United States Patent

[11] **3,625,148**

[72] Inventors **Miloslav Muselik**
Ricmanice;
Antonin Svoboda, Adamov, both of
Czechoslovakia

[21] Appl. No. **852,569**
[22] Filed **Aug. 25, 1969**
[45] Patented **Dec. 7, 1971**

[73] Assignee **Adamovske strojirny narodni podnik**
Adamov, Czechoslovakia

[54] **DEVICE FOR AXIALLY MOVING FLUID-DISTRIBUTING ROLLERS**
5 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **101/348,** 29/115, 74/22, 101/DIG. 14
[51] **Int. Cl.** **B41f 1/46,** F16h 25/12
[50] **Field of Search** 101/DIG. 14, 348, 349; 74/22

[56] **References Cited**

UNITED STATES PATENTS

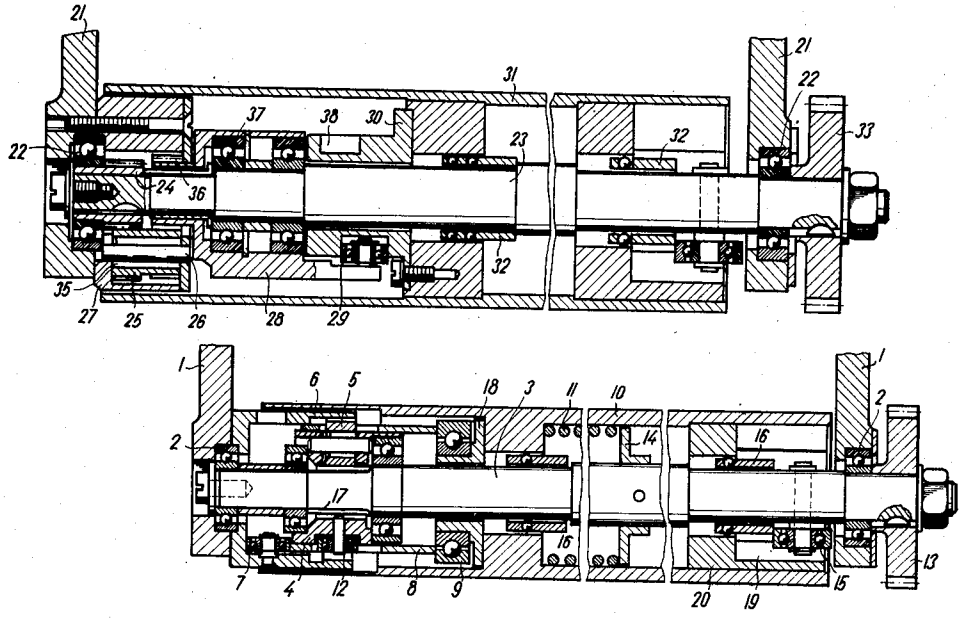
378,344	/1888	Thomson	101/348
1,849,868	3/1932	Einstein	74/22 X
2,040,331	5/1936	Peyrebrune	101/348
2,184,552	12/1939	Hinsky	101/37
2,608,354	8/1952	Whittaker	74/22 X
2,697,983	12/1954	Taylor	101/348
3,161,241	12/1964	Allen et al.	74/22 X
3,389,449	6/1968	Fyfe	101/348 X
3,452,673	7/1969	Gegenheimer et al.	101/349

FOREIGN PATENTS

934,862	11/1955	Germany	74/22

Primary Examiner—Clyde I. Coughenour
Attorney—Richard Low

ABSTRACT: In a drive for the fluid-distributing roller of a printing press, the roller can be used for distributing either moisture or ink and, in addition to rotating about its axis, is required to be axially reciprocated. The distributing roller coaxially surrounds a drive shaft with which it rotates but with respect to which it can be axially reciprocated. Housed within the roller and surrounding the drive shaft is a step down transmission driven by the drive shaft and driving a cam assembly which is also situated within the distributing roller between the latter and the drive shaft. The cam assembly is driven by the stepdown transmission to provide for the distributing roller lateral movement cycles each of which includes axial movement first in one direction and then in the opposite direction. Each of the lateral movement cycles takes place during a time when the distributing roller and drive shaft both rotate through more than one revolution.



