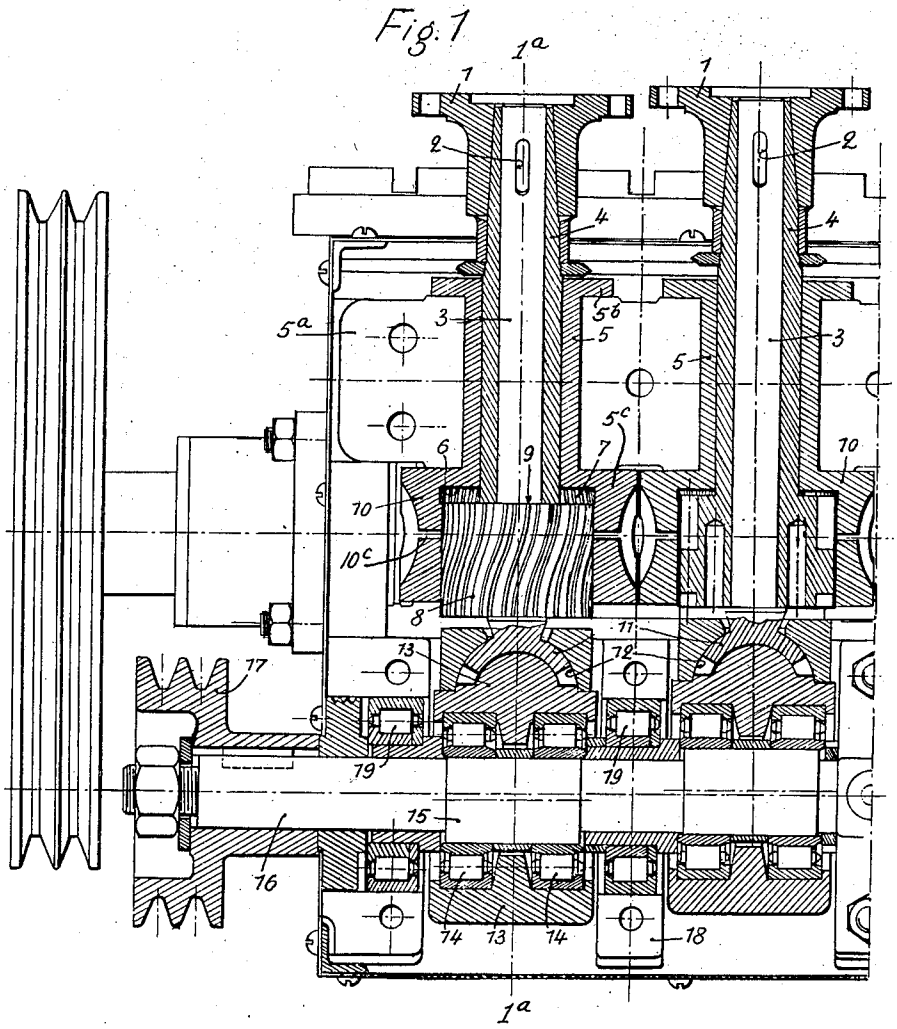
May 9, 1950 M. CASSÉ 2,506,855

ROLLER FELTING MACHINE

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Fig. 1



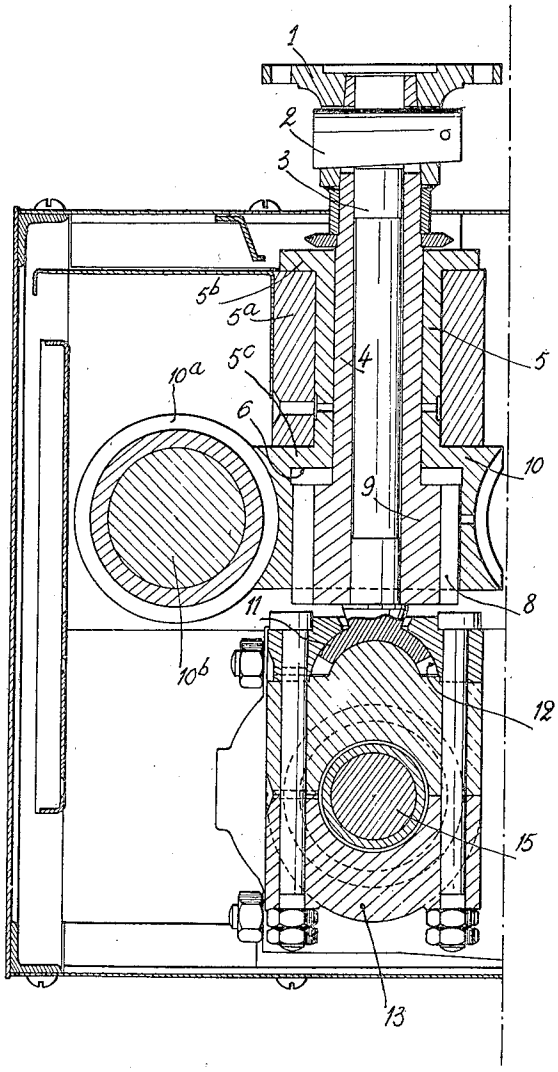
