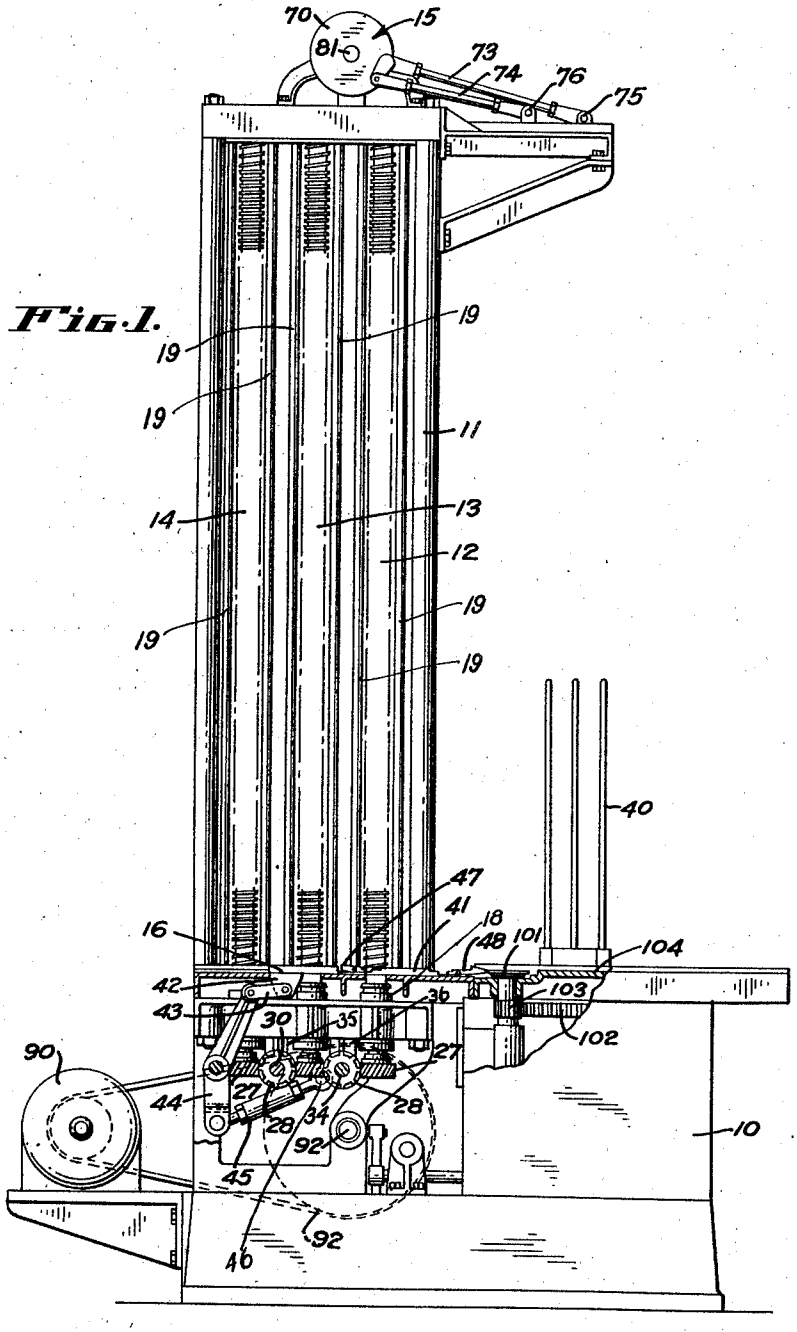
June 13, 1939. C. A. JOHNSTONE 2,162,336

COMPOUND DRIER FOR COATED DISKS

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Fig. 1.



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Fig. 2.