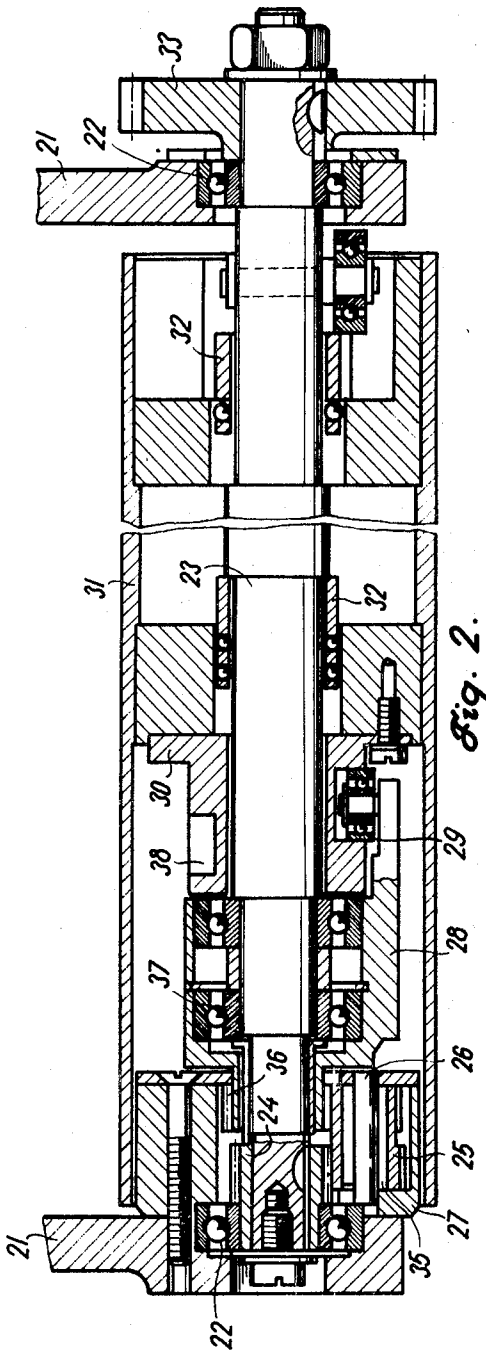

33
21
22
32
31
23
32
30
38
29
37
28
36
26
24
25
27
35
21
22

Fig. 2.

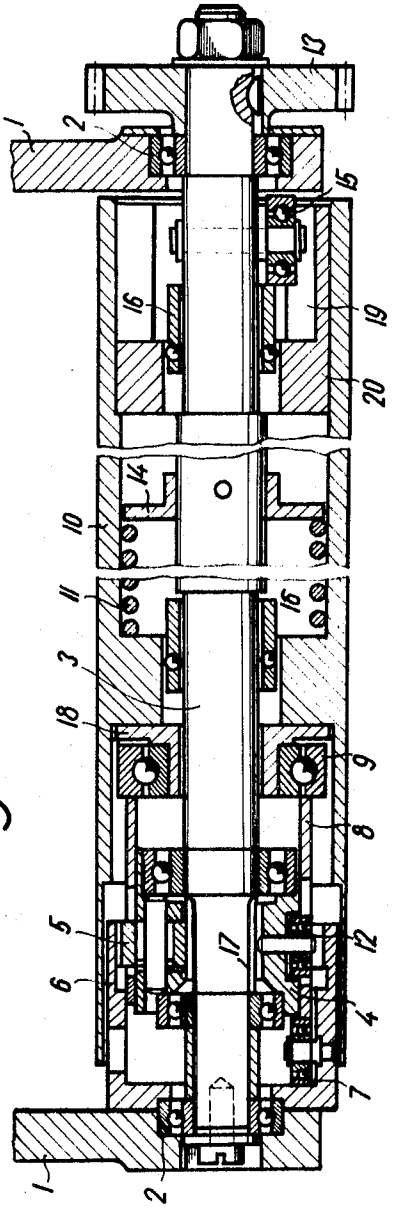

13
1
2
15
16
19
20
14
10
11
16
3
18
9
8
5
17
12
6
4
7
1
2

Fig. 1.