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ROLLER FELTING MACHINE

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Fig. 1a



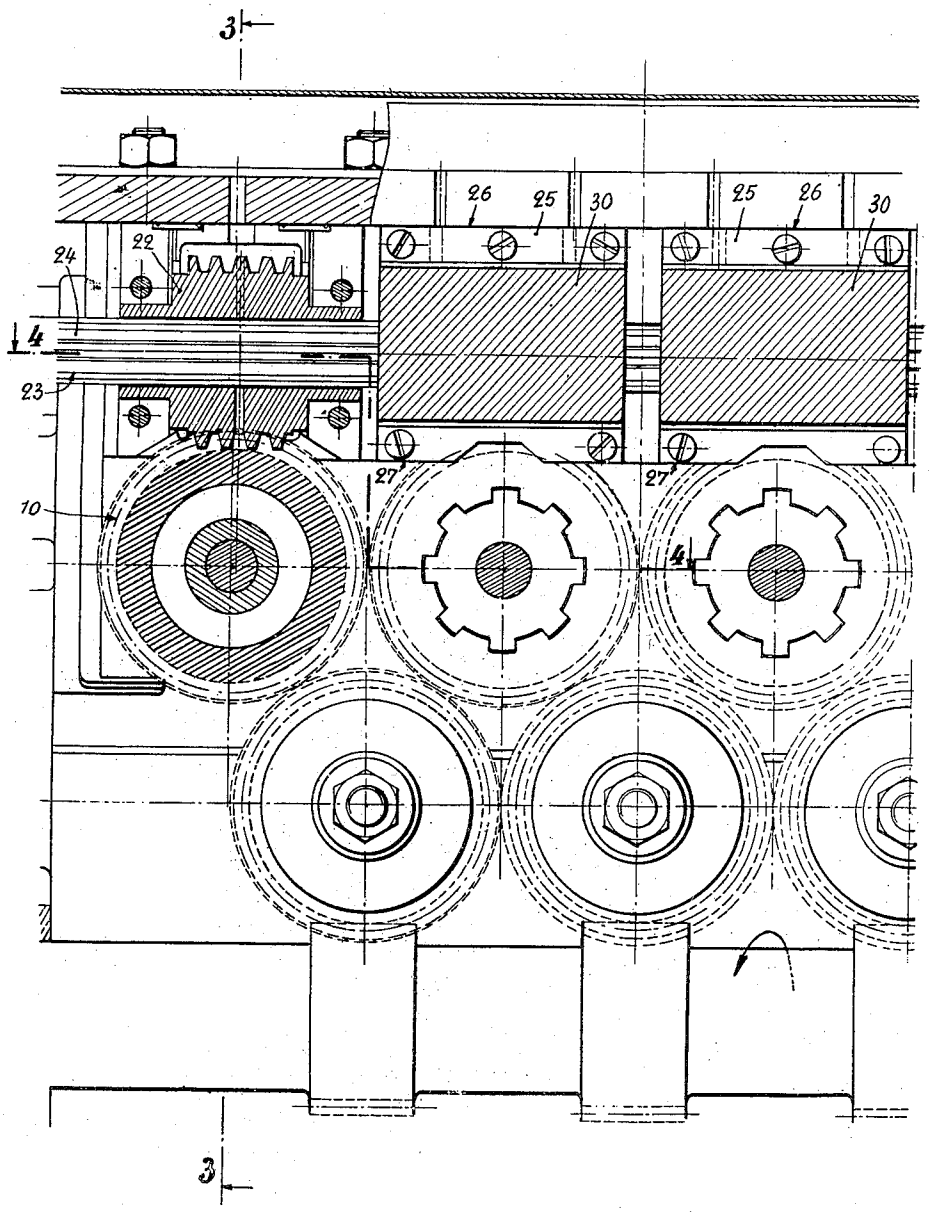
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Fig. 2



