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DEVICE FOR CORRECTING FINELY AND WHEN WORKING THE AMPLITUDE OF THE ADVANCE MOVEMENT OF A BAND OF CARDBOARD IN A SHAPING MACHINE

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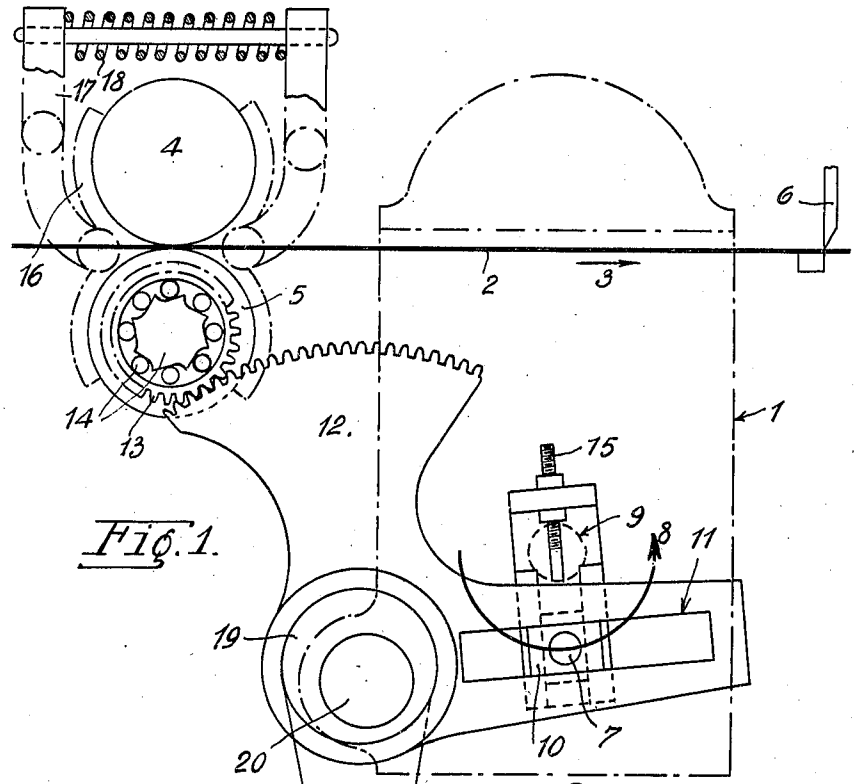


FIG. 1.

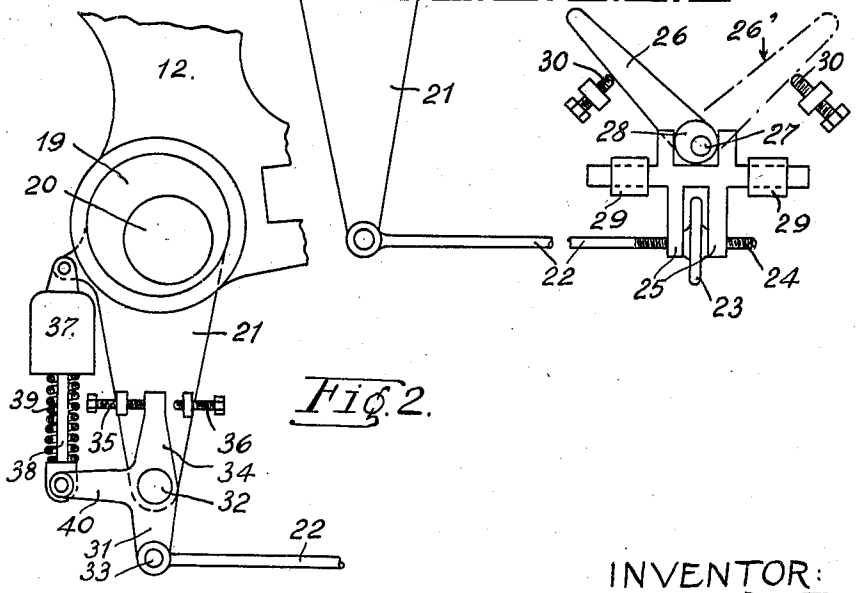


FIG. 2.

