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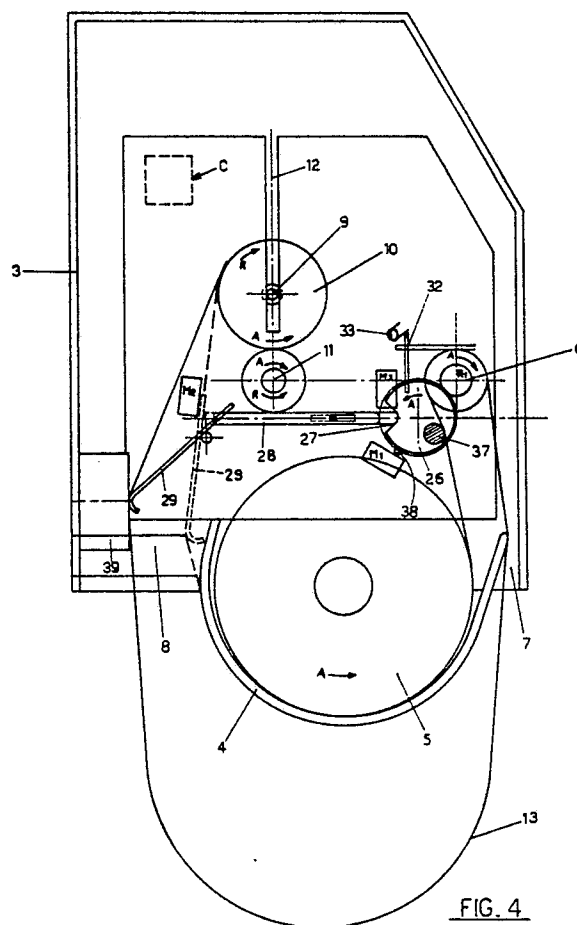
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54 **An automatic dispenser of rolled paper.**

57 An automatic rolled-paper dispenser is disclosed which utilizes one single rotor (14) for causing motions of two driving rollers (6 and 11) via a kinematic chain. The kinematic chain includes a driving pinion (15) meshing with a driven wheel (16) which in turn meshes with an orthogonal pair (17, 18) to drive a shaft (19) therethrough.

The shaft (19) is provided with two helices or screws (20 and 21) driving respective gear wheels (22 and 23) carried by the driving rollers (11,6) respectively, the screw (20) being keyed on the shaft (19) while the screw (21) is secured thereto so as to be driven in rotation only for a given sense of rotation of the shaft (19).

FIG. 4 is proposed for publication with the abstract.



AN AUTOMATIC DISPENSER OF ROLLED PAPER

This invention relates to an automatic dispenser of a rolled paper, particularly for use as a towel, of the type in which a given amount of paper is dispensed when required by an user, the supplied paper being then caused to rewind up after a predetermined time.

Though only rolled paper is mentioned above, and will be referred to in the following for the sake of simplicity, it is to be understood that the invention also applies to the case when an other material, such, for example, as a fabric is employed than paper.

Automatic rolled-paper dispensers are already known.

They comprise a housing in which a roll of paper to be delivered is located; an edge part of the paper is passed through appropriate outlet and inlet openings and is re-wound around an axis or re-winding drum. In order that paper is dispensed, two driving rollers are provided and are connected to the roll of paper to be supplied and the re-winding drum respectively; these latter run-off each a given amount of paper to form a paper loop beneath the dispenser; after a predetermined time is elapsed, the driving roller connected to the re-winding drum is rotated in an opposite sense, with respect to its preceding sense of rotation, thereby causing the supplied paper to re-wind up.

These prior known dispensers usually use two motors for individually and selectively operating each of said driving rollers. Said motors are self-operating units so that they require separate controls, which makes the dispenser complicated in construction and, thus, more expensive.

Moreover, as mentioned above, said motors operate in a selective manner as a result of which the paper dispensing time is equal to the sum of the rotation times of two motors.