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ROLLER FELTING MACHINE

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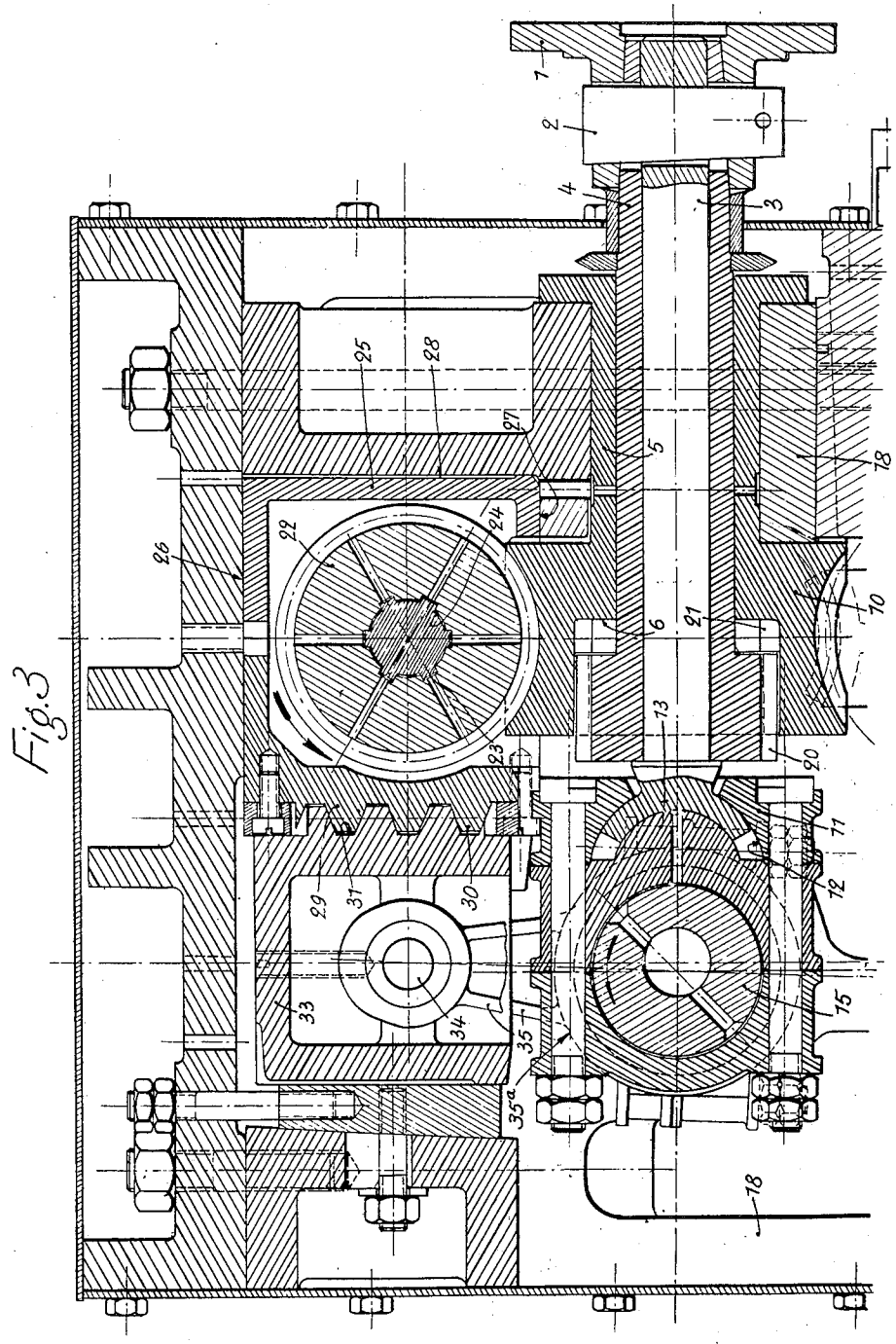