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DEVICE FOR CORRECTING FINELY AND WHEN WORKING THE AMPLITUDE OF THE ADVANCE MOVEMENT OF A BAND OF CARDBOARD IN A SHAPING MACHINE

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7 Claims. (Cl. 271—2.4)

My invention relates to a device for finely correcting and particularly during operation the amplitude of the advance movement of a band of cardboard in a shaping machine, in which said movement is controlled by a toothed sector, oscillating at an angle of oscillation that can be adjusted.

This fine correction which is effected when working of the amplitude of the advance movement of this band of cardboard is obtained according to the invention, by means making it possible to displace the axle of oscillation of the toothed sector.

The drawing shows two embodiments of the invention, given by way of example; Fig. 1 relates to the first embodiment which is shown semi-diagrammatically; Fig. 2 shows part of Fig. 1 to which has been adapted the device according to the second embodiment.

In Fig. 1 the contour in dot and dash line which is designated by the reference numeral 1, represents a press for shaping cardboard which is brought in the form of band 2 in the direction of the arrow 3, under the impulse communicated to it by two cylinders 4 and 5 between which said band passes. On coming out of the press 1, the band of cardboard can be cut by a knife 6, either immediately, or after having been subjected again to a certain number of operations under the action of tools which could be placed between the press 1 and the knife 6. The cylinders 4 and 5 cause the band 2 to advance intermittently and during the pauses, the knife 6 operates.

This intermittent advance is obtained by a mechanism consisting of a crank 7 which rotates uniformly in the direction of the arrow 8 round an axle 9 and which moves a sliding member 10 in the groove 11 of the arm of a lever which is integral with a toothed sector 12 which, thereby executes an oscillating movement. This oscillating movement communicates a rotative to and fro movement to a toothed pinion 13, which transmits motion to the cylinder 5, by means of a free wheel device 14 which acts in such a direction that motion is only transmitted to the cylinder 5 when its direction of rotation corresponds to the conveyance of the band 2 in the direction of the arrow 3, as it is not set in motion in the other direction.

By moving the crank 7 by means of the threaded rod 15, so as to draw it near or away from the axle 9, it is possible to modify the amplitude of the oscillating movement communicated to the sector 12 and thus to determine the length of the band 2 which is moved at each oscillation. It is thus possible to shape pieces of cardboard of given length corresponding to the work it is desired to execute.

As the cylinder 5 and the cylinder 4 have a certain mass, their inertia makes it necessary at the end of the oscillation to brake them if it is desired that they should stop substantially instantaneously and not continue, under the action of the impulse received to discharge more cardboard than the amount fixed. For this reason, these two cylinders are braked by means which are shown diagrammatically by the sectors 16, the levers 17 and the spring 18. Generally a mechanism is provided which has the effect of releasing the braking means during the period when the band is advancing and of applying them as soon as the sector 12 reaches the end of its course and reverses its movement.

The mechanism described up to this point is known and operates on different machines for shaping cardboard in band. It has in particular the following drawback which this invention has the object of eliminating.

The amplitude of the advance movement which is communicated intermittently to the band 2 does not remain invariable during work lasting a certain time for, owing either to the overheating of the journal boxes of the cylinders 4 and 5 and of the wear of the machine in general, or to an irregularity in the nature of the material to be worked, or to an overheating of the braking members of the cylinders 4 and 5 slight variations occur in the advance. The machine must then be stopped in order to shift the shaping members or to rectify the position of the crank 7 in the direction of the correction desired.

A variation is likewise noticed in the amplitude of the advance movement varying according to the speed of the machine, and this is easily accounted for in view of the inertia of the mechanical pieces in movement, in particular of the cylinders 4 and 5 which the braking members will not be able to stop so suddenly if they are started at high speed as if they rotate slowly. Consequently, when the machine is adjusted by making it rotate slowly, it is found that once the normal working speed has been re-established, the machine is out of order.

