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ADVANCING THE REAMS OF PAPER IN PAPER-CUTTING MACHINES

Filed May 13, 1939

2 Sheets-Sheet 1

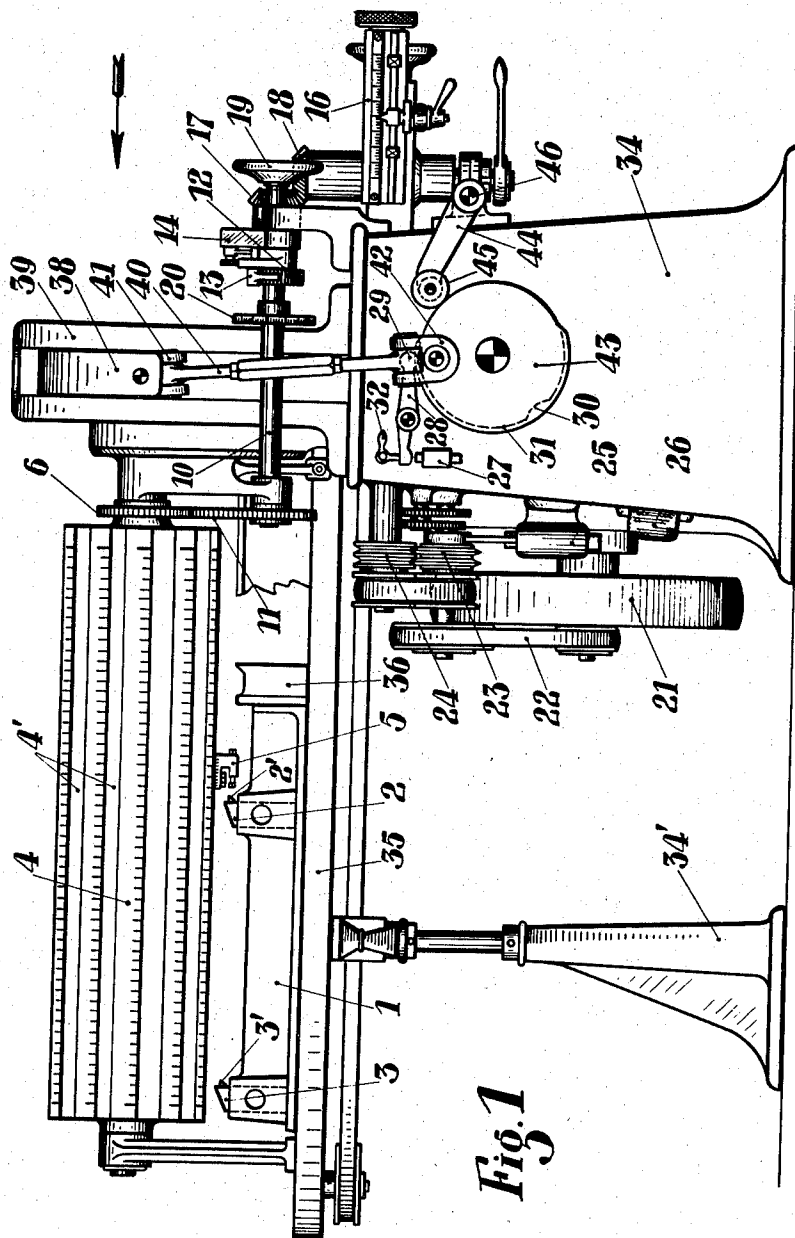


Fig. 1

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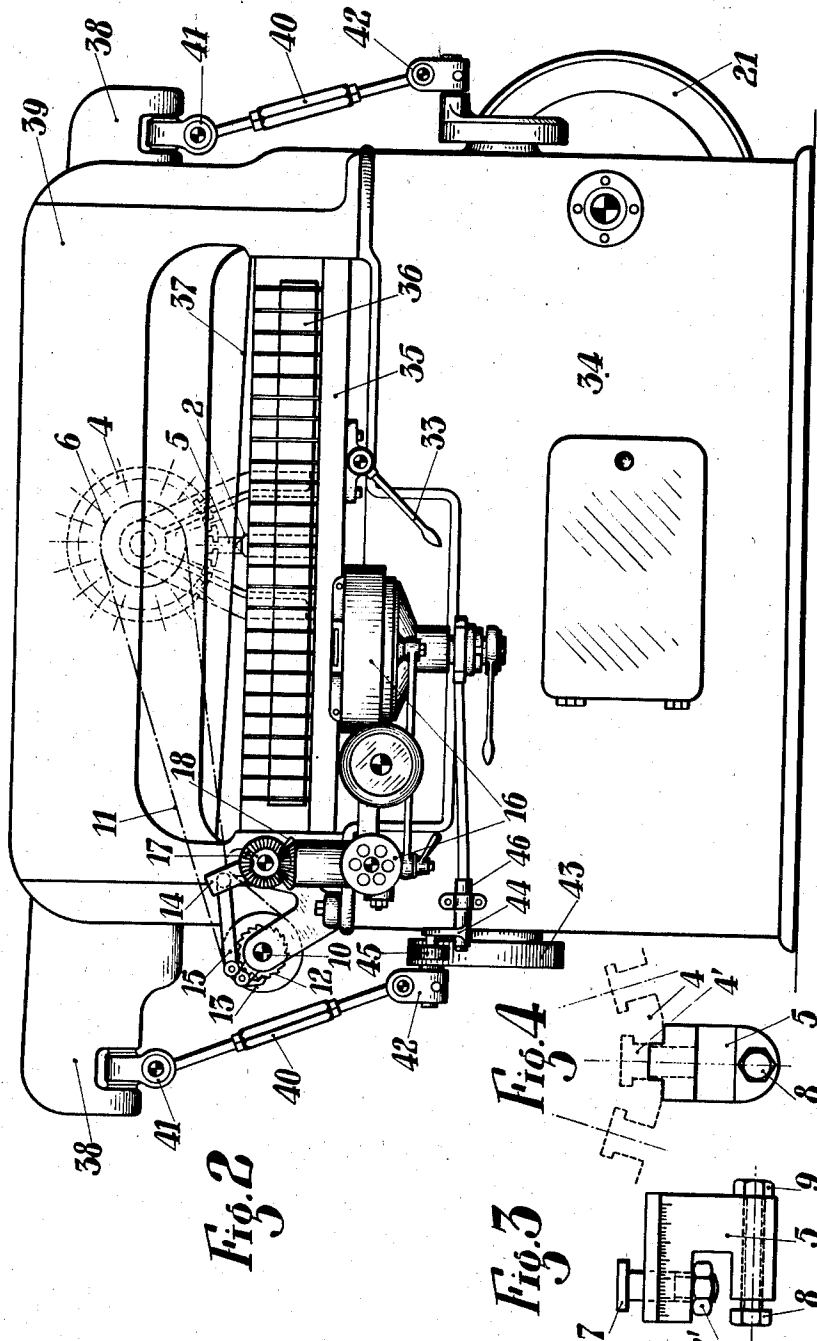
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DEVICE FOR THE AUTOMATIC PARTITION
IN VARYING DIMENSIONS, FOR ADVANC-
ING THE REAMS OF PAPER IN PAPER-
CUTTING MACHINES

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5 Claims. (Cl. 164—59)

The present invention relates to a device for the automatic partition, in varying dimensions, for the advancing of the reams of paper in the paper-cutting machine.

In the paper-cutting machines, to which the invention refers, the ream of paper to be cut is laid flat on the table of the machine, and is pushed forward by means of a mobile push-mechanism, controlled so as to bring this ream under the knife of the machine, and in the exact position required for cutting in the dimensions required.