Fig. 3

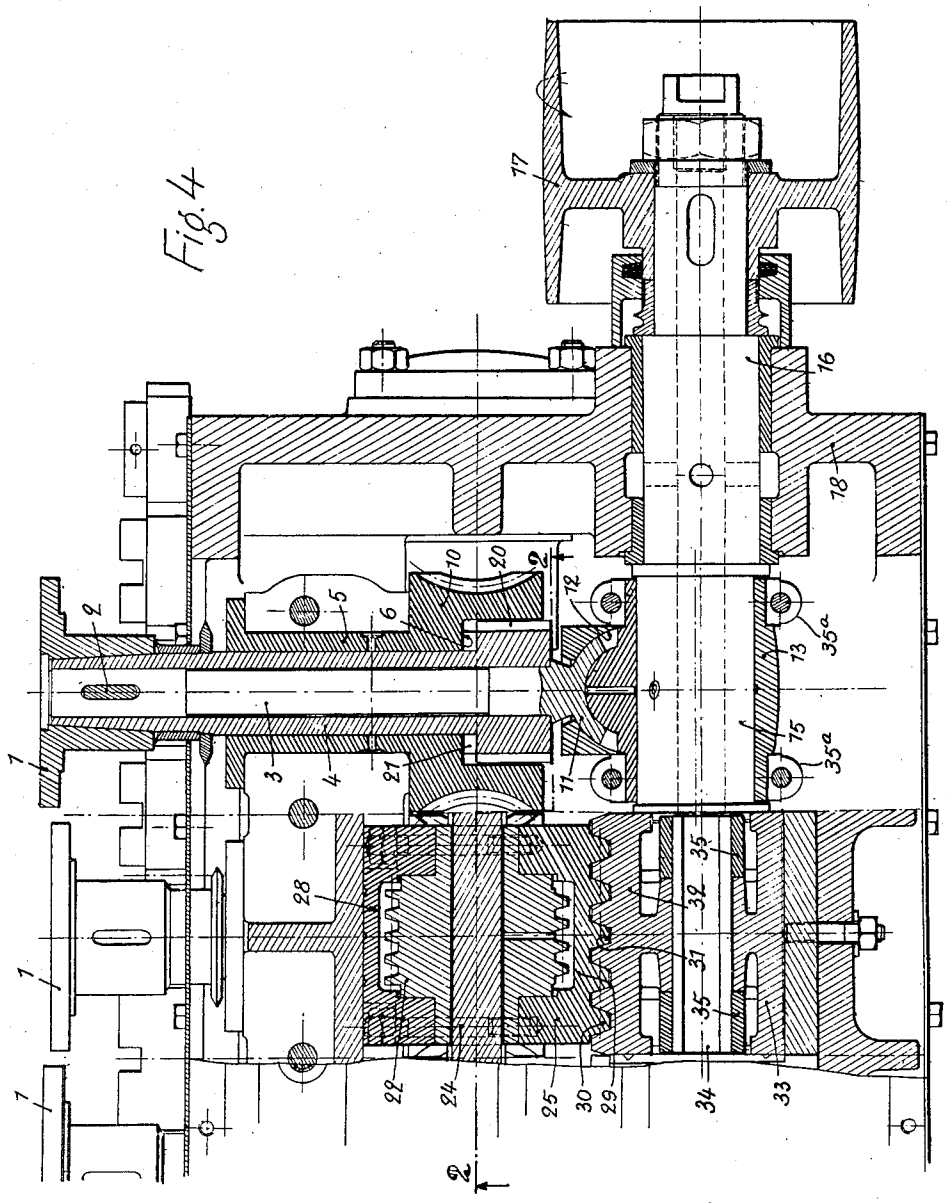
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Fig. 4