The above disadvantages are obviated by this invention which provides an automatic rolled-paper dispenser utilizing one single motor to drive simultaneously both said driving rollers during the paper dispensing step, and to operate only the re-winding roller during the paper re-winding step.

By the use of one single motor in the dispenser of this invention, the dispenser is considerably simplified in construction and, as a result, its cost is reduced, which is mainly due to the fact that there is only one motor to be controlled rather than two.

Thus, the automatic rolled-paper dispenser of this invention is particularly characterized in that it utilizes a single rotary motor whose pinion meshes with a driven wheel that in turn meshes with an orthogonal gear pair to drive therethrough a shaft carrying two helical toothings or screws, one of these screws being keyed on said shaft and the other screw being secured in such a manner thereto as to be driven in rotation only when the shaft is rotated in one of the two possible senses of rotation thereof, said screws being in mesh with respective wheels that are keyed on driving rollers controlling the supply and the re-winding of the paper, means being provided to cause said single motor to start, to stop and to invert its motion.

According to further teachings of this invention, at least one of said two driving rollers is so designed as to enable an appropriate sensor cooperating therewith to impart the necessary contact adherence to the paper running over said roller as well as to signal exhaustion of the paper roll and to cause automatic complete re-winding of a free portion thereof.

The above and other features of the automatic rolled-paper dispenser of the invention will be better understood when reading the following detailed description made in connection with the accompanying drawings which shown, by way of example, one preferred embodiment thereof and in which:-

-Figure 1 is a partial side view of an automatic rolled-paper dispenser according to the invention with the outer housing removed therefrom;

-Figure 2 is a partial side view schematically showing the dispenser in figure 1 as seen from an opposite side to that of figure 1;

-Figure 3 is a partial view of the dispenser in figure 1 as seen from the above;

-Figure 4 is a side view similar to that of figure 1, with the different parts being shown schematically and superposed to one another to facilitate description of the dispenser operation.

With reference to the above figures, an automatic rolled-paper dispenser according to the invention is shown to include an internal stationary framework having two sidewalls 1 and 2 and an outer housing 3, shown in figure 4.

Secured to the dispenser framework is a cradle-like housing 4 designed to receive a roll 5 of a paper to be dispensed. The cradle-like housing 4 is usually mounted in a pivotable manner in order to make for easy introduction of the paper roll 5.

In charging the dispenser, a free end portion or edge of the paper roll 5 is made to pass over a driving roller 6, out of a front opening 7 in the bottom of the dispenser and then introduced again into the dispenser through a rear opening 8 to be wound around an axis or drum 9 into a re-winding paper roll 10 which is constantly kept in contact with a driving roller 11 (figure 4). The re-winding drum 9 has its ends received in respective vertical open-top opening 12 formed in the sidewalls 1 and 2 of the dispenser frame.

With reference to figure 4, it is noted that in a rest condition of the device, the paper portion lying out of the dispenser, as shown by dash-line, is kept in contact with the outer surface of the cradle-shaped housing 4, while during utilization by an user, said paper portion defines a paper loop underneath the dispenser which is designated by reference numeral 13.

Firstly the construction of the automatic dispenser of the invention will be described in the following and then its operation.

Provide inside the dispenser is a rotary electric motor 14 a pinion 15 (figure 1) of which extends out of the sidewall 1 of the dispenser frame.

Reverting to figure 1, it is noted that the driving pinion 15 meshes with a driven wheel 16 that in turn is in mesh with an orthogonal pair 17, 18 to drive therethrough a shaft 19. This shaft 19 is provided near its ends with respective helices or screws 20 and 21 meshing with associated gear wheels 22 and 23 carried on said driving rollers 11 and 6, respectively. The screw 20 is keyed on shaft 19 so as to be rotated in any senses of rotation of the shaft 19, and

thus, the drive pinion 15. On the other hand, the screw 21 is by known means so secured to shaft 19 as to be rotated only in one sense of rotation of same shaft 19 and to be at rest when the shaft 19 rotates in the opposite sense.