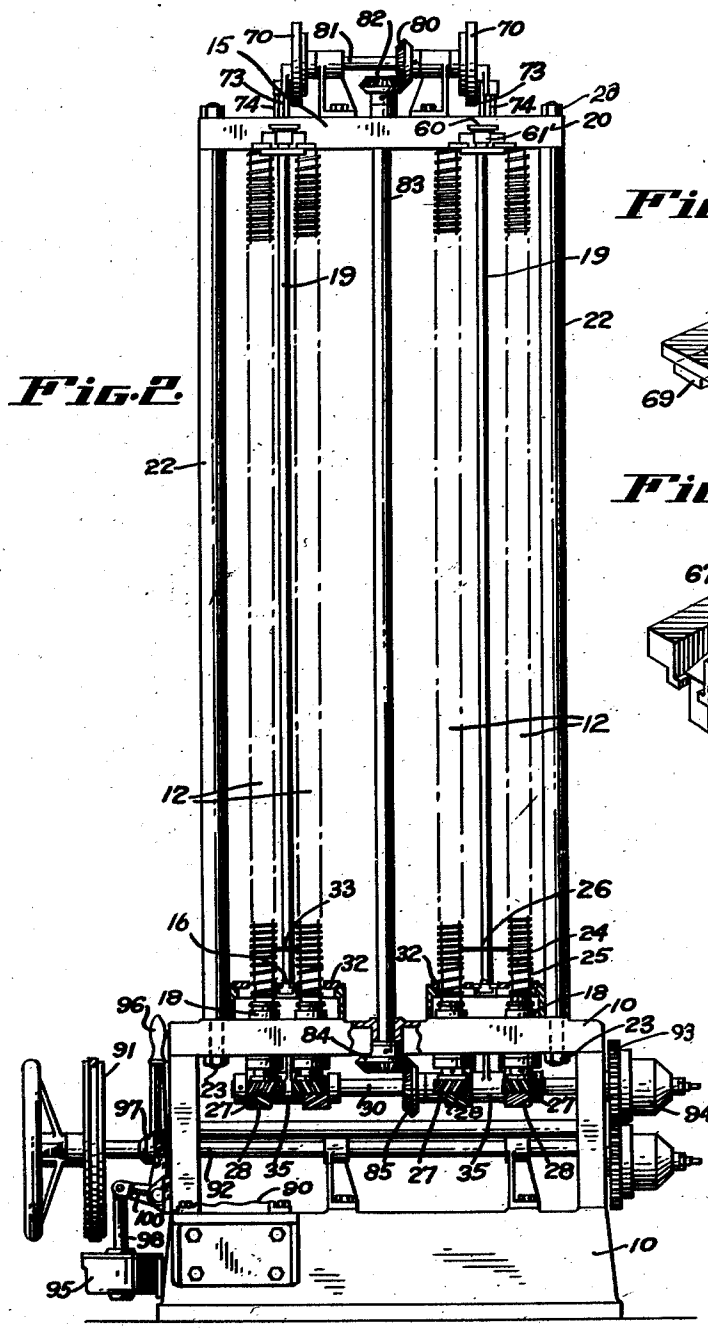


Fig. 7.

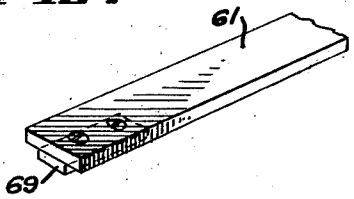
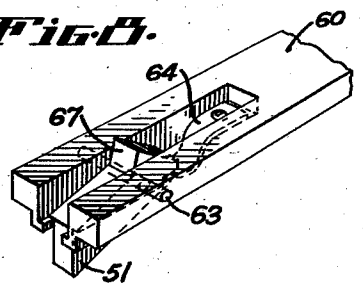


Fig. 8.



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COMPOUND DRIER FOR COATED DISKS