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2,506,855

ROLLER FELTING MACHINE

Marcel Cassé, Essonnes, France

Application May 8, 1946, Serial No. 668,040
In France April 14, 1944

Section 1, Public Law 690, August 8, 1946
Patent expires April 14, 1964

4 Claims. (Cl. 28—5)

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My invention relates to a felting machine of the roller type for milling felt and particularly "hoods" for the hat-manufacturing industry, comprising two superposed rows of rollers, wherein each roller of at least one row has imparted to it, in addition to the normal continuous rotary motion, a reciprocating motion parallel to its axis of rotation and an oscillatory motion about its axis, as disclosed in applicant's prior specification 2,039,709.

My invention is more specifically concerned with machines of the type in which the axial reciprocating motion of the rollers of the same row is controlled by a common shaft provided with a number of eccentric journals, one for each roller, and one object of my invention is to provide a machine of this type in which the circumferential oscillatory motion is controlled by said common shaft, thus materially simplifying the construction.

Other objects of the invention will become apparent from the following description, with reference to the accompanying drawings, which are given solely by way of example and in which:

Fig. 1 is a fragmentary horizontal section of the roller control for a row of rollers in a machine according to the invention, adapted to impart to the rollers axial and circumferential oscillations, which are in phase.

Fig. 1ª is a vertical section on line 1ª—1ª of Fig. 1.

Fig. 2 is a fragmentary vertical section, along the line 2—2 of Fig. 4 of a modification of the invention, in which the axial and circumferential oscillations are out of phase by 90°.

Fig. 3 is a fragmentary section on a larger scale along the line 3—3 of Fig. 2, and

Fig. 4 is a horizontal section along the line 4—4 of Fig. 2.

Referring to Fig. 1, I have denoted by 1 a series of flanged connectors, to which are adapted to be secured the rollers (not shown), belonging to one row of rollers of the felting machine, for example the upper row. Each flanged connector has a tubular shank keyed at 2 to the inner end of a shaft 3, which is coaxial with the roller and is rigidly secured to a bush 4, which is adapted to rotate and slide in a tubular shaft 5 rotatably mounted in a bearing 5ª, in which it is held in axial position by suitable shoulders 5ᵇ, 5ᶜ. Sleeve 5 is enlarged at one end to provide a cylindrical cavity 6, the internal cylindrical wall of which is formed with helical threads or flutes 7, engaging corresponding threads or flutes 8 of a screw 9 which is secured to or integral with bush 4

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and is housed in said cavity. The outer wall of the enlarged end of tubular shaft 5 is formed with helical gear teeth 10 meshing with a worm 10ª, cut at the periphery of a shaft 10ᵇ which is common to the various rollers and is driven in a continuous manner by any suitable conventional prime mover. Reference numeral 10ᶜ denotes radial lubricating ducts, for carrying lubricant to the outer and inner gear teeth and threads.

At its outer end, shaft 3 is formed with a spherical cup 11, housed in a spherical recess 12 of a connecting rod 13, which is mounted by means of antifriction bearings 14 on an eccentric journal 15 of a driving shaft 16, which is common to the various rollers of the same row and is driven in rotation by means of a pulley 17.

