **65** whose hub **66** is in the form of an eccentric cam which engages a cam roller **67** secured to, and projecting from, the outer side of the fork bar **61a**. At each revolution of the pulley **65** the cam member **66** acts to rock the vibrating arm and fork inwardly on one side of the machine. A similar cam on the opposite side vibrates or moves the arbor roll **25** in the opposite direction but any suitable means may be employed for imparting vibration, if desired, to the burnishing roll. It will be understood that the transverse supporting bar **64**, which carries the supporting collar **63**, is either the same supporting bar that forms the fulcral support for the arms **11a** which support the burnishing roll, or is coaxial therewith in order that when the roll is raised to permit insertion of the cloth the vibrator mechanism above described will have a corresponding movement about the same axis.

What I claim is:

In a machine for face finishing cloth the combination with means for continuously feeding a web of cloth through the machine, of a nap raising element comprising a revoluble cylinder of unyielding material covered with crushed glass presenting projecting fine sharp points for raising and paralleling the surface fibers of the fabric, a revoluble burnishing element arranged rearwardly of the glass coated cylinder and comprising a non-abrasive cylinder of hard compressed block felt, means for presenting and supporting successive salient portions of the travelling cloth against each of said cylinders, and means for rotating said cylinders at relatively higher speed than the travel of the cloth and in the same direction whereby a fine close nap is raised on the face of the cloth and then smoothed and compressed to form a uniform light-reflecting surface.

W. N. HADLEY.