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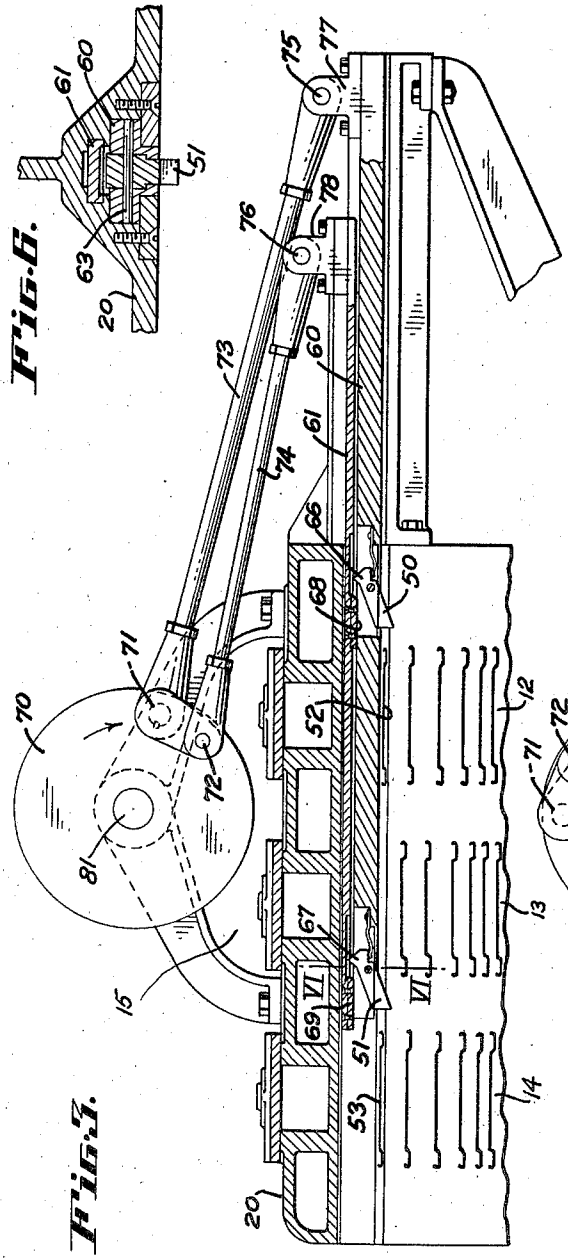


Fig. 3.

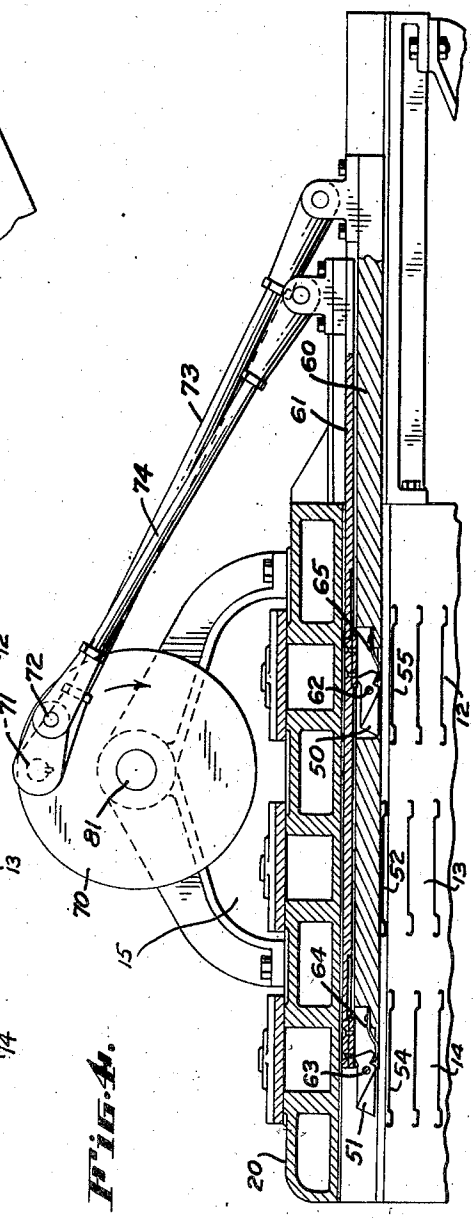


Fig. 4.