More specifically, with reference to figure 1, when the drive pinion 15 rotates in a counterclockwise direction, that is the direction of arrow A, all of the other elements of the kinematic chain will rotate in the sense shown by arrows A. Namely, the driven wheel 16 will rotate in a clockwise direction, and the shaft 19 will be actuated in a anticlockwise direction, when viewed from the right, to cause both the screws 20 and 21 to rotate in the same sense of rotation so that these screws 20 and 21 will drive the gear wheels 22 and 23 in a clockwise direction.

On the other hand, when the drive pinion 15 is rotated in a clockwise direction, that is in the sense of arrow R, the motions will be inverted such that the driven wheel 16 is rotated in a counterclockwise direction and the shaft 19 - (again as seen from the right side, figure 1) rotates in a clockwise direction to drive only the screw 20 in the same sense of rotation, the screw 20 in turn causing the gear wheel 22 to rotate in a counterclockwise direction. In this latter case, both the screw 21 and the gear wheel 23 meshing therewith are not driven in rotation.

Referring now to fig. 2 that shows a partial view of the dispenser as seen from an opposite side to that of figure 1, the driving roller 6 extends out of the sidewall 2 of the dispenser framework and is there provided with a gear wheel 24 meshing with a gear wheel 25 pivoted on the wall 2 and carrying at its rear side a cam 26 shown in dotted line in figure 2. More specifically, the cam means 26 is a circular disk having a recess 27 on the periphery thereof. One end of a lever 28 making part of a pair of articulated levers, is pressed against the profile of the cam 26, the other lever 29 of said pair, shown in dotted line in figure 2, being arranged inside the dispenser. The lever 28 is secured to the dispenser wall 2 by means of a pivot pin 30 received in an elongated slot 31 of said lever 28. In this way, the lever 28 is able to move in a reciprocating manner, while the lever or blade 29 is able to swing about the pivot connection of the two levers.

As seen in sectional view in figure 2, fitted inside the dispenser is a square member 32 an arm of which is constantly pressed against the driving roller 6 by a spring means 33. In fact, there is a number of pressing arms, designated by reference numeral 34, that are acting on the roller 6, as shown in figure 3, all of these arms 34 being secured to the same axis 35 to which the square member 32 is secured.

As shown in figure 3, the roller 6 is provided, in the portion thereof extending between the two walls 1 and 2, with regularly spaced apart cavities 36 or zones where the roller material has been removed to reduce the roller diameter, said cavities being designed to receive said arms 34 with interposition of the paper layer.

Obviously, the outer surface of roller 6 is conveniently roughened to provide for better friction with respect to the paper run around it.

Again with reference to figure 3, it can be noted that the rear roller 11 is shown to have a configuration the same as that of roller 9, though in this case the cavities 36 could be omitted since, as distinct from the cavities 36 in roller 6, they no longer fulfil any function, as will be explained in the following. Naturally, the outer surface of roller 11 is also roughened in order to increase friction with the paper in contact therewith.

According to a further feature of the automatic rolled-paper dispenser construction of the invention, it is to be observed that a stationary axis 37, shown schematically in figure 2 and is sectional view in figure 4, is arranged between the two walls 1 and 2 and has the function of increasing tension between the paper and the roller 6.

Moreover, as shown in figure 4, arranged within the dispenser are three microswitches M1, M2, M3 that can be operated by a pawl 38 on cam 26, the blade-shaped lever 29 of the pair of articulated levers 28, 29 and the square member 32, respectively. As will be better explained below, said microswitches are able to emit signals towards a centralized electronic station schematically shown at C, figure 4, for starting, stopping and/or inverting motion of the motor 14.