This disorder resulting therefrom can be fairly important and it is not unusual with pieces of cardboard discharged 30 inches in length to obtain 30.1 inches when passing from the slow regulating speed to the fast working speed. As this slight error of 0.1 inch is multiplied by the num-

ber of pieces in work between the press 1 and the knife 6, it will be seen that this error constitutes fairly important drawback, in particular if the knife 6 is at a certain distance from the press, different tools being inserted between these two members.

In order to meet the above difficulties the sector 12 rotates around a pivot 19 which is carried by an axle 20 which is itself eccentric. By causing the pivot 19 to rotate round said axle 20, the oscillation axle of the toothed sector can be displaced. But by this displacement, the distance of said oscillation axle from the axle 9 is modified and, consequently also the oscillation amplitude transmitted by the crank 7 to the sector 12. As the displacement which the eccentric pivot 19 makes it possible to communicate to the oscillation axle of the toothed sector can be very small with respect to the displacement communicated to said pivot, it is thus possible to obtain an extremely fine adjustment. It is clear that, owing to said adjustment, the engagement of the sector 12 with the pinion 13 will be a little modified, but yet to an extent which is not liable to interfere with the good working of the machine. For the correction to be effective, the oscillation axle of the toothed sector must move, in particular in a direction which is as near as possible to that of a line joining the oscillating centre of the sector to the centre of the axle 9, and for the modification in the engagement of the sector 12 with the pinion 13 to be as little as possible it is necessary to move the sector as little as possible in the direction of a line joining the oscillation centre of said sector to the axle of said pinion. In the embodiment according to Fig. 1, the arrangement adopted which, substantially, gives the best results is such that the pivot 19 is capable of being moved on either side of a middle position in which the rotation axle of the toothed sector, that of the toothed pinion with which it engages and the eccentric axle round which the pivot can rotate, are in line in a common plane.

The displacement of the pivot 19 can be effected by hand, by means of a lever 21, with which it is integral, of a system of rods 22 and of a control hand-wheel 23 acting on a threaded part 24 of this system of rods. The gearing down obtained by this arrangement makes it possible to proceed to a still finer adjustment. As the hand wheel 23 is axially retained by the abutments 25, it will clearly be seen how the rotation of the wheel will impart to the system of rods 22 an axial movement of displacement, making the lever 21 rotate simultaneously with the pivot 19 which is intended to cause the displacement of the oscillation axle of the toothed sector.

In the example shown, this simple arrangement has been completed with a lever 26 which is capable of oscillating round an axle 27 and of moving the abutments 25 by the action of an eccentric 28, said abutments being carried by a support sliding in the guides 29 in a direction parallel to the system of rods 22. It will be seen that by causing the lever 26 to pass from the position in full line to the position 26' in dot and dash line, a displacement is effected of the abutments 25, of the wheel 23, of the system of rods 22, of the lever 21, of the pivot 19 and, thereby, of the oscillation axle of the toothed sector. The amplitude of this displacement can be adjusted exactly by modifying the position of the abutment screws 30.

The utility of this perfecting of the device described consists in the fact that the whole can be so established that once one of the positions of the lever 26 has been adopted to regulate the discharge of the band of cardboard at the slow rate of work, it is only necessary to pass to the other position for the machine to maintain this regulation at the fast rate of work. The hand-wheel 23 then only serves to effect rectifications outside these two positions, rectifications which may be necessitated by causes independent of the simple change which has occurred in the working speed of the machine.

It is of course an important feature herein to control the displacement of the pivot 19 in any practical manner, while the modification in adjustment corresponding to the slow and to the fast rate of working, that is to say, the action obtained by the swinging of the lever 26 is also quite practical when it is desired to include the same.