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COMPOUND DRIER FOR COATED DISKS

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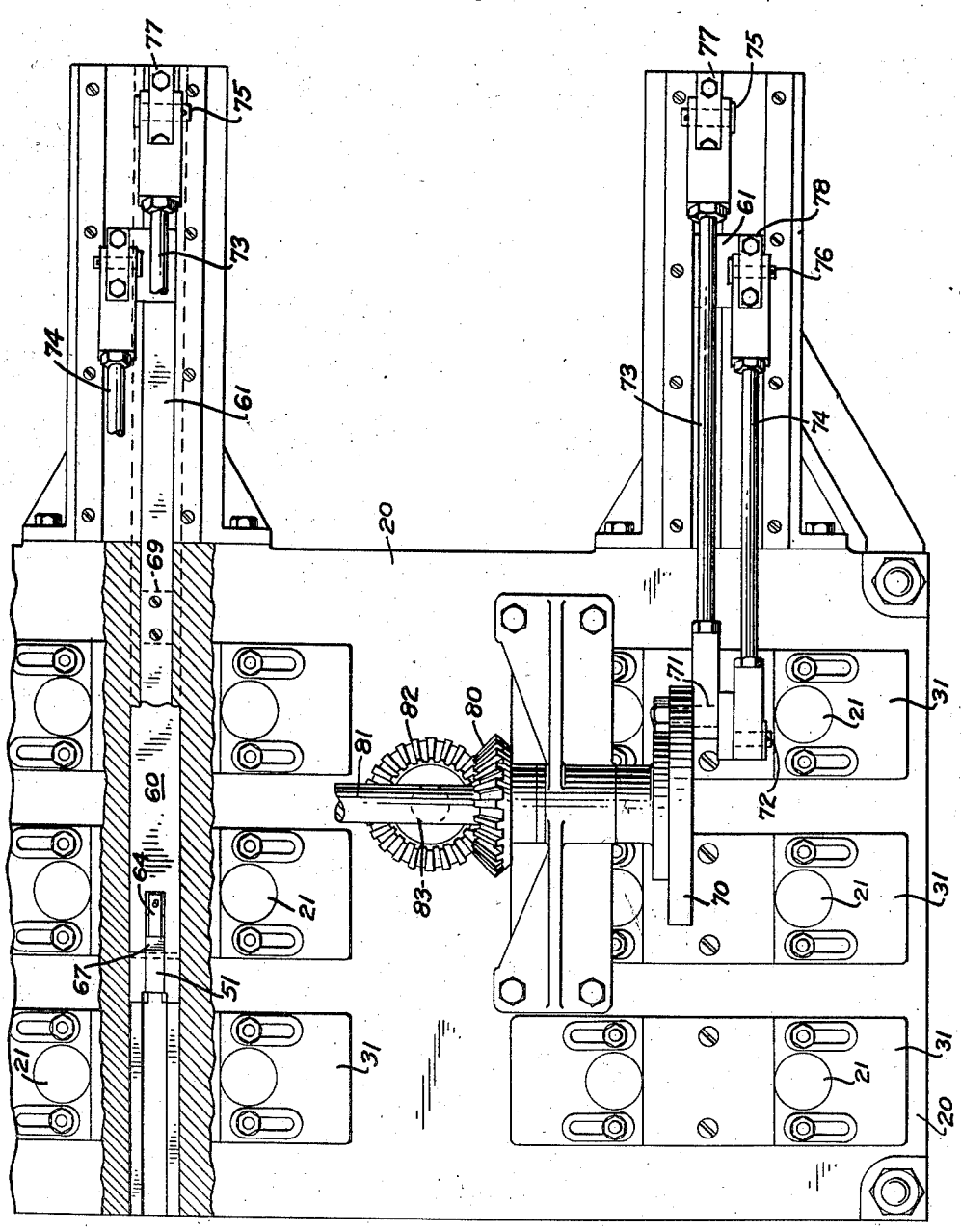


Fig. 4.

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Patented June 13, 1939 2,162,336

UNITED STATES PATENT OFFICE

2,162,336

COMPOUND DRIER FOR COATED DISKS

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Application September 7, 1937, Serial No. 162,704

7 Claims. (Cl. 34—11)

This invention relates to mechanism for handling circular disks, and particularly disks to which coatings have been applied,—such as tops for cans.

The object of the present invention is to provide automatic means for feeding circular disks into, through and out of a machine without any part of the mechanism coming into contact with the coated face of the disks; to provide a novel form of retracting mechanism for controlling the pawls feeding the disks; to provide means for quickly moving one disk vertically out of the path of the disk next in line and then slowing the movement of said disk to prolong its time of passage through the machine; to provide a mechanism having a plurality of relatively short travel channels and means for transferring the disks one at a time from one channel to the other; to provide a structure of simple construction easily adjusted for various sized disks.