Now, operation of the automatic rolled-paper dispenser of the invention will be described with particular reference to figure 4 in which, as already said, the different parts are shown schematically and/or in a superposed relationship with one another for a better understanding of the dispenser operation. In any case, reference to figures 1, 2 and 3 will permit the positions of the individual parts to be more precisely defined.

In operation, the device is supposed to start from a rest position with the lying-out portion of paper being in contact with the outer surface of the cradle-like housing 4, as shown in dotted line, figure 4.

When the user requires to use paper, he (she) operates an appropriate push-button (not shown) provided in the front of the paper dispenser thereby starting the motor 14 to cause rotation of the kinematic chain of figure 1 in the sense of arrows A. At this stage, both the driving rollers 6 and 11 will rotate in a clockwise direction so that the roller 6 will cause a portion of paper to be fed through the front opening 7 of the dispenser, while the roller 11 will cause a similar amount of paper to be fed through the rear opening 8 by partial un-winding of the re-winding paper roll 10. It is to be noted that during this paper supply stage, the driving roller 6 causes the cam 26 to perform one complete turn, the cam starting from, and stopping at, the same position it is shown to occupy in figure 4. Paper supply is arrested upon the cam 26 completing one turn since at that instant the cam pawl 38 actuates the microswitch M1 which sends a signal to station C to stop the motor 14. It is to be observed that during this paper delivery, the supplied paper runs into a paper loop 13 underneath the dispenser, as shown in solid line, figure 4, and, at the same time, the pair of articulated levers 28, 29 are moved from the dot-and-dash-line position to the solid line position where the end of lever 28 is engaged in the recess 27 of the disk or cam 26. For this position of the pair of articulated levers 28, 29, the blade-like lever 29 has performed a swinging movement about the pivot of the lever so that the end thereof is pressing the paper against a rear stationary abutment 39 of the dispenser, shown in fig. 4.

A timer means (not shown in the drawings) allows for the paper to remain in this loop-forming position a time sufficient for utilization thereof by an user, after which time the timer causes automatic re-winding of the papers by the motor 14 being started in the inverted sense of rotation.

The paper re-winding is normally faster than is the paper releasing and, at this stage, the kinematic chain rotates in the sense of arrows R. In particular, the driving roller 11 will rotate in an anticlockwise direction to cause fast re-winding of the paper roll 10 around the drum 9. During this re-winding stage the portion of paper extending out of the dispenser will return to its dash-and-dot-line position of figure 4 where the paper adheres to the outer

surface of the cradle-shaped housing 4, so that the pair of articulated levers 28 and 29 are caused to move back to their starting position as shown in a discontinued line. The paper re-winding is stopped by the blade-like lever 29 actuating the microswitch M2 which sends a signal to station C to stop the motor 14.

Then, the dispenser is ready for a further paper utilization.

As the re-winding paper roll 10 is increasing in diameter, the axis or drum 9 thereof will move up vertically along the elongated openings 12 in the sidewalls 1 and 2 of the dispenser frame.

As already said, in order to assist in achieving the required adherence of the paper to the driving roller 6, the invention provides the square member 32 whose horizontal arms 34 fit into corresponding cavities 36 in said roller 6.

According to an important feature of this invention, in addition to serve the above-mentioned purpose, the square member 32 also functions as a means for controlling the self-rewinding of the end paper portion when the paper roll 5 has runned out. In fact, when the paper roll 5 is exhausted so that paper is lacking between the drum 6 and the arms 34 pressing thereon, said arms 34 will tend, under effect of spring 33, to enter the cavities 36 in the roller 6 to cause a rotation of the square member 32 about the pivotal axis 35 (figure 2) which actuates the microswitch M3. This microswitch M3 sends a signal to the centralized station C whereupon this latter causes the paper to re-wind during a predetermined time at a high speed.

