Dec. 25, 1956 P. L. E. CADIER 2,775,339

BALER MECHANISM

Filed Jan. 21, 1953 4 Sheets-Sheet 1

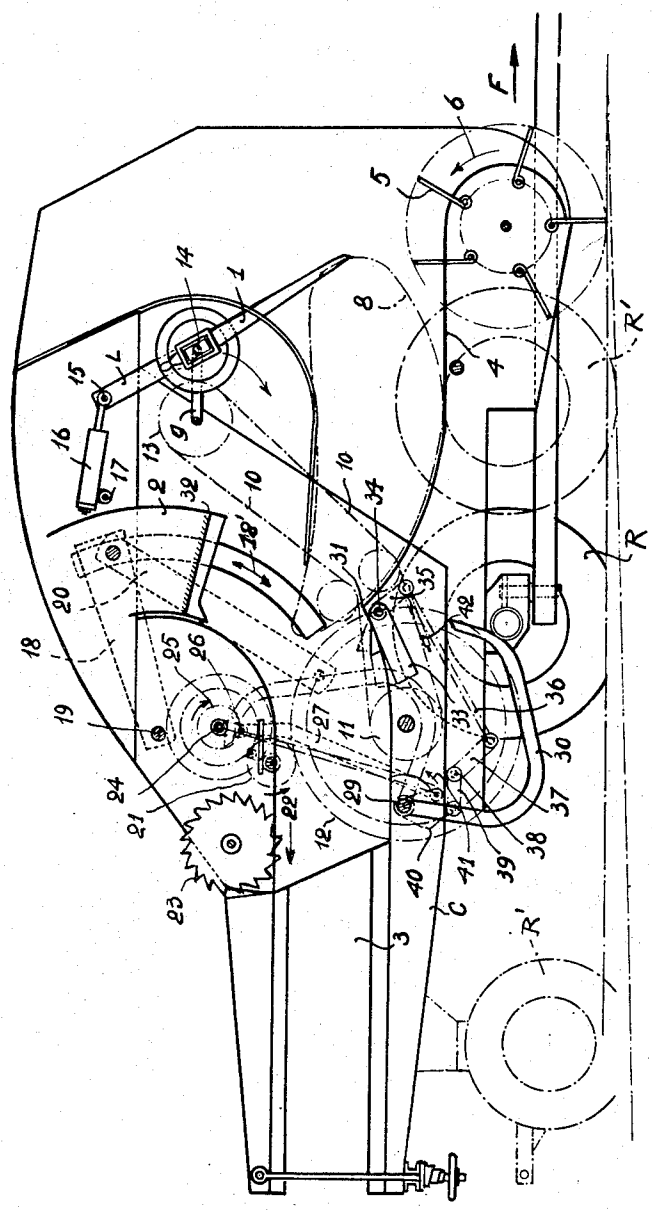


FIG. 1

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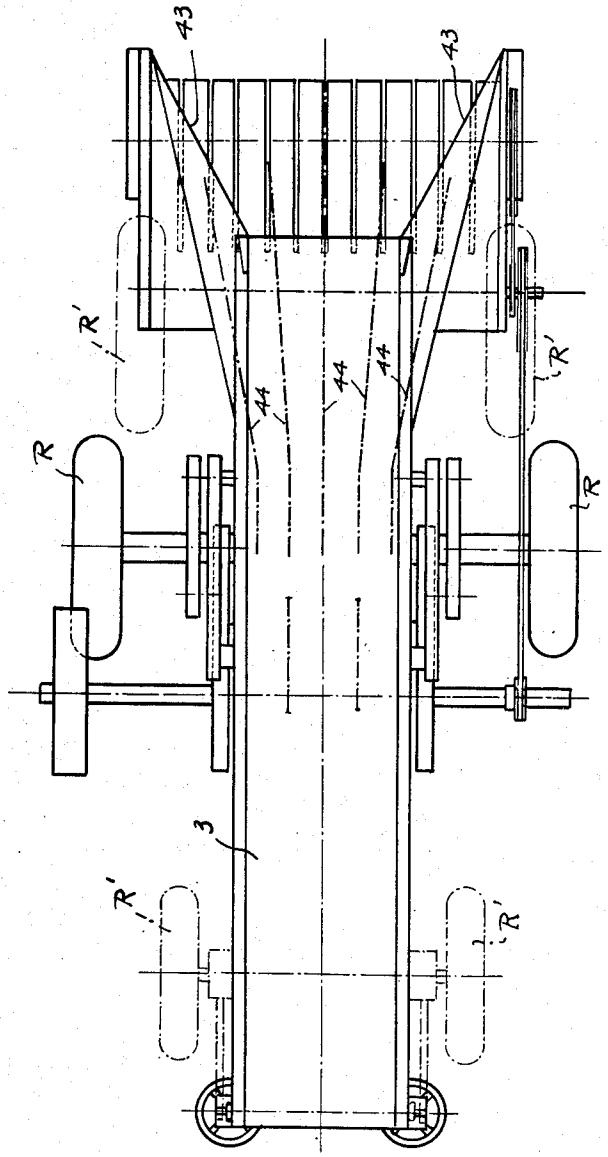