DEVICE FOR AXIALLY MOVING FLUID-DISTRIBUTING ROLLERS

BACKGROUND OF THE INVENTION

The present invention relates to printing presses and in particular to a device for axially reciprocating a rotary fluid-distributing roller used for distributing moisturizing liquid or ink in moisturizing mechanisms or inking mechanisms of printing presses.

Up to the present time known devices for laterally or axially moving such distributing rollers in printing machines have included mostly a cam and lever mechanism, or they make use of inclined rollers coacting with supporting rollers which are connected to the distributing roller. Also use is sometimes made of an inclined ring which is provided with a keyway and a small ball.

One of the disadvantages inherent to these known devices is a defective and nonuniform feeding of moisturizing liquid to the moisturizing rollers which then, because of the deficiency in the moisturizing liquid, take up printing ink from the printing plate and soil those locations which are not to be printed. Devices with an axially shiftable distributing roller bring about, as a result of the use of fixedly arranged cams, an undesirable and much too rapid lateral or axial movement. As a result, and also as a result of the rotary movement of the distributing roller, the distributed film is defective since the excess of the moisturizing liquid collects at the edges of the roller. Thus, the edge regions of the paper sheet which is printed receive too much moisture.

In particular, during higher speed operation there are, as a result of the violent axial movements of the roller, large inertial forces which produce periodic impacts on the entire frame of the printing press and have an unfavorable influence on the quality of the printing.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a construction which will avoid the above mentioned drawbacks.

One object of the invention is to provide a fluid-distributing roller assembly capable of achieving a uniform, perfectly satisfactory distribution of a fluid, such as moisturizing liquid or printing ink.

Another object of the invention is to provide a fluid-distributing roller assembly which reciprocates axially in cycles each of which includes axial movement first in one direction and then in the opposite direction, with each of these cycles taking place during several revolutions of the distributing roller so that the axial cyclical movement takes place at a lower speed than the rotary movement of the fluid-distributing roller.

In addition, it is an object of the invention to provide a construction which will have, as compared with known constructions, a substantially reduced inertia at the end of the axial strokes where the movement of the roller is reversed.

Further, it is an object of the invention to provide a construction which will reduce to a minimum vibrations of of the printing press resulting from the periodic impacts derived from the fluid-distributing roller.

Still further, it is an object of the invention to provide a construction which enables the axial stroke through which the distributing roller moves to be increased, as compared with known constructions, particularly as a result of the relatively slow axial movement of the distributing roller, so that also in this way an improved distribution of the fluid is achieved.

According to the invention, the structure includes an inner drive shaft which is coaxially surrounded by the hollow fluid-distributing roller. While this roller is constrained to rotate with the drive shaft, it is at the same time supported for free axial movement relative thereto. A step-down transmission is driven by the drive shaft and housed at least partly within the distributing roller. The step-down transmission is operatively connected with a camming assembly, which in turn, is connected with the fluid-distributing roller to axially reciprocate the latter. Because of the reduced rate of movement of the camming assembly derived from the step-down transmission the fluid-distributing roller is axially reciprocated through cycles each of which includes axial movement first in one direction and then in the opposite direction, with the fluid-distributing roller and drive shaft both turning through more than one revolution during each lateral or axial movement cycle of the fluid-distributing roller. The step-down transmission may take the form of a planetary gear drive, or it may simply include a double gear meshing with a pair of additional gears in order to achieve a two-stage stepdown gear transmission.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a fragmentary longitudinal sectional elevation of one embodiment of a fluid-distributing assembly of the invention, the plane of FIG. 1 containing the central axis of the fluid-distributing roller; and

axis 2 is a fragmentary longitudinal sectional elevation of a second embodiment of a fluid-distributing assembly of the invention, the plane of FIG. 2 also containing the central axis of the distributing roller,