Other objects and advantages of the invention will be brought out in the following description, taken in connection with the drawings, in which:

Fig. 1 is a side elevation with parts cut away to show details of construction;

Fig. 2 is likewise a side elevation taken at right angles to Fig. 1 looking toward the left hand or motor side, here again parts being omitted to show features of construction;

Fig. 3 is an enlarged side view partly in section of the disk transfer mechanism at the top of the machine;

Fig. 4 is like Fig. 3, showing the same parts in a different period of the operation cycle;

Fig. 5 is a top plan view of the mechanism shown in Figs. 3 and 4 with parts broken away to show the disk engaging pawl parts;

Fig. 6 is a cross-section taken on the line VI—VI of Fig. 3;

Fig. 7 is a perspective view of one pawl control cam and bar; and

Fig. 8 is a similar view of the pawl and its supporting bar.

The invention in the form shown and described herein is designed for the drying of treated or coated disks such as can ends and has provision for their being fed in one by one at the bottom of the machine, from which point they travel upward to the top and are transferred to means for carrying them down and at the bottom are transferred to means for carrying them to the top, from which point they pass out of the machine completely dried.

Broadly, therefore, the machine comprises a mechanism to feed the disks into the machine after being coated, means to elevate these disks, means to transfer the disks when they reach the top of this mechanism, means to receive the disks and lower them through the machine, means to transfer the disks to an elevating mechanism, means to lift the disks again to the top of the machine, and means to remove the disks from the top of this mechanism completely dried.

In order to clarify the drawings illustrating this invention, the casing used to house the elevating and lowering mechanisms has been omitted, but it is to be understood that in actual use the machine is provided with a housing, its purpose being to confine the heated air within it like an oven, to accomplish drying of the coating on the disks. Also omitted is any showing of the burner used in heating the air and the means for circulating or forcing this heated air through the machine. Another omission is any detailed showing of the coating mechanism usually placed adjacent the machine. These constitute no part of the present invention and any suitable burner and circulating mechanism as well as coating mechanism may be employed.

The operating parts of the machine are erected on a base 10 which usually rests on the floor. Attached to this base is a frame work generally indicated by the numeral 11 supporting the elevating screws 12, 13 and 14. At the top of the framework 11 is mounted the top disk transferring and ejecting mechanism generaly indicated by the numeral 15. In the top of base 10 and beneath framework 11 is mounted the bottom disk feeding and transferring mechanism generally designated by the numeral 16.

The machine shown is in tandem form, that is, there is a duplication on each side of the machine as shown in Fig. 2 of all the parts, enabling the machine to accommodate two lines of disks.

Elevating screws 12 and 14, and lowering screws 13 in pairs, are journaled in suitable bearings 18 in base 10, and are journaled in plain bearings at the top in frame member 20 at 21. Frame members 10 and 20 are connected by suitable spacing members 22 and tie bolts 23.

Elevating means 12 and 14 and lowering means 13 accomplish their function by having a continuous thread 24 formed thereon and spaced apart throughout the major portion of their length a distance sufficient to prevent the adjacent disks supported thereon from contacting each other. Near the ends of each of these screws the threads are spaced apart as shown at 25, the purpose of the wider spacing being to

cause a more rapid movement of the disks when first engaged by the thread, and also when being given up by the thread at the end of its travel. The need for the accelerated movement of the disk when it first enters and when it leaves the traveling screws is to get it out of the way of the next disk being fed into or off of the screw. Once the disks have begun their travel, it is desirable that they move as slowly as possible so as to prolong the drying effect of the air being circulated around them. The efficiency of the machine depends upon having as many disks as it is physically possible to accommodate on each screw. Guide rods 19 with suitable clearances maintain the disks in a position of balance on threads 24 and 25.

In the drawings, for the sake of clarity, disks have been omitted between the pairs of screws 12, 13 and 14 except that at 26 and 33 in Fig. 2 disks are represented as being supported by the adjacent pairs of lifting screws 12. It is to be understood that in actual operation there may be a disk supported at each convolution of the thread.