Fig. 2

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FIG. 3

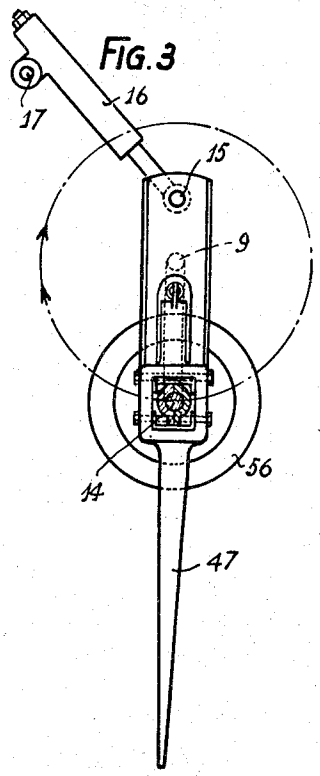


FIG. 4

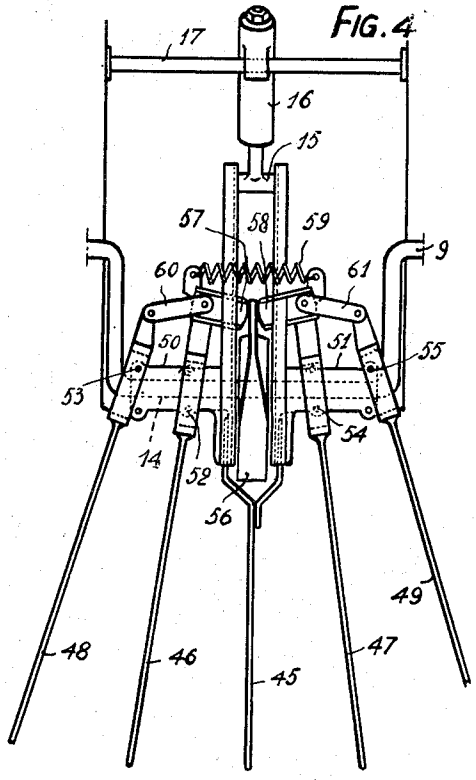
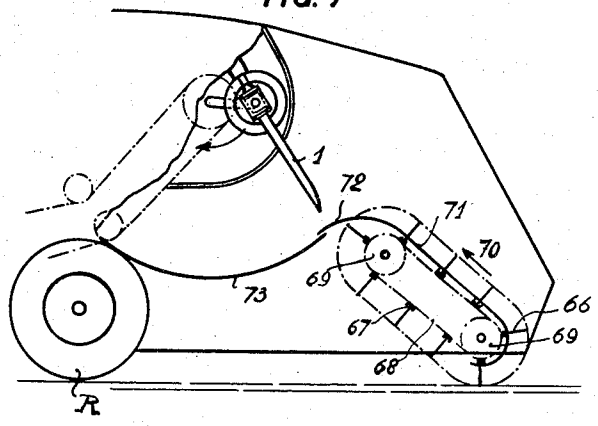