Fig. 2 shows a modification constituting a second embodiment of the device just described. In this figure can be recognized the sector 12, shifting in position by virtue of its pivot 19 rotating or rotation of the eccentric shaft 20 caused by the modifications in angular position that a system of rods 22 can impart during operation to the lever 21. But in this figure this lever is in two pieces 21 and 31. One end of the part 21 is integral with the pivot 19, the other end is articulated at 32 at one of the ends of the part 31, the free end of which is operated at 33 by the system of rods 22. An extension 34 of this part 31 can oscillate between two adjustable abutments 35, 36. It is clear that even if, while maintaining the system of rods 22 motionless, the position of the part 31 of the lever is modified within the limits allowed by the abutments 35, 36, the part 21 of this lever is oscillated and, thereby, the position of the pivot 19 is modified and consequently, the oscillation axle of the toothed sector is moved between given limits. This arrangement can for instance replace the lever 26 of the previous example, and be used to pass instantaneously from the adjustment at the slow rate to the adjustment at the fast rate of working. In the example shown, this operation is effected electrically by means of an electro-magnet 37 which is connected to the part 21 of the lever and which acts by means of the rod 38 against the action of a spring 39 on an arm 40 of the part 31 of the lever.

The excitation of said electro-magnet can be effected as indicated above under the action of any organ of the machine with which the device co-operates.

What I claim is:

1. In a device for fine correction during operation of the amplitude of intermittent feeding movement of a band of cardboard through a shaping or pressing machine having a pair of rollers for feeding the cardboard, a pinion connected by means of a one-way clutch to one of said rollers, and a gear sector rockably mounted on the machine in permanent mesh with said pinion, with drive means for rocking or oscillating said gear sector, the combination of a shaft supporting and forming a pivotal mounting for said gear sector, said gear sector being oscillatable upon the pivotal mounting, and means for shifting said shaft eccentrically in order to vary the degree of oscillation of said gear sector, by altering the relative position of the latter with respect to the drive means therefor.

2. In a device for fine correction during operation of the amplitude of intermittent feeding movement of a band of cardboard through a shaping or pressing machine having a pair of rollers for feeding the cardboard, a pinion connected by means of a one-way clutch to one of said rollers, and a gear sector rockably mounted on the machine in permanent mesh with said pinion, with drive means for rocking or oscillating said gear sector, the combination of an eccentric forming the pivotal mounting of and supporting said gear sector, and a shifting arm rigid with said eccentric for partly rotating the same in order to vary the degree of oscillation of said gear sector, and alter its relative position with respect to the drive means therefor.

3. A device according to claim 2, wherein the eccentric axis and the axis upon which the eccentric rotates and that of the pinion with which the gear sector meshes are disposed in a single plane in the middle position of the eccentric and said gear sector.

4. A device according to claim 2, wherein manual means are included for fine adjustment of the shifting arm in order to manually produce extremely fine adjustments of the eccentric about its axis.

5. A device according to claim 2, wherein a link member is connected to the outer end of the shifting arm, and a rotatable member is screwed upon a thread on said link member and abutment means are included for determining an axially fixed position of said rotatable member so that rotation thereof will cause axial movement of the link member with consequent shifting of the shifting arm and partial rotation of the eccentric.

6. A device according to claim 2, wherein a link member is connected to one end of the shifting arm, means are connected to said link member having a pair of abutment means and an eccentric is disposed between said abutment means having a lever for partly rotating said eccentric in order to shift the abutment means and the link member and thereby adjust the angular position of the shifting arm.

7. A device according to claim 2, wherein a link member is connected to one end of the shifting arm, means are connected to said link member having a pair of abutment means and an eccentric is disposed between said abutment means having a lever for partly rotating said eccentric in order to shift the abutment means and the link member and thereby adjust the angular position of the shifting arm and wherein adjustable stops are located in spaced positions in the path of said lever so as to allow shifting of the shifting arm through the link member from one predetermined position to another predetermined position and thereby determine two different adjusted positions of the eccentric.

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