The successive journals 15 are offset by 180°, for balancing purposes. Shaft 16 is supported on the frame 18 of the machine by means of bearings 19 located at the ends of the shaft and between eccentric journals 15.

It will be understood that, in operation, three distinct motions are imparted to each roller through shaft 3, viz:

A continuous rotary motion transmitted from shaft 10ᵇ through pinions 10 and shafts 5;

A reciprocating axial motion transmitted from eccentric journal 15 directly to shaft 3;

A circular oscillatory motion which is produced by the reciprocation of shaft 3 along tubular shaft 5. In this axial movement, the internal threads 7 of shaft 5 coact with the external threads of shaft 3 after the manner of a nut along a screw, and as screw 9 is reciprocated under the action of eccentric journal 15 through the kind of ball-and-socket joint 11, 12, 13, while the nut 6, 7, is stationary in the axial direction, said nut is caused to oscillate about the axis of rotation of shaft 3, and this oscillatory motion combines with the continuous rotary motion transmitted through pinion 10.

It will be seen that in this embodiment of the invention, the axial reciprocation and the circumferential oscillation transmitted to a given roller are in phase. It will also be noted that these movements are controlled by the same shaft 16, without any transmission, thus simplifying the construction considerably and affording much higher operative speeds.

In the embodiment shown in Figs. 2 to 4, which is so devised that the reciprocation and oscillation of the rollers are out of phase, the rollers of one row are still adapted to be connected with a respective flanged connector 1, keyed to a shaft 3, extending through a bush 4, rotatable and axially

movable in a tubular shaft 5 formed with a pinion 10. Shaft 16, connecting rod 13 and the ball-and-socket connections 11 are similar to the corresponding parts of the previous embodiment. In this modification, however, the helical threads 7—8 are replaced by rectilinear flutes 20, which are cut in the outer end of bush 4 and are parallel to the axis thereof and by corresponding rectilinear flutes 21 formed in the inner wall of the cavity 6 of shaft 5, whereby shaft 3 and bush 4 are adapted to slide without rotating along tubular shaft 5.

22 denotes a worm similar to worm 10a and meshing with pinion 10. Said worm is splined at 23 on a driving shaft 24, which is parallel with shaft 16 and is common to all the rollers of the same row. Said worm 22 is enclosed and abuts at both its ends in a rectangular block 25, which is guided on three of its faces 26, 27 and 28 in the frame 18 of the machine, but is free to slide along said faces, together with worm 22, in a direction parallel to the axis of shaft 24.

The fourth exposed face 29 of block 25 is formed with oblique straight flutes 30 (the obliquity appearing in Fig. 2), engaging corresponding oblique flutes 31 cut in the face 32 of a second rectangular block 33, which is also guided on three of its faces, and is free to slide along these faces in a direction at right angles to the axis of the shaft 34. In Fig. 2, block 25 can move horizontally in the plane of the figure, while block 33 (not shown in this figure), can move vertically in the same plane. In Fig. 3, block 25 is contrived to move back and forth with respect to the plane of the figure, while block 33 is contrived to move vertically in said plane. In Fig. 4, block 25 moves horizontally in the plane of the figure, while block 33 moves back and forth with respect to the plane of the figure.

Block 33 is connected by a pin 34 and two links 35 ending in circular collars 35a to connecting rod 13, on either side of the ball-and-socket connection 11 and links 35 are so arranged that their axis, in their middle position, is substantially at right angles with the axis of shaft 3. The operation of journal 15, links 35, pin 34 and block 33 is quite similar to the operation of a piston and a crank and connecting rod conventional device.

The machine operates as follows:

Shaft 24, rotated at a constant speed by any suitable prime mover, transmits its motion to each roller through splines 23, worm 22, pinion 10, hollow shaft 5, flutes 20, bush 4, shaft 3 and flanged connectors 1.

An axial reciprocation is simultaneously imparted to the rollers, as in the case of Fig. 1, through shaft 16 and shaft 3, which latter slides along shaft 5 with which it is locked in rotation.