FIG. 7



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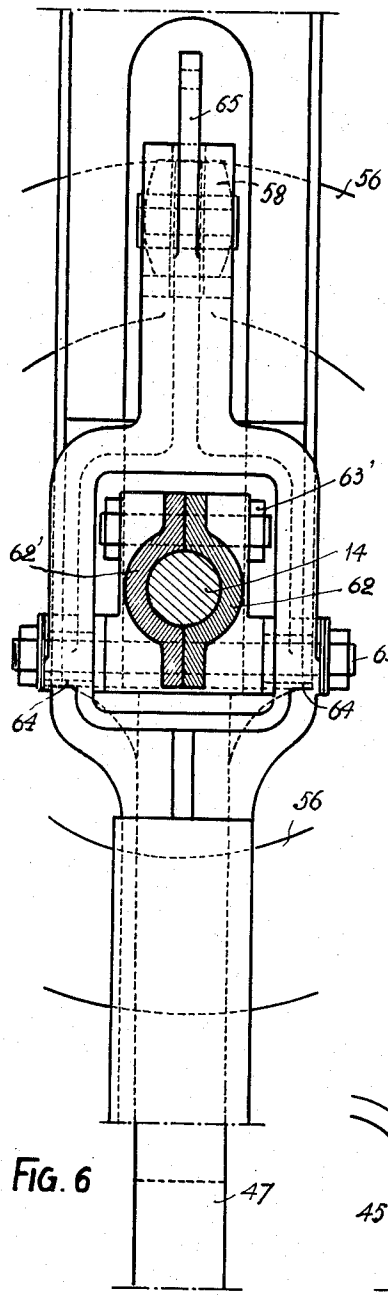


FIG. 6

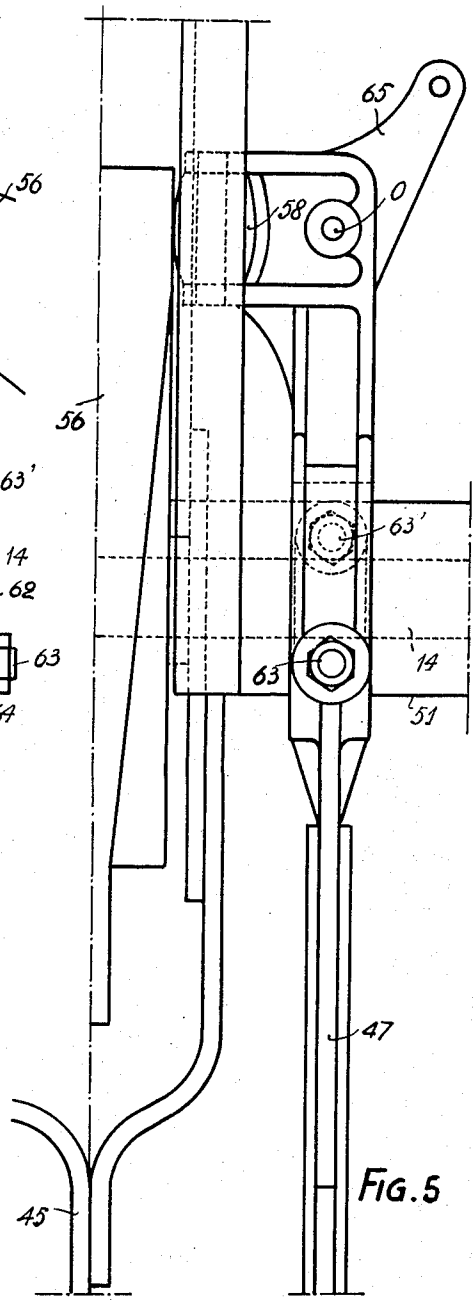


FIG. 5

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2,775,339

BALER MECHANISM

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Application January 21, 1953, Serial No. 332,203

Claims priority, application France January 31, 1952

3 Claims. (Cl. 198—223)

The present invention relates to a press for straw or hay of the so-called "high compacity" type.

The presses of the above specified type as currently used, including both the presses operating at a fixed station and those provided with collectors, are of the "rolling piston" type. This type of machine requires for the operation thereof the simultaneous action of three main units, namely: a feeder for feeding the material to be pressed into a hopper; a compactor for transferring the material from the hopper into a compression channel; and a piston for compressing the material delivered by the compactor into the compression channel.

The chief drawback of such known high-compacity presses is that they require a high expenditure of energy, especially due ot the fact that the piston which is supported either on rollers or more simply on wooden or metallic slideways, is a source of considerable energy losses by friction. Further drawbacks of such presses include their great weight and the fact that conjugate operation of the above-mentioned three units retards the rate of delivery of the compressed material by creating a pressure drop in the flow of the material undergoing treatment.