As it should be readily apparent, recharging of the paper dispenser is as follows: -the paper roll 10 is removed from the top of the dispenser by the axis 9 being caused to slide off the open-top slits 12 and a fresh paper roll 5 is fitted into the cradle-like housing 4.

From the above, it clearly appears that the automatic rolled-paper dispenser of the invention has significant advantages over the paper dispensers of the prior art, these advantages being mainly due to the fact that only one single motor 14 is used to operate the whole of the kinematic chain of the dispenser thereby eliminating the need for separate control of two individual motors, as is the case with the known types of dispensers.

Obviously, while a preferred embodiment of the automatic rolled-paper dispenser of the invention has been disclosed herein before, many changes can be made in the details of construction, as will be apparent to those skilled in the art, without departing from the spirit and scope of the invention.

Claims

1. An automatic rolled paper (5) dispenser of the closed-cycle type, that is to say of the type in which the paper, subsequent to their having run over a driving roller (6), through an outlet opening (7) of the dispenser and through an inlet opening (8) thereof, is rewound around a re-winding axis or drum (9) to form a paper roll (10) that is constantly kept in contact with a driving roll (11), characterized in that one single motor (14) is provided to transmit, through an appropriate kinematic chain, the required rotations to said driving rollers (6 and 11) for both dispensing the paper and re-winding thereof, means being provided which cause the

motor (14) to start, to stop and to invert its motion, and means being provided for pressing the paper against said driving roller (6) as well as for outputting a signal when the paper roll (5) is exhausted.

2. The automatic rolled-paper dispenser according to claim 1, wherein said kinematic chain includes a drive pinion (15) meshing with a driven wheel (16) which in turn meshes with an orthogonal pair (17,18) to drive a shaft (19) therethrough, this shaft (19) carrying near the ends thereof respective helices or screws (20,21) which in turn are in mesh with associated gear wheels (22,23) said gear wheels (22) and (23) being keyed on said driving rollers (11) and (6) respectively.

3. The automatic dispenser according to claims 1 and 2, wherein said screw (20) is keyed on the shaft (19) while the screw (21) is so secured to said shaft as to be driven in rotation only when the shaft (19) rotates in a given direction, in such a manner that during the paper dispensing step both the driving rollers (6,11) are actuated, while during the paper re-winding step, only the driving roller (11) is actuated.

4. The dispenser according to claim 1, wherein said driving roller (6), via a gear wheel pair (24, 25), causes a cam or disk (26) to turn, the disk or cam (26) having a recess (27) formed thereon, and being provided with a pawl (38) designed to actuate a microswitch (M1) that causes said motor (14) to stop.

5. The dispenser according to claim 1 and one or more of claims 2 to 4, wherein a pair of articulated levers (28,29) are provided, one end of the first lever of said pair being able to fit into said recess of the cam (26) when this latter has actuated the micro-switch (M1), while the second lever or blade (29) by its end presses the paper against a stationary abutment (39).

6. The dispenser according to claim 1 and one or more of the claims 2 to 5, wherein during the paper re-winding stage, said pair of articulated lever (28,29) are made to be so displaced that the lever (29) is swung about the levers' pivot such that it actuates a microswitch (M2) that causes the motor (14) to stop.

7. The dispenser according to claim 1, wherein at least one first roller (6) of said driving rollers (6,11) has grooves (36) formed therein and said paper pressing means are able to fit into said grooves.

8. The dispenser according to claims 1 and 7, wherein said pressing means are comprised of at least one square member (32) an arm (34) of which is acted upon by a spring (33) tending to push it towards one of said grooves (36) of roller (6), in such a manner that upon the paper roll (5) being exhausted, said arm (34) enters the corresponding groove (36) as a result of which the square member (32) is rotated about its pivot axis (35) to actuate a microswitch (M3) that causes the out-extending portion of paper to re-wind for a predetermined time.