According to the invention, this push-mechanism, intermittently displaced at each rotation of an eccentric-plate driven from the motor, is combined with a device for controlling the dimensions of the sections, and, according to one of the essential characteristics, the forward movements of this push-mechanism are synchronized with the movements of this controlling device. This latter consists of an horizontal drum perpendicular to the blade of the paper-cutter; it carries, distributed over its circumference, means for receiving and retaining, in any desired position over the length of this drum, projecting devices or dogs, which according to the angular position of the drum, come by turns and place themselves in the trajectory of projecting heads fixed to the upper side of a branch of the push-mechanism mounted mobile on the table, exactly in the axial vertical plane of the drum.

The general mechanism of control and synchronization is such that, the blade of the paper-cutter having descended to the table level (cutting movement), the said drum rotates, during the upward movement of the blade, the angle being controllable, so as to bring a new dog to its inferior part, in the axial vertical plane; after which, the pressure mechanism moves forward, pushing the ream of paper in front of it, until its head strikes against the said dog, which arrests the course of the pressure mechanism, the paper-cutter's blade being then lowered (cutting movement). The same cycle of operations is repeated each time with amplitudes of the movement of the push mechanism corresponding to the distance included between two dogs which have been brought to a stop successively.

One will understand that by a regulated control of the disposition of the dogs on the drum, combined with a controllable amplitude of each movement of rotation of the drum, one can dispose the machine so as to carry out a series of successive cuttings, of equal or different dimen-

sions, cuttings which are automatically carried out, in the required succession, just as long as the machine is in operation.

In the annexed drawing:

Fig. 1 shows a side view of the machine, showing more specially the devices of interest of the invention,

Fig. 2 is a front view, following the arrow of Fig. 1,

Fig. 3 is the side view, on a larger scale,

Fig. 4 is a front view of one of the stops.

The machine consists of a foundation frame 34—34' carrying the control devices and the horizontal table 35 on which moves from back to front and from front to back, the push mechanism 36. This push mechanism is formed of a rigid cross-piece transversal to the table; in front of it, it pushes towards the front of the machine, the ream of paper which is laid flat on the table, so as to bring it under the cutting-line, beneath the cutting-blade 37 supported by an horizontal arm 38, guided in the superior frame 39. This arm 38 is supported at either extremity by a connecting rod 40 which is articulated at the top to an eye 41 pivoting on the arm 38, and at the lower end, it is connected with another eye 42 pivoting on a cam 43 worked from the motor by intermediates not shown. This disposition is known in paper-cutting machines; at each revolution of the cam 43 the blade 37 performs a downwards movement right to the table 35 and an upward movement.

The push mechanism 36 is part and parcel of a posterior horizontal arm 1, resting on the table, and which is perpendicular to the push bar 36; this arm 1 is fitted at its upper edge with two heads 2 and 3 which stand out, but which can be made to disappear by means of a thrust exercised on their superior edge from the front towards the back, and which are brought back to their outstanding position by means of a spring which is not shown.

4 is an horizontal drum, supported at either extremity by journals so as to be at a small distance above the heads 2 and 3 which are in the axial vertical plane of this drum. The cylindrical surface of this drum possesses a certain number of radial grooves 4' which extend over the whole length of the drum, and which are uniformly distributed; these grooves (Fig. 4) have a bottom which is wider than their entrance. These grooves are graduated, over their entire length, in metrical measures. They receive dogs 5 shaped in any convenient manner; each dog is, for instance, a little bloc of metal supported by

an upper bolt 7 the head of which engages itself in the wide part of the groove 4', a bolt 7' serves to fix the dog in place in its groove, a micrometric screw 8, with a nut 9, serves for the final precise regulating of the position of the dog thanks to a millimetric graduation carried by each dog. The drum is controlled, as will be explained, so as to turn on each time for an angle equal to the angular distance between 2, 3, 4 or more successive grooves, so as to bring each time a new dog in the trajectory of the heads 2 and 3.