It is an essential object of this invention to provide a high-compacity press wherein the number of main component units required for operation of the press is reduced to two, the compactor unit being eliminated.

Another object is the provision of a high-compacity press which, while having a greater rate of delivery than that of known presses, requires less power for operation; and one which, moreover, is more easily adapted for the installation thereon of an automatic binding device for binding the compressed bundles or bales, with string or wire, as well as a collector device.

Further features and advantages of the invention will appear from the ensuing description with reference to the accompanying drawings which illustrate, diagrammatically and merely by way of example, forms of construction of the improved high-compacity press. In the drawings:

Fig. 1 is a view in elevation, partly in section, of the high-compacity press;

Fig. 2 is a plan view partly in section, corresponding to Fig. 1;

Fig. 3 is an elevational view of a preferred embodiment of the feeder;

Fig. 4 is a front view corresponding to Fig. 3;

Fig. 5 is a front view on an enlarged scale, illustrating the manner in which a pivoted tine or fork is mounted on the feeder, the said tine, which is the one adjacent to the central tooth or tine, being shown in the position occupied by it when the free ends of the tines are brought in to their minimum spacing;

Fig. 6 is a side view, partly in section, corresponding to Fig. 5;

Fig. 7 is a partial view similar to Fig. 1, illustrating a high-compacity press equipped with a collector of a different type.

In the exemplary construction shown in Figs. 1 and 2, the high-compacity press comprises a frame C provided with carrier wheels R, the said press being provided with a feeder 1, an oscillating piston 2 movable over an arcuate path, a compression channel 3 and a bottom sheet metal platform or table 4 upon which the material, e. g. straw, to be pressed into bales, is spread. In the event the machine is designed for operation as a gatherer or collector and is drawn in the direction indicated by the arrow F, the material is gathered by the teeth 5 of a pick-up unit rotated in the direction indicated by arrow 6, and is deposited on the table 4.

The material deposited on the table 4 is picked up by the tines of the feeder 1 the tips of which describe a curve 8 generally shaped with the contour of a bean, under the combined action of a crankshaft 9 driven in rotation by a chain 10 trained over a drive pinion 11 rotating as a unit with a main gear 12, and over a pinion 13 fixed on the crank-shaft 9 and having an equal number of teeth to that of the pinion 11, and of a lever L secured to the tines of the feeder 1. The lever L is journalled on a crankpin 14 of the crank-shaft 9 and is pivoted at a point 15 to the end of a connecting rod 16 the other end of which is journalled on a shaft secured at a point 17.

The material taken up by the tines of feeder 1 is deposited in front of the face of piston 2 which is supported from two arms 18 journalled at one end thereof on a pivot 19. The piston 2 has a semi-circular motion imparted to it, as indicated by the arrow 18', from the main gear 12, through a connecting rod 20, the said gear 12 being in turn driven by means of a pinion 21.

The material as it is propelled through the compression channel 3 in the direction indicated by the arrow 22, is compressed in said channel by the piston 2, and simultaneously rotates a ratchet wheel 23. Rotation of wheel 23 causes through a suitable drive, rotation of the shaft 24. The shaft 24 is formed with a crank 26 having one end of a connecting rod 27 pivoted to it, the other end of the connecting rod 27 being pivoted to a crank 28 formed on a shaft 29. As a result of the connections just described rotation of the shaft 24 causes an up-and-down oscillation of a needle 30 adapted to bring the binding string or wire towards a conventional binding unit 25 rotatable with the shaft 24.

Each successive step of angular displacement, of given amplitude, effected by ratchet wheel 23, thus results in the formation of a bale of predetermined length in the compression channel 3, and the binding thereof with one or more loops of string or wire.

While the high-compacity press described hereabove may if desired be equipped with a cutter as at 31 cooperating with a further cutter at 32, in the usual manner, in order to sever any bunch of material that may have slipped in between the under face of the piston 2 and the lower part of the channel 3 and thus have become incorporated in part in the completed bale and in the next bale being formed, the invention preferably contemplates means adapted, at the time of the forming of a bale, to lift up any such bunch of material and present it to the face of the piston at a point high enough to cause the material to be swept clear.