DESCRIPTION OF PREFERRED EMBODIMENTS

FIG. 1 illustrates an embodiment of the invention where a step-down transmission in the form of a planetary gear drive is used. This embodiment of FIG. 1 includes an inner drive shaft 3 journaled at its end regions in bearings 2 which are carried by sidewalls 1 of the printing press. An annular body 4 surrounds the shaft 3 and is supported for free rotary movement thereon by the illustrated ball bearings which are mounted at their inner races on the shaft 3 and which carry, at their outer races, the annular body 4. The body 4 carries an axially extending pin on which a satellite gear 5 is supported for free rotary movement. This gear 5 meshes with a gear 17 formed by teeth formed directly in the shaft 3, and a fixed gear 6 which has inner teeth and is fixed to the left wall 1, as viewed in FIG. 1. The stationary gear 6 forms an inner ring gear meshing with the satellite gear 5 which in turn meshes with the gear portion 17 of the drive shaft 3, so that as the latter rotates the gear 5 planetates around the shaft 3.

The stationary ring gear 6 carries a roller 7 which has a stationary axis extending radially with respect to the axis of the shaft 3. This roller is simply formed by the outer race of a bearing, as is apparent from the lower left region of FIG. 1. This roller 7 engages the left camming end of an elongated tubular cam 8, as viewed in FIG. 1. This left end of the cam 8 rolls on the roller 7 during rotary movement of the cam 8 about its axis which coincides with the axis of the shaft 3. The shaft 3 carries within the elongated hollow fluid-distributing roller 10 a ring 14 fixed to the shaft 3 for rotary movement therewith and pressed against by the right end of a coil spring 11 whose left end, as viewed in FIG. 1, presses against an inwardly directed flange or shoulder of the distributing roller 10 which is hollow and coaxially surrounds the shaft 3 so as to form a housing for the various components housed between the roller 10 and the shaft 3 in the manner shown in FIG. 1. The end of the inwardly directed flange of roller 10 opposite to that end thereof which is engaged by the spring 11 is engaged by a ring 18 that is freely shiftable axially along the shaft 3 and that presses against the inner race of a ball bearing 9 whose outer race presses against the right bearing end of the tubular cam 8.

The rotary body 4 which carries the satellite gear 5 also carries, on a radially extending pin, a roller 12 which is received in an axial slot formed in the cam 8 so that the latter cam will be axially movable with respect to the roller 12, in the form of a ball bearing, while at the same time rotary movement of the body 4 is transmitted to the cam 8 through the roller 12.

The elongated hollow fluid-distributing roller **10** is itself supported for rotary movement on bearings **16** which surround and are carried by the shaft **3**. At its right end, as viewed in FIG. **1**, the shaft **3** is keyed to a driving pinion **13** driven from any suitable drive transmission. Also, the shaft **3** fixedly carries a radially extending pin on which a roller **15**, in the form of a ball bearing is mounted. This roller **15** is received in an axial groove **19** formed in a sleeve **20** which is situated in the interior of and fixedly carried by the hollow distributing roller **10**, so that through the roller **15** rotary movement of the shaft **3** is transmitted to the sleeve **20** and from the latter to the roller **10**. Thus, it is clear that with this construction the roller **10** will necessarily rotate together with the shaft **3** while at the same time being free to move axially with respect thereto.

The above described structure of FIG. **1** operates in the following manner:

The rotary movement of the shaft **3** is derived from an unillustrated driving mechanism which transmits rotary movement to the driving pinion **13**. The teeth **17** of the shaft **3** mesh with the satellite gear **5** which in turn meshes with the inner teeth of the stationary ring gear **6** so that the satellite **5** rides along these inner teeth and planetates about the shaft **3**. This construction forms a step-down transmission with the satellite gear **5** turning the body **4** around the shaft **3** at a speed of rotation substantially less than the speed of rotation of shaft **3**. The roller **12** carried by the body **4** transmits this slower rotary movement to the rotary cam **8** whose left camming end, as viewed in FIG. **1** moves along the roller **7** so that the cam **8** will reciprocate axially. Thus, during the rotary movement of the tubular cam **8** this cam acts through bearing **9** and the ring **18** on the roller **10** to shift the latter to the right, as viewed in FIG. **1**, up to the right end position, while during the continued movement of the components the spring **11** will expand to return the roller **10** back to its left end position, also as viewed in FIG. **1**, the spring **11** acting to maintain the camming end of the tubular cam **8** in engagement with the roller **7**.