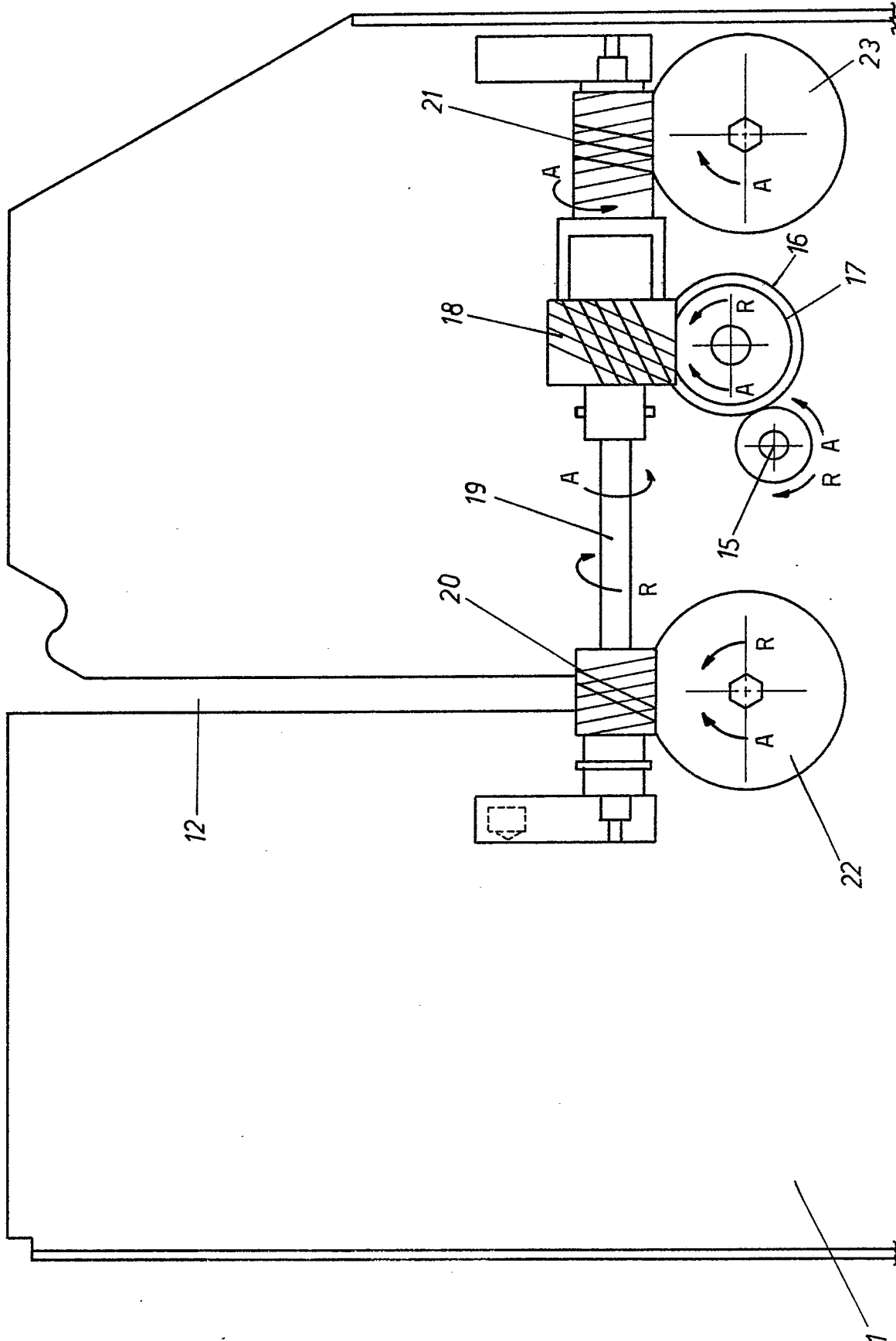


FIG. 1