Such means may comprise, as shown in Fig. 1, a set of pusher members 33 spaced across the width of the bottom table. As shown, the members 33 are fixed on a shaft 34 provided with a crank portion 35 having connected to it one end of a connecting rod 36 the other end of which is connected to a lever arm 37. The lever arm 37 is pivoted on a shaft 38 at one point thereof and its free end engages a cam 40 rotatable with the shaft 29 controlling the movements of the needle or needles 30.

During the formation of a bale of material, the shaft

29 is rotated for a fraction of a full turn in the direction indicated by arrow 41 and drives the cam 40 with it, so that the lever 37 pivoted at 38 is released and allowed to respond to the action of a spring 42 connected to the rod 36. The pushers 33 are therefore lifted by the action of the crank 35, and penetrate into the compression channel, carrying away in the process any material clinging to the bottom table of said channel. In this way the simultaneous incorporation of a bunch of material into two adjacent bales is prevented.

It has been found that, in order to produce a bale of highly compressed material, it is desirable that the compression channel 3 (see Fig. 2) should not exceed about 0.60 meter in width, whereas the vertical walls 43 limiting the table 4 laterally, should be spaced from each other, at the input end of the press, by about 1.40 meter to 1.60 meter depending on whether the material is being supplied by means of a pick-up device, or from the output of a thresher or the like. Accordingly, it will be understood that the proper operation of a high-compacity press will only be possible on condition that the tines of the feeder 1 are adapted to follow converging, rather than parallel, paths, somewhat as indicated by the lines 44 in Fig. 2.

To accomplish this result, the press may be provided with a feeder device similar to that shown in Figs. 3 to 6, having an odd number, e. g. five tines or forks therein respectively designated 45, 46, 47, 48 and 49, supported on a pair of sleeves 50 and 51 rotatably mounted on the crankpin 14 of the crankshaft 9 and maintained at a constant relative spacing from one another by the action of the pivot member 15 and the fork-shaped root portion of the central tine 45 fixedly mounted on the two sleeves. As shown, the sleeve 50 is provided at its ends with two pivots 52 and 53 having the tines 46 and 48 pivotally supported thereon respectively. Similarly, the sleeve 51 is fitted with the two pivots 54 and 55, respectively, mounting the tines 47 and 49. The pivots 52, 53 and 54, 55 of each pair are so arranged relatively to each other that the shorter lever arm of the tine 46 or 47 adjacent the central tine 45, is greater than the shorter lever arm of the end tine 48 or 49. Secured on crankpin 14 is a cam 56 directly engaging a pair of follower rollers 57 and 58 respectively supported from the shorter lever arms of tines 46 and 47; the said shorter lever arms have their ends interconnected by a tension spring 59. Moreover, the end of tine 46 nearest the roller 57 is connected by a link 60 to the tine 48, and the end of tine 47 nearest the roller 58 is connected by a link 61 to the tine 49.

With the arrangement just described, the cooperation between the rotary movements of crankshaft 9, pivots 15, the lever connected to the central tine 45 and the connecting rod 16 connected to the pivot 15 of the lever associated with the central tine and to fixed point 17, results in causing the tips of the tines 45 to 49 bodily to describe a curve 8 (Fig. 1) having a generally bean-shaped contour.

Moreover, assuming the tines of the feeder unit are spaced a maximum distance apart (see Fig. 4), as the crankshaft 9 and pivot 15 are set into motion, the free ends of said tines will be seen to move in towards one another during a portion (α) of each complete revolution of the crankpin 14, corresponding to the period during which the tines engage straw or hay to introduce it into the compression channel 3. During this portion of the full revolution, the free ends of the tines move from their maximum to their minimum spacing. During the remaining portion ($2\pi-\alpha$) of the revolution on the other hand, corresponding to the period during which the tines are idle, the free ends of the tines move back from their maximum to their minimum spaced condition.

Consequently, in the operation of the feeder unit, the feeder tines perform a scissors-like motion, the distance covered in either direction by the ends of the outer tines 48 and 49 being greater than the distance covered by the ends of the inner or intermediate tines 46 and 47. Hence, the material spread over the wide table 4 is readily fed into the considerably narrower compression channel 3 to produce a highly compact bale under the action of the oscillatory piston 2.