The drive to the pairs of feed screws, which must operate at the same speed and also must be adjusted so that the disks 26 and 33 are supported in a horizontal manner, is accomplished in this device by means of the helical gears 27 secured on the lower ends of feed screw shafts 12, 13 and 14. These are engaged by helical gears 28 in turn rigidly secured to cross shaft 30, journaled in base 10.

To enable the machine to accommodate disks of varying sizes each pair of feed screws, 12, 13 and 14, is mounted in adjustable brackets 31 in top frame 20 and adjustable base plates 32 in base 10. By referring to Fig. 2 it will be seen that the pair of feed screws 12 on the left hand bank are set close together to take a small disk 33 while those in the right hand bank are set apart more widely to take the larger disk 26. Suitable attaching means such as cap screws are employed to secure these adjustable bearing plates 21 and 32 in the desired position. It should be noticed that by employing helical gears 27 and 28 in driving each pair of screws 12, the need for intricate and delicate adjustments of each pair of screws is unnecessary because the gears which drive each cooperating pair of screws have their teeth inclined opposite to each other so that an equal movement of each screw away from the center line between the two will preserve the cooperating threads in correct alignment at the point where they support the disk 26.

The reversed rotation of lowering feed screws 13 with respect to lifting feed screws 12 and 14 is accomplished by driving helical gears 29 on the lower ends of screws 13 from the opposite side of helical gears 28 (see Fig. 1). The preferred form of drive shown in this case calls for the intermeshing of all five gears, namely, the helical gears 27 on the bottoms of feed screws 12 and 14, helical gears 28 on horizontal shafts 30 and 34, and helical gear 29 on the lower end of feed screw 13. Horizontal shafts 30 and 34 are journaled in suitable hangers 35 and 36 respectively in base 10. The drive to shaft 30 is from motor 90 to pulley 91 on shaft 92 having a pinion gear (not shown) meshing with pinion gear 93 on shaft 30. (See Figs. 1 and 2.)

Hand lever 96 through clutch collar 97 controls the clutch (not shown). A hydraulic ram 95 is connected by link 98 to bell crank 100 mounted on the same shaft as lever 96 and effects an automatic disengagement of the clutch upon energization of the ram. The latter is effected automatically by means of the pressure or strain sensitive mechanism housed at 94, but as this constitutes no part of the present invention and is well known in the art, a detailed description need not be given.

The general practice is to have the disks enter the machine with the coated side up. They may be placed in the magazine 40 mounted on base 10, from which they are fed into the liner applying mechanism by an automatic feeding mechanism. Due to the fact that the lower surfaces of the disks are not coated, particular care against scratching this lower surface is not necessary.

As already noted, the lining mechanism attached to the right of the machine as shown in Fig. 1 comprises the parts 101, 102, 103, 104, etc., but these are well known in the art and do not constitute part of the present invention.

One form of feed mechanism suitable for use in handling the disks as they come off the lining head 101 is shown in Figs. 1 and 2, and comprises the reciprocating member 41, having a depending boss 42 connected by links 43, 44, and adjustable link 45 pivoted to crank 46, rigidly mounted on shaft 34. Rotation of crank 46 imparts a reciprocating movement to member 41.

The reciprocation of member 41 is employed to feed disks to lifting screws 12, and also to move disks from the lower end of lowering feed screws 13 into screws 14. The latter function is accomplished by pawl 47 pivoted horizontally to member 41 so that it may be depressed on the return stroke when in contact with the lowermost disk in feed screw 13. The movement of a disk into feed screws 12 is accomplished by pawl 48 likewise horizontally pivoted to allow it on the return stroke to pass beneath the disk moved into position over it and which will next be moved into screws 12 on its forward stroke.

One of the important objects obtained by the present invention is the avoidance of any contact of the machine parts with the coated upper surface of the disks as they pass through the machine during the drying operation. This is most likely to occur during the transfer of the disks from lifting screws 12 to lowering screws 13, and when the dried disks are being ejected from the machine as they leave lifting screws 14. As the disks reach the top of lifting screws 12 and 14, it is necessary to move them as suggested above and it is necessary to do this by a mechanism which operates and reciprocates above the disks.