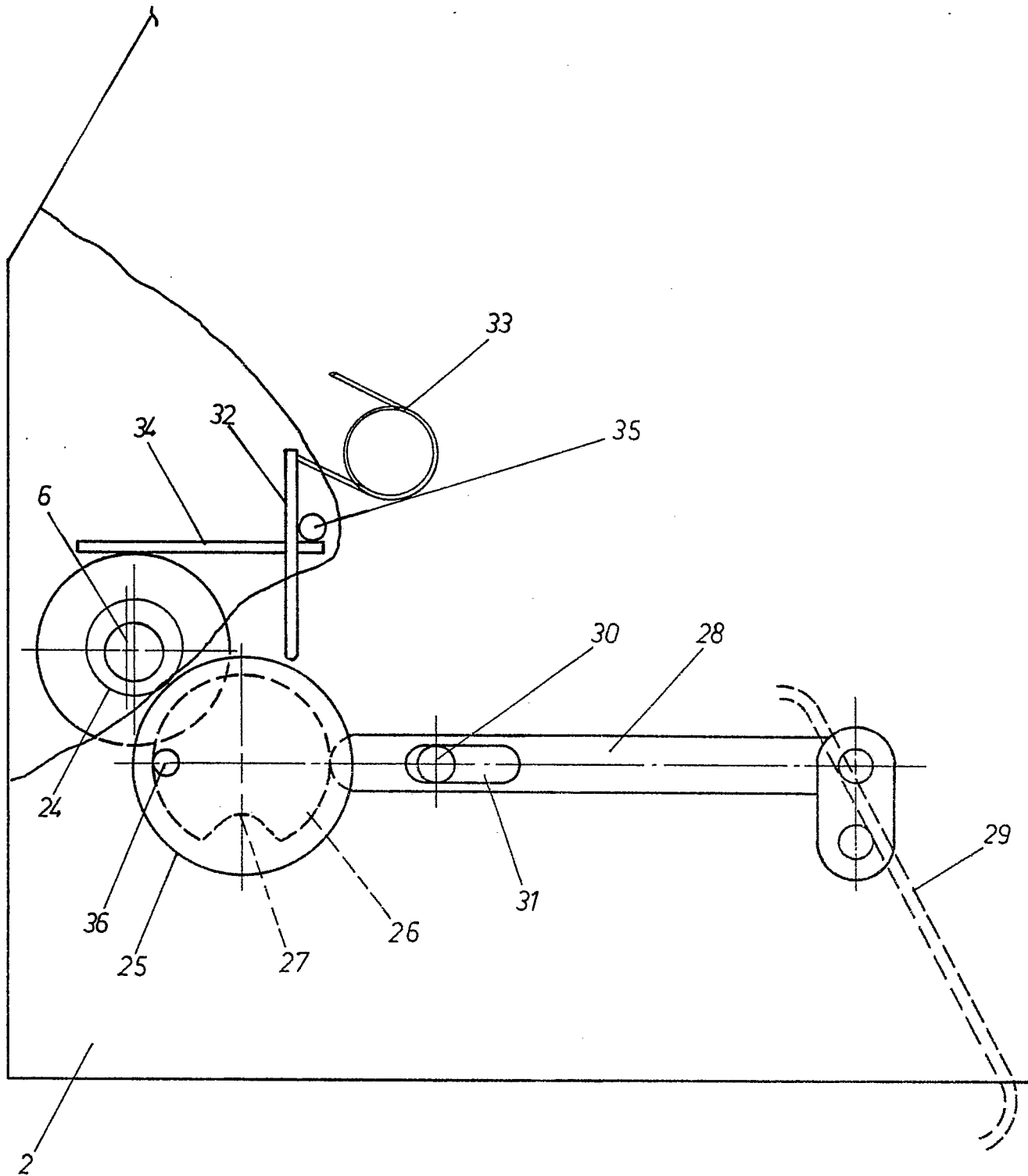


FIG. 2