Moreover, the rotation of shaft 16, operatively connected by a crank and rod connection 35 with block 33, imparts to block 33 a rectilinear reciprocation in a vertical direction, along the guiding surfaces thereof. Due to the engagement of the oblique flutes 30—31 of blocks 33 and 25 and to the contrivance imposed by the guiding surfaces of block 25, the latter is caused to execute a rectilinear horizontal reciprocation, at right angles to the plane of Fig. 3. Worm 22, which is locked axially with block 25, is carried along therewith in its reciprocating motion and acts on pinion 10 as would do a rack executing a rectilinear reciprocating motion at right angles to the plane of Fig. 3. This motion imparts to pinion 10 a circumferential oscillatory motion which

combines with the continuous rotary motion also transmitted by worm 22 to pinion 10.

Worm 22 therefore performs a dual function: on the one hand it transmits its continuous rotary motion to pinion 10, and on the other hand, owing to the straight reciprocating motion which is given to it by block 25, it transmits an oscillatory motion to pinion 10. Owing to the fact that the links 35 are offset by 90° relatively to shaft 3, the two oscillatory movements are out of phase, so that when the speed of the one passes through zero upon changing its direction, the speed of the other one is a maximum.

It will be seen that owing to this construction, the two oscillatory movements are derived from one and the same shaft 16, without the intermediary of complicated gearing, the whole device forming a compact unit adjacent said shaft 16. In both embodiments of the invention, due to the arrangement of flutes 7, 8 or 30, 31, the reciprocation of the element (nut 9 in Fig. 1, connecting rod 13 in Fig. 4) of the mechanism for converting the eccentric rotation of journal 15 into an axial reciprocation of shaft 3, a periodically reversed abaxial reaction is generated in said interengaging flutes by the reciprocation of said element, which causes a rotary oscillation of gears 10.

Of course, the invention is in no way limited to the embodiments illustrated and described which have only been chosen by way of example.

I claim:

1. In a roller felting machine, a number of aligned roller actuating members, a rotary shaft having eccentric journals, a mechanism for converting the eccentric rotation of said journals into an axial reciprocation of said roller actuating members, a gear slidably arranged upon each of said roller actuating members and rotatable therewith, rotation control means in mesh with said gears for rotating said roller actuating members, and means including elongated interengaging flutes for operatively connecting a reciprocating element of said mechanism with said gears.

2. A roller felting machine as claimed in claim 1, wherein said rotation control means for each roller actuating member includes a worm engaging the related gear.

3. In a roller felting machine, a number of aligned roller actuating members, a rotary shaft having eccentric journals, a mechanism for converting the eccentric rotation of said journals into an axial reciprocation of said roller actuating members, a gear slidably arranged upon each of said roller actuating members and rotatable therewith, rotation control means, in mesh with said gears, for rotating said roller actuating members, and elongated helical interengaging flutes for operatively connecting a reciprocating element of said mechanism with a coaxial and interfitting portion integral with said gear, whereby the periodically reversed tangential reaction generated in said interengaging helical flutes by the reciprocation of said element causes a rotary oscillation of said gears, in phase with said axial reciprocation.

4. In a roller felting machine, a number of aligned roller actuating members, a rotary shaft having two sets of eccentric journals, the eccentricity of one set being at 90° with respect to the eccentricity of the other set, a mechanism for converting the eccentric rotation of one set of eccentric journals into an axial reciprocation of said roller actuating members, a gear splined upon each of said roller actuating members, an actuating shaft, worms splined upon said shaft and

respectively engaging said gears for rotating said roller actuating members, slidable blocks engaging the respective worms, means for guiding each slidable block in a direction parallel with said actuating shaft, actuating blocks having oblique flutes engaging corresponding flutes of the respective slidable blocks, means for guiding each actuating block in a direction at right angles with said actuating shaft and a mechanism for converting the eccentric rotation of the other set of eccentric members into a reciprocating motion of said actuating blocks along their respective guiding means.

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