It has heretofore been the practice in mechanisms of this type to allow the disk moving mechanism to drag across the face of the next disk reaching the top of the lifting screws. This invention provides a mechanism whereby the ejecting means, in this case a pawl, is under control at all times and is automatically held in retracted position on the return stroke when it would otherwise drag across the coated face of the disk reaching the top.

The mechanism now to be described is applicable not only to the machine of the type herein shown but would also be applicable to any flat sheet handling apparatus where the coated sheets are fed step by step by a pawl or other engaging device which back-tracks on itself.

In Figs. 3 and 4 there is shown a preferred embodiment of the invention which employs pawls 50 and 51 to move disks 52 and 53 respectively

out of feed screws 12 and 14 (omitted except for the presence of the reference numeral, for purposes of clarity), as they are lifted to the end of the thread. The disks are shown spaced as they would be by threads 25 and 24 (see Fig. 3). Fig. 4 shows pawls 50 and 51 in the desired retracted position on their back stroke. Disk 53 has been moved out of the machine as the pawl 51 traveled to the left. Disk 54 has almost reached the top of screw 14 from whence it will be ejected. Disk 52 has been moved into the threads of lowering screws 13 and is ready to begin its downward traverse. Disk 55 has almost come to the top of lifting screws 12.

Control of pawls 50 and 51 is obtained by providing a pair of reciprocating members 60 and 61, arranged to move relative to each other as they reciprocate. Reciprocating member 60 has pawls 50 and 51 pivoted therein at 62 and 63 with a suitable spring 64, 65, respectively, provided to effect a quick return of each pawl to operating position. An angled projection 66 and 67 is formed on the upper right hand portion of pawls 50 and 51 respectively, each projection being arranged for sliding contact with its cooperating cam 68 and 69 respectively. Cams 68 and 69 are preferably case-hardened and are secured to reciprocating bar member 61. In Fig. 3 the cams are shown at the left of pawl projections 66 and 67, whereas in Fig. 4 they are shown in engagement therewith and effecting the lifting of the pawls out of the path traveled by the pawl on its working stroke.

In this particular embodiment, control of each set of reciprocating members 60 and 61 is obtained by driving them from a common disk 70, having crank pins 71 and 72 thereon, the latter being connected by rods 73 and 74 respectively to pins 75 and 76 in bosses 77 and 78, secured to the ends of reciprocating members 60 and 61. It will be noticed that crank pins 71 and 72 are set apart, in this embodiment, there being a thirty degree lead, with the result that reciprocating members 60 and 61 move at different times. Thus, member 61 will begin a return movement causing cams 68 and 69 to contact projections 66 and 67 before or at least simultaneously with reciprocating member 60 reaching the extreme end of its stroke at the left. Likewise, reciprocating member 61 will begin its movement to the left, causing cams 68 and 69 to release pawls 50 and 51 before reciprocating member 60 begins its working stroke to the left.

The drive to disk 70 carrying crank pins 71 and 72 is accomplished by means of bevel gear 80 secured to short shaft 81 carrying disks 70. Bevel gear 82 engages gear 81 and is secured on the end of vertical shaft 83 journaled in upper member 20 and at its lower end in base 10 beneath which bevel gear 84 is secured to mesh with bevel gear 85 on shaft 30 (see Figs. 2 and 5). In Fig. 5 the above drive is shown in detail for one bank of lifting screws only in order that parts of the left hand portion may be broken away to show details of construction of the reciprocating members, pawl, cam, etc.

It is understood that a suitable chute will be provided in upper frame 20 adjacent lifting screw 14 to receive the disks as they are ejected by pawl 51.