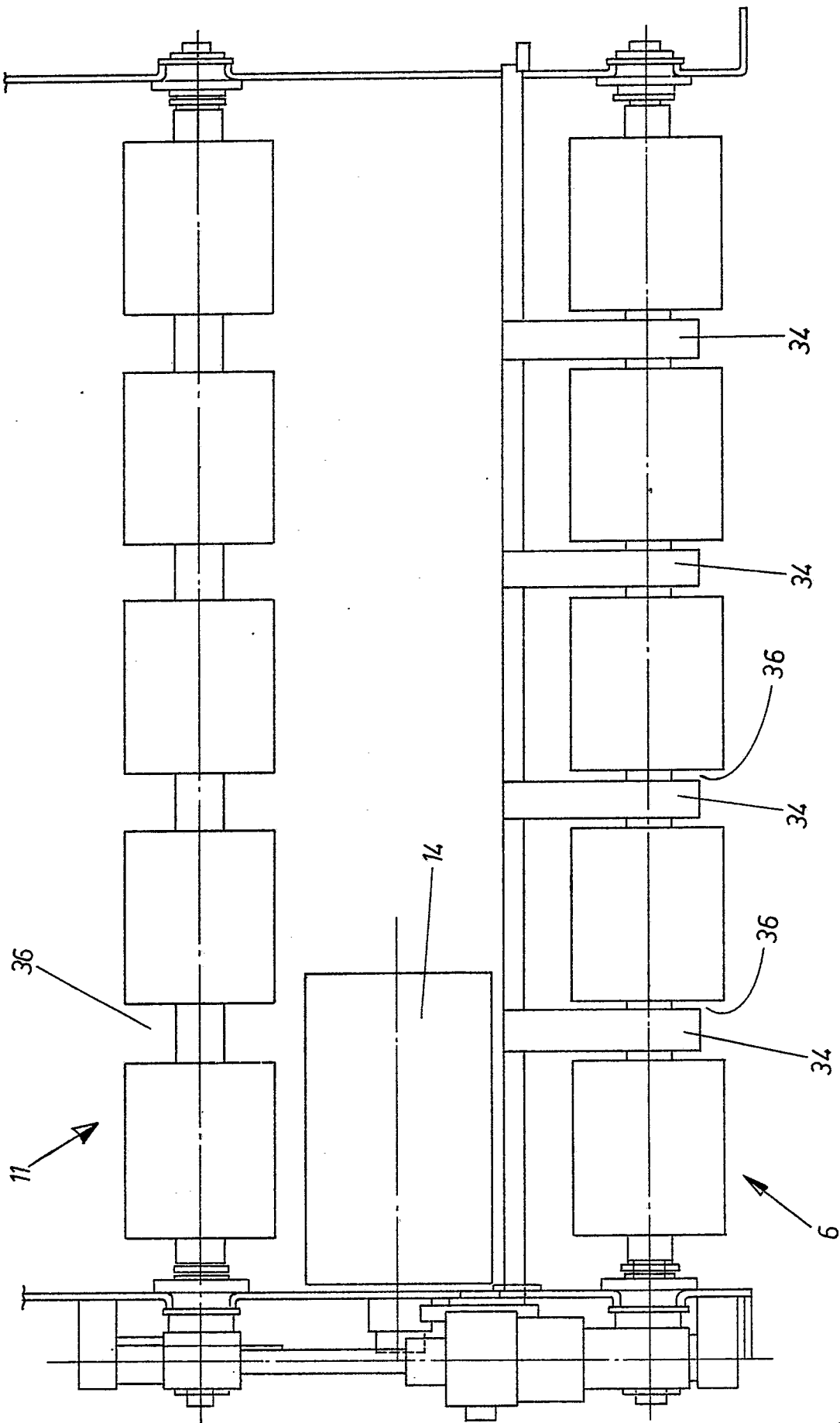


FIG. 3