As shown in Figs. 5 and 6, partially illustrating one practical embodiment of the feeder mechanism, 14 designates the crankpin of crankshaft 9; 62 and 62' are two component elements of sleeve 51 which is made up of two parts interconnected by the bolts 63 and 63' of which the bolt 63 blocks the rings 64 serving to journal the pivot of the tine 47. Reference 56 designates the cam and 58 is the follower roller carried on the shorter lever arm of tine 47. It will be noted that in this embodiment, the shorter lever arm of the tine 47 is formed with an eye-hole O for mounting the connecting rod 61, and is provided with a lug 65 serving to anchor the spring 49.

It will be understood that the contour of cam 56 is so designed as to impart to the tines 46, 48 and 47, 49, the requisite lateral movements during the requisite portion of each revolution, in order to cause them first to spread apart for sweeping the broad part of table 4, and then to close in again to rake the material into the compression channel 3.

In cases where the press is to be operated exclusively at a fixed station, being fed either manually or from a threshing machine, the press is preferably mounted on four wheels of which the front pair are mounted on a pivotal carriage. The wheels are represented in broken lines in Figs. 1 and 2 and are designated R'. The frame C of the press is preferably so constructed as to enable such additional wheels to be readily and quickly removed and mounted. In the event of the press being used in this way, the pick-up unit would of course be removed.

If on the other hand the press is equipped with collector means and is only occasionally to be used at a fixed station, the components need not necessarily be provided removable. Thus the press may be fed by hand and the pick-up allowed to rotate idly, or the pick-up drive may be disengaged and the material to be compressed deposited on the table 4, or straw from a thresher may be arranged to drop upon the table.

In the example described above, the press is fitted with a pick-up having only a single axis of rotation. In the construction shown in Fig. 7 on the other hand, the pick-up has two spaced axes of rotation at different levels. The pick-up unit here shown essentially comprises teeth 66 secured to spaced rake members 67 secured on an endless chain 68. Movement is imparted to the chain in the direction indicated by the arow 70 through the drive pinions 69. In this case, the teeth 66 extend through slots formed in the sheet metal cover members 71 over and up which the material is caused to slide, the material being released from action of the rakes as it reaches the arcuate portion 72 of the members 71; for this purpose the teeth 66 are caused to be retracted over this part of their path of movement. The material discharged over the arcuate portion 72 drops by gravity into the low section 73 (corresponding to the table 4 of Fig. 1); whence it is taken up by the feeder device 1.

It will be understood that the constructions illustrated and described herein have been given by way of indication only, and not of limitation, and that various modifications may be made in the details thereof without exceeding the scope of the invention. Thus, any suitable construction, differing from that shown, may be used for the feeder device serving to reduce to an appropriately narrow width the material spread over the wide table section 4 or 73 in order to feed it into the compression channel 3 which, as previously stated, is narrower in width than that of the input end of said table section. One suitable feeder unit may comprise, for example, a movable table which may or may not be provided with strips or teeth or the like, the said table tapering down

gradually in useful width to a width equal to that of the channel, either owing to the provision of fixed side walls placed at suitable angles with respect to each other, the lower parts of said walls being arranged to be tangent to the strips or the like of the table; or by the use of movable walls adapted to close in towards each other as they move towards the input of the channel, as a result of a simultaneous movement thereof correlated with the movement of the piston.

In the case a pick-up unit is used having two spaced axes of rotation, the said axes may be arranged to extend on a common level.

I claim:

1. In a feeding device for use in connection with a high pressure baling mechanism having a compression feeding chamber, in combination, a series of fingers disposed in advance of said chamber and being partly eccentrically located, each finger including a feeder portion being movable to describe an endless predetermined path in opposite directions towards and from said chamber, means operable for moving and guiding said fingers, said means comprising a crank including a crank shaft journalling said fingers between the ends thereof, a lever connected to the end of each finger, said eccentrical fingers being pivoted with relation to said shaft for movement at an angle to the axis of said shaft, cam and cam follower means between said crank shaft and at least two of said eccentrical fingers, the remaining of said eccentrical fingers being linked to said two fingers.

2. In a feeding device, as claimed in claim 1, together with, resilient means connected to said two fingers for guiding said follower means on said cam.

3. In a feeding device, as claimed in claim 1, all of said eccentric fingers being arranged symmetrically of said cam along the axis of said shaft.

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