At one extremity, the drum carries a pinion 6 actuated by a chain 11, from the secondary shaft 10. On this shaft 10 is fixed a ratchet wheel 12 having a number of teeth equal to the number of grooves in the drum. A pawl 13 works in this ratchet wheel 12 in one direction, leaving it free in the other direction; the course of this pawl is controlled by a link 14 (Fig. 2) so as to cause the pawl 12 to move, one, two, three, or more teeth at a time. The link 14 is pivoted from the lever 15 of the divider 16 by means of the conical pinions 17 and 18. The divider itself is given an alternative rotary movement in both directions, as is known, by means of the arm 44 resting on a terminal bearing 45, on the side of the cam 43 (full lines Fig. 1); this arm is fixed on the secondary shaft 46 which transmits its oscillations to the divider by known means, not shown. At each turn of the cam 43, the drum 4 will therefore perform a revolution of the required amplitude, whereas, as stated, the paper-cutting blade performs a complete movement of rising and of stroke; the control is such that the drum begins to revolve when the blade of the paper-cutter reaches the level of the table and finishes when the blade has risen about 25 mm. During this revolution, the pressure mechanism and consequently the ream of paper are immobilised.

The secondary shaft 10 is fitted at its extremity with a hand wheel 19 by means of which the workman can bring the drum 4 back to its starting point at will and rapidly. A plate 20 graduated in as many divisions as there are grooves in the drum, is fixed on the shaft 10 and allows, by means of an index, to know at any moment the number of the dog which is going to stop the pressure mechanism 1 at a determined position.

One will understand that the drum's revolutions can be suspended at will, by lifting the pawl 13 momentarily.

The push mechanism 1 is advanced by mechanical devices not shown in detail because they are known and used in such mechanisms. These known devices consist in the wheel 21 which controls by means of a belt 22 the bearings 23. The latter, coming in contact with the grooved pulleys 24, cause these to revolve and their shaft determinates the advance of the push mechanism 1 up to the moment when the head 2 which constitutes one of the new devices of the invention, comes up against the dog 5 which has been brought in its trajectory. At this moment, there is a slight shock and the push mechanism is stopped in its forward movement, the contact between the bearings 23 and the pulleys 24 being open.

So as to prevent loss of time when starting, the contact between the bearings and the pulleys 24 is established by an electro-magnet 25; the latter is part of an electro-magnetic contactor 26. The beginning of the advance of the push mechanism, that is to say the arrival of the current in the electro, takes place when the locking

contact 27 is actuated by the lever 28, that is to say when the bearing 29 of this lever enters the recess 30 of the crank plate 31 shown by dotted lines in Fig. 1, and which is part of the cam 43. Each head 2—3 carries also a part 2'—3' projecting out on the front facing, by means of the action of a spring; when one of these heads enters in contact with a dog 5, this part 2'—3' is pushed back in the head and thus cuts the electric circuit of the electro-magnet 25 with which it is connected by any appropriate means easy to be conceived. The lock 32 allows the automatic movement of the push mechanism to be suspended, which, can then be mechanically displaced from the lever 33, as is known. This stoppage of the automatic advance may be necessary for the controlling of placing of the dogs 5 on the drum 4, or for checking the varying dimensions obtained in the cutting, without having to proceed to a trial cutting. In such a case, it is sufficient to act alternatively on the control wheel 19 of the drum 4 and on the lever 33; by lowering each time the machine's paper-press, one will be able to check the agreement of the different data of the ream to be divided and of the cutting-line.

The number of the dogs 5 which may be fixed on the drum 4 is only limited by the space required for fixing them; they are narrow enough to allow combinations for a large number of cuttings; as they can be fixed on any point of the drum, and in any number whatever, the value of the cutting-dimensions is very variable.

When the ream of paper only occupies half the depth of the table, the drum 4 is long enough to place a series of dogs towards the back, and thus to allow a series of cuttings in the other direction of the ream. The front head 2 can also be used for cuttings in one direction of the ream whereas the back head 3 could be used for cuttings in the other direction. The placing of the dogs on the drum would in this case be made by taking into account the dimensions of the ream to be divided in each of its directions and of the dimensions of each cutting.