In this way the distributing roller **10** will be axially reciprocated back and forth through cycles each of which includes first movement in one axial direction and then movement in the opposite axial direction. At the same time the roller **10** is rotated at the same speed as the shaft **3** by way of the transmission **15**, **19**, **20**, and the bearings **16**, of course, permit the roller **10** to reciprocate axially. The rate of axially reciprocation of the roller **10** is substantially less than the speed of rotation of the roller **10**.

The embodiment of the invention which is illustrated in FIG. **2** utilizes a two-stage step-down transmission rather than a planetary step-down transmission. The embodiment of FIG. **2** includes a shaft **23** journaled in bearings **22** which are carried by sidewalls **21** of the printing press. The right end of the shaft **23**, as seen in FIG. **2**, fixedly carries the driving pinion **33**. At its left end region, the shaft **23** is keyed to a gear **24** which rotates with the shaft **23**. The gear **24** meshes with one of the gear portions of a double, step-down gear **25**. The gear **25** of the step-down transmission is supported for rotary movement by a needle bearing **35** which in turn is carried by a pin **26** that is fixed to a gear unit **27**. The double gear **25** has its gear portion of smaller diameter meshing with an output gear **36** of the step-down transmission.

The gear **36** is fixed to a rotary body **28** which surrounds the shaft **23** and which is supported for free rotary movement with respect thereto by bearings **37** carried by the shaft **23**. The rotary body **28** fixedly carries a radially extending pin on which a camming roller **29**, in the form of a ball bearing, is mounted. This camming roller is received in a helical or spiral camming groove **38** which is formed in the cam **30** that surrounds the shaft **23**. The cam **30** is fixed to an elongated hollow fluid-distributing roller **31**.

The fluid-distributing roller **31** is supported for free rotary movement on bearings **32** which also support the roller **31** for the axial movement with respect to the shaft **23**. These bearings **32** are carried by and surround shaft **23**. The ring in the interior of the roller **31** to which the cam **30** is fixed is itself fixed to the roller **31**, and the right portion of the roller **31**, as viewed in FIG. **2**, is acted upon by the same structure as shown at the right portion of the roller **10** of FIG. **1** for the purpose of providing between the shaft **23** and the roller **31** a transmission which will rotate the roller **31** together with the shaft **23** while freeing the roller **31** for free axial reciprocation with respect to the shaft **23**.

The embodiment shown in FIG. **2** operates as follows:

The shaft **23** is driven from the driving mechanism which rotates the pinion **33**. At the same time, the gear **24** rotates together with the shaft **23** and drives the double gear **25** of the gear unit **27**. The double gear **25** in turn rotates the gear **36** with which it meshes, and the gear **36** is fixed to the body **28** so as to rotate the latter. As a result of this stepdown transmission, the body **28** rotates at a speed which is less than the speed of rotation of the shaft **23**. The camming roller **29** rotates with the body **28**, with the axis of the roller **29** remaining in a stationary plane which is normal to the axis of the shaft **23** so that the camming roller **29** coacts with the camming groove **38** to displace the cam **30** axially back and forth through cycles each of which includes movement first in one axial direction and then in the opposite axial direction. Of course, these cycles of axial movement are also carried out by the distributing roller **31**. As a result, in this case also the fluid-distributing roller **31**, while rotating together with the shaft **23**, will reciprocate axially through cycles with the shaft **23** and the roller **31** turning through more than one revolution during each cycle of axial reciprocation of the roller **31**.