Operation

Assuming that motor 90 is in operation, the clutch engaged, and the parts are functioning as described above, a plurality of disks are placed in magazine 40, and are picked off the bottom of the pile one by one by the lining mechanism and eventually deposited separately to be picked up by pawl 48 on reciprocating bar 41 and fed step by step into the lower thread 25 of lifting screws 12. This lower thread 25 is of higher pitch than the balance of the thread 24 so as to lift the disk quickly out of the way of the next disk being inserted by pawl 48. The disk lies between lifting screws 12, being guided and held in the threads of the screw by guide rods 19, suitably positioned on each side. As the disk reaches the upper end of screws 12, the thread of higher pitch corresponding to thread 25 at the bottom accelerates the lift imparted to the disk so that pawl 50 may engage it and move it out from between screws 12 into the threads of screws 13. Here again the initial thread at the ends of screws 13 is of higher pitch than the balance of the threads for the purpose already made clear. The disk travels down under control of screws 13 until it reaches the bottom where it is engaged by pawl 47 and moved out from between screws 13 into the threads of lifting screws 14. The disk rises between threads 14 to the top of the screws from whence it is ejected by pawl 51 into a chute or other conveyor means and carried to a station for subsequent operations.

The above description has dealt with a single disk in its passage through the machine, but it is understood, of course, that the machine is capable of and intended to handle disks fed to it on each stroke of pawl 48. Pawl 48 is timed to make a complete round trip for each revolution of the lifting screws with the result that there is a disk suspended between each adjacent thread when the machine is in operation.

It is not intended to limit the invention to the specific disclosure of a preferred form herein made, except as the claims may require.

I claim:

1. In a sheet feeding machine adapted to handle coated sheets which, if scratched, are rendered less valuable, the combination of a reciprocating member, a sheet engaging finger hinged thereto, means for controlling said finger on its non-working stroke to swing it into a position where it cannot contact any adjacent lying sheet, said means releasing said finger substantially at the beginning of the working stroke to engage edgewise a single one of said sheets at a time.

2. In a sheet feeding machine adapted to handle coated sheets which, if scratched, are rendered less valuable, the combination of a reciprocating member, a sheet engaging finger hinged thereto, a second reciprocating member lying adjacent said finger, means for driving said pair of reciprocating members so that each changes its direction of travel at a different time from the other, whereby this difference effects control of said finger.

3. In a sheet feeding machine adapted to handle coated sheets which, if scratched, are rendered less valuable, the combination of a reciprocating member, a sheet engaging finger hinged thereto, a second reciprocating member lying adjacent said finger, and moving in a plane parallel to the plane in which the other reciprocating member moves, means for driving said pair of reciprocating members so that each changes its direction of travel at a different time from the other, whereby this difference effects control of said finger.

4. In a sheet feeding machine adapted to han-

dle coated sheets which, if scratched, are rendered less valuable, the combination of a reciprocating member, a sheet engaging finger hinged thereto, a second reciprocating member lying adjacent said finger, and moving in a plane parallel to that of the other reciprocating member, a common drive for said pair of reciprocating members having cranks arranged so that each changes its direction of travel at a different time from the other, whereby this difference effects control of said finger.

5. In a transfer mechanism adapted to impart a step by step horizontal movement to coated articles without permitting any contact between the moving means and the coated surface, the combination of a pair of reciprocating members arranged adjacent each other, a finger pivoted in one of said members, said finger serving to impart movement to an article when moved in one direction and to swing on said pivot into retracted position when moved in the other direction, means on the other of said reciprocating members for effecting said last-named result, and means for moving both of said reciprocating members in synchronism but in such a manner that one begins its return stroke before the other.

6. In a transfer mechanism adapted to impart a step by step horizontal movement to coated articles without permitting any contact between the moving means and the coated surface, the combination of a pair of reciprocating members arranged adjacent each other, a finger pivoted in one of said members, said finger serving to impart movement to an article when moved in one direction and to swing on said pivot into retracted position when moved in the other direction, a cam face on the other of said reciprocating members to engage said finger for effecting said last-named result, and means for moving both of said reciprocating members in synchronism but in such a manner that one begins its return stroke before the other, whereby the cam is effective for its purpose during the return stroke of the finger.

7. In a transfer mechanism adapted to impart a step by step horizontal movement to coated articles without permitting any contact between the moving means and the coating surface, the combination of a pair of reciprocating members arranged in slidable engagement with each other, a finger pivotally mounted in one of said members, resilient means urging said finger into position to move an article, a cam on the other of said members positioned to engage said finger retractively in one relative position of said members, means for moving said reciprocating members in synchronization, said cam holding member having phase lead sufficient to cause said finger to be retracted during the movement in one direction.

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