When the reams to be divided are of large dimensions, the placing of the series of dogs is performed on the drum 4, leaving a groove free between each successive dog. The length of the drum being thus occupied by a first series, the second series will be fixed in the grooves which have been left free taking the drum from the front towards the rear. These two series of dogs mixed up amongst each other will also allow the reams to be cut in both directions with different dimensions.

When two series of dogs are mixed up, it will be necessary to cause the drum 4 to make a circular displacement of two grooves after each cutting. If the series of dogs were placed at every third groove on the drum, it would be necessary to cause the drum to make a circular displacement equal to three grooves each time, so that the drum should always find the dog of the series foreseen.

This mechanical system allows of a very great number of combinations for the most varied applications. On the other hand, the dogs being independent, each one in its respective series, they can be regulated independently without influencing the regulating of the other dogs.

Having now fully described my said invention, what I claim and desire to secure by Letters Patent, is:

1. In a paper-cutting machine of the described

type, a push mechanism to advance the ream of paper on the table towards the cutting-line, a posterior horizontal rigid bar, perpendicular to this push mechanism and being part of it, a projecting head carried by the superior edge of this bar, an horizontal revolving drum, the movement of which is intermittent and controlled, above this bar and the axis of which lies in the vertical plane of this bar, means over the entire cylindrical surface of this drum, capable of receiving projecting dogs whose positions and reciprocal distances are determined according to the dimensions of the cuttings to be carried out successively, a reciprocating cutter for cutting the paper advanced by the push mechanism, and means for periodically operating the cutter for cutting purposes and a means to cause this drum to revolve after each cutting at a predetermined angle so as to bring a new dog each time in the trajectory of the head of the said bar.

2. In a paper-cutting machine of the described type, a push mechanism to advance the ream of paper on the table towards the cutting-line, a posterior horizontal rigid bar, perpendicular to this push mechanism and being part of it, a projecting head carried by the upper edge of this bar, an horizontal revolving drum moving intermittently and controlled, above this bar and the axis of which lies in the vertical plane of this bar, longitudinal grooves over the entire length of this drum, to receive and fix, at any separations and according to any dispositions, outstanding dogs, the shaft of this drum bearing a ratchet wheel the teeth of which are equal in number to that of the grooves, and of a pawl working this wheel in one direction, this pawl having a regulable amplitude of movement, and being put in control movement as soon as the cutting has been performed, and before the advance of the push mechanism, a reciprocating cutter operating on the paper at the cutting line, and means for reciprocating the cutter.

3. In a machine for cutting reams of paper, a table to receive and support the paper, a push mechanism, means for operating the push mech-

anism to move the paper toward and into a cutting line, a cutter for cutting the paper at the cutting line, and means for reciprocating the cutter into and from the cutting line, and a control mechanism for limiting the movement of the push mechanism for selecting the length of paper to be cut, said control mechanism including a member mounted for rotation, dogs mounted for sliding movement in the member, means for fixing the dogs at predetermined positions in the member both longitudinally and peripherally, means for adjusting the member so as to dispose a selected dog in line with the push mechanism, and means on the push mechanism to engage the positioned dog to limit the operative movement of the push mechanism.

4. In a machine for cutting reams of paper, a table to receive and support the paper, a push mechanism, means for operating the push mechanism to move the paper toward and into a cutting line, a cutter for cutting the paper at the cutting line, and means for reciprocating the cutter into and from the cutting line, and a control mechanism for limiting the movement of the push mechanism for selecting the length of paper to be cut, and a control mechanism for limiting the movement of the push mechanism in its effect on the paper, said control mechanism including a cylindrical body mounted for rotation in a fixed plane, and formed with a series of longitudinally arranged channels, dogs mounted for movement longitudinally of any one or more of said channels, means for fixing the dogs in predetermined position in the length of the channel, and means carried by the push mechanism to engage a selected dog to limit the movement of the push mechanism in its adjustment of the paper.

5. A construction as defined in claim 4, including means for selectively rotating the cylindrical body to position any one of the dogs thereon in cooperative alignment with the movement of the push mechanism.

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