We claim:

1. In a printing press, a rotary drive shaft, a hollow fluid-distributing roller coaxially surrounding and spaced from said shaft, bearing means supporting said roller on said shaft for axial movement relative thereto, means rotating said roller with said shaft while freeing said roller for axial movement with respect to said shaft, a step-down transmission means housed at least partly within said roller and driven by said shaft to have an output speed which is less than the speed of rotation of said shaft, and cam means housed within said roller and rotatable about the axis of said shaft, said cam means being driven by said step-down transmission means and having an axial end face operatively connected to said roller for reciprocating the latter axially along said shaft through lateral movement cycles each of which includes movement of said roller axially first in one direction and then in an opposite direction while providing for each lateral movement cycle a time during which said roller and shaft rotate through more than one revolution.

2. The combination of claim **1** and wherein said step-down transmission means includes a stationary inner ring gear surrounding said drive shaft and extending into said roller, a satellite gear meshing with said ring gear, means supporting said satellite gear not only for movement about its own axis but also for free rotary movement about the axis of said drive shaft while riding along said stationary ring gear, and said shaft fixedly carrying a gear of said step-down transmission which meshes with said satellite gear.

3. In a printing press, a rotary drive shaft, a hollow fluid-distributing roller coaxially surrounding and spaced from said shaft, bearing means supporting said roller on said shaft for axial movement relative thereto, means rotating said roller with said shaft while freeing said roller for axial movement with respect to said shaft, a step-down transmission means housed at least partly within said roller and driven by said shaft to have an output speed which is less than the speed of rotation of said shaft, said step-down transmission means includes a stationary inner ring gear surrounding said drive shaft and extending into said roller, a satellite gear meshing with said ring gear, means supporting said satellite gear not only for movement about its own axis but also for free rotary movement about the axis of said drive shaft while riding along said stationary ring gear, and said shaft fixedly carrying a gear of said step-down transmission which meshes with said satellite

gear, and cam means housed within said roller, said cam means includes an elongated hollow tubular cam surrounding said drive shaft between said roller and drive shaft and formed with an axial slot, said means which supports said satellite gear for rotation about said drive shaft carrying a member received in said slot of said tubular cam to rotate the latter at the same speed that said satellite gear planetates around the axis of said drive shaft, said tubular cam having a camming end and an opposed bearing end, a cam roller having a stationary axis extending radially with respect to said drive shaft and engaging said camming end of said tubular cam, a bearing carried by said hollow roller in the interior thereof and engaging said bearing end of said cam so that the latter can turn at a slower speed than said roller, and spring means acting on said roller to urge the latter bearing into engagement with said cam, so that through said cam said roller is displaced on one axial direction while said spring means returns said roller in the opposite axial direction.

4. In a printing press, a rotary drive shaft, a hollow fluid-distributing roller coaxially surrounding and spaced from said shaft, bearing means supporting said roller said shaft, bearing means supporting said roller on said shaft for axial movement relative thereto, means rotating said roller with said shaft while freeing said roller for axial movement with respect to said shaft, a step-down transmission means housed at least partly within said roller and driven by said shaft to have an output speed which is less than the speed of rotation of said shaft, wherein said step-down transmission includes a gear fixed to said drive shaft for rotary movement therewith, a double gear having a driven gear portion meshing with said gear which is fixed to said drive shaft and a driving gear portion coaxial with said driven gear portion thereof, and cam means housed within said roller, said cam means including a rotary sleeve freely turnable on said drive shaft between the latter and said roller and carrying a gear which meshes with said driven gear portion of said double gear to be driven through said step-down transmission at a speed of rotation smaller than that of said drive shaft, said sleeve carrying a cam roller whose axis extends radially with respect to said drive shaft, so that said cam roller rotates around said drive shaft at a speed less than the speed of rotation thereof, and said cam means including an annular cam coaxially surrounding said drive shaft and fixed to said roller for rotary movement therewith.

5. The combination of claim 4 and wherein said cam has an exterior periphery formed with a spiral cam groove which receives said cam roller so that during relative rotation between said cam and cam roller said fluid-distributing roller will be axially reciprocated with respect to said drive shaft.

* * * * *