Jan. 13, 1931. P. R. SIMMONS 1,789,160

FEEDING DEVICE FOR PAPER SHEET STOCK

Filed Aug. 10, 1929 3 Sheets-Sheet 1

FIG. 1

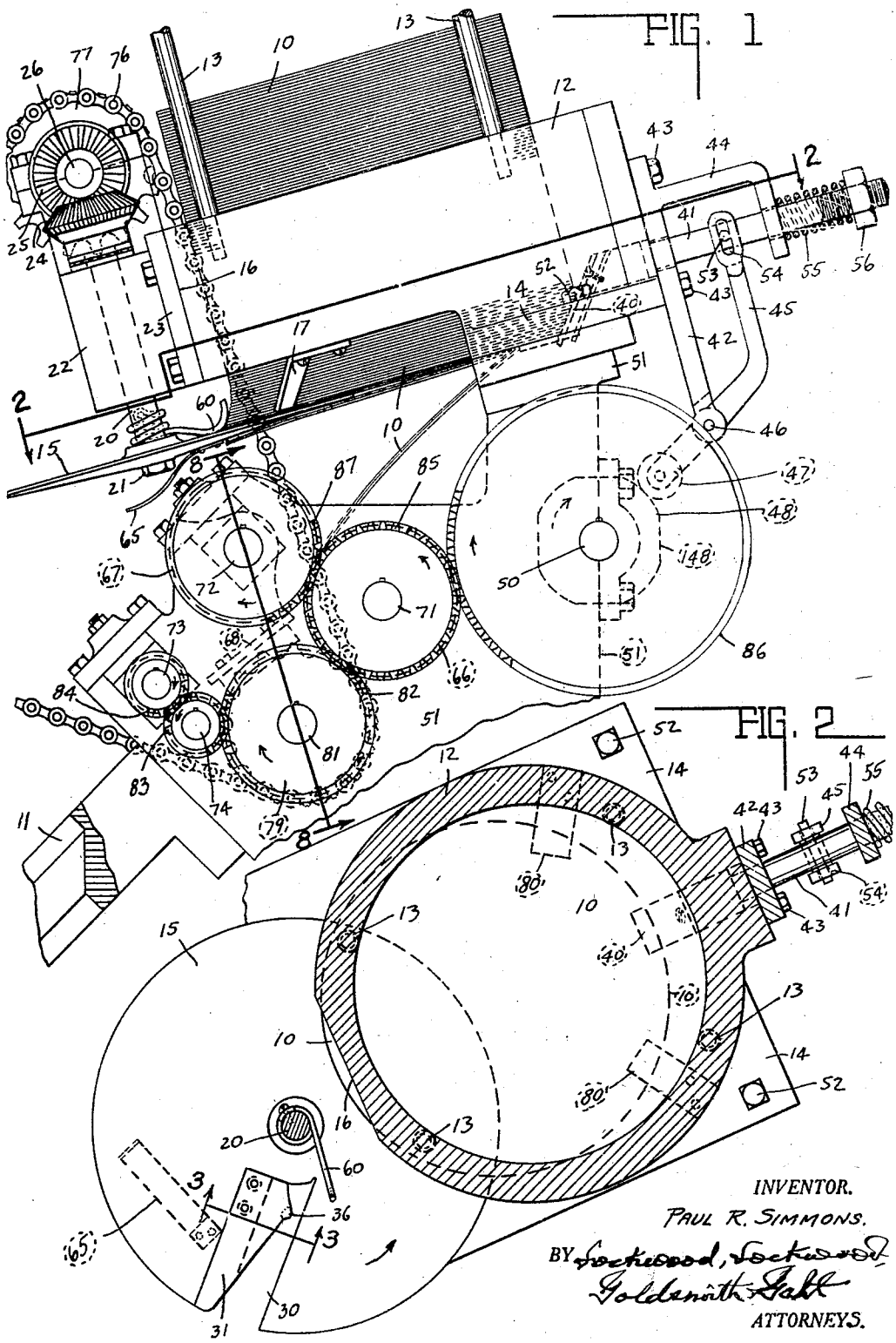

FIG. 2

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FIG. 5

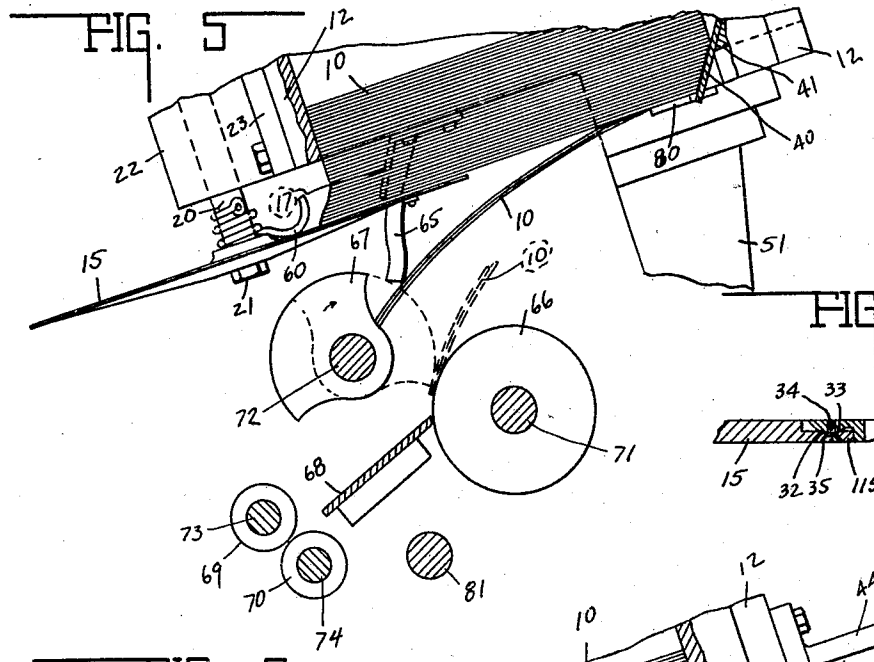

FIG. 3

FIG. 6

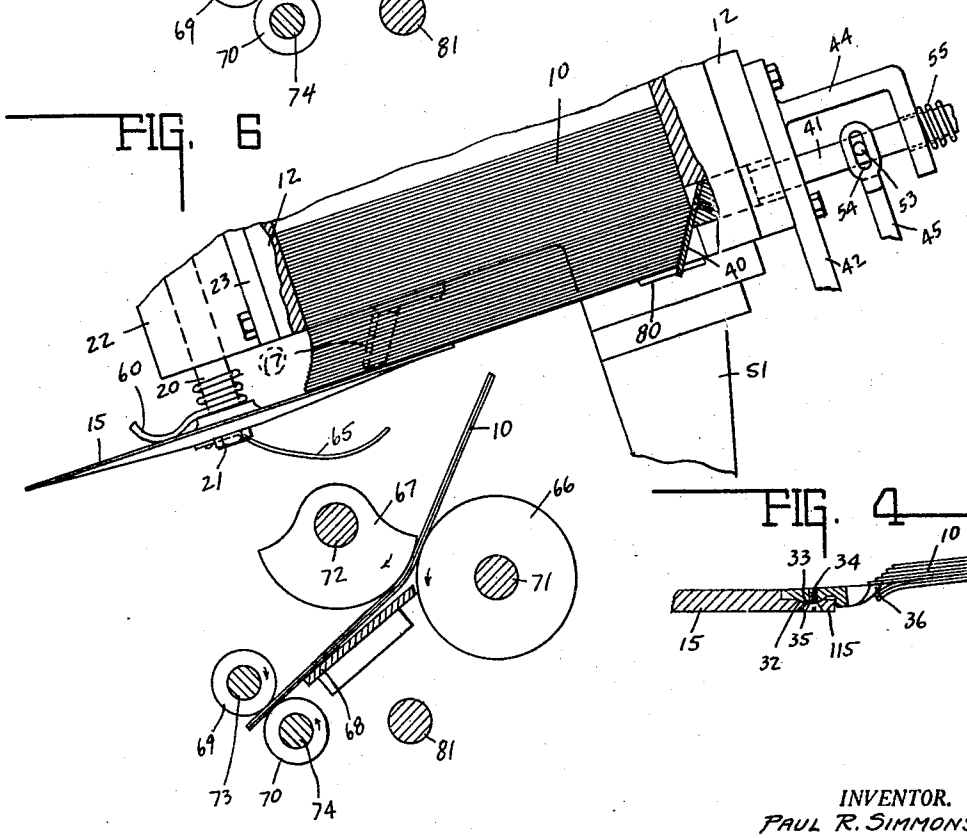

FIG. 4

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FIG. 7

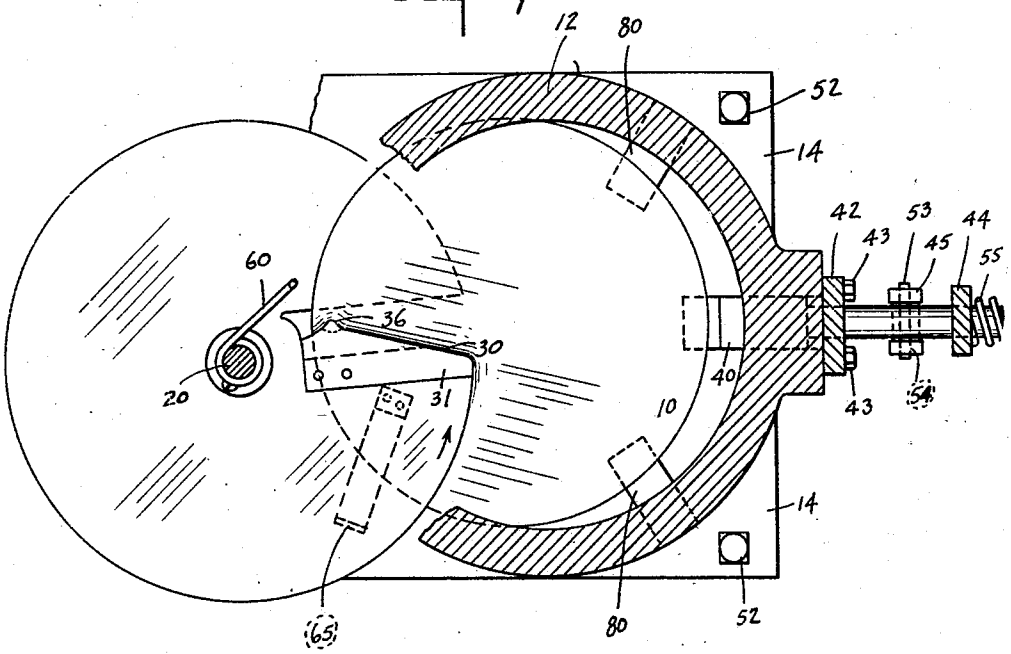
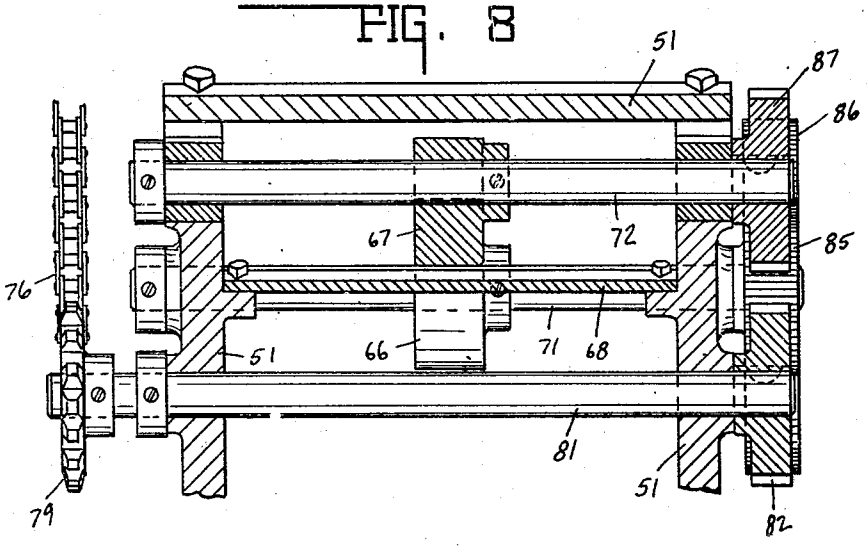


FIG. 8



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UNITED STATES PATENT OFFICE

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FEEDING DEVICE FOR PAPER-SHEET STOCK

Application filed August 10, 1929. Serial No. 384,862.

This is a novel machine for feeding paper sheet stock from the bottom of a stack of said sheets, one or more sheets at a time, to a machine for forming or treating the same as desired. The particular machine herein set forth has been made and adapted for feeding flat circular flexible paper disks to a machine for pressing them into paper dishes and the like.

One object of said machine is to select by mechanical means the bottom sheet or sheets and separate the same from the stock, and to do so satisfactorily, and particularly to feed a predetermined number of sheets from the bottom of the stack at each operation of the machine. The object last stated is of importance where the forming machine can treat a plurality of sheets simultaneously, as is true in making paper dishes.

One feature of the machine is the provision of a slotted rotary sheet selecting disk which as it rotates selects a sheet from the bottom of the stack as desired, and passes its adjacent portion through the slot and separates it from the stack without disturbing the stack.

Another feature consists in providing said disk with an adjustable selecting plate so as to select two or more sheets at a time from the bottom of the stack.

Another feature of the invention is the provision of means in connection with said separating disk and revolving therewith for depressing the selected sheet or sheets down and away from the stack after they have been selected by said selecting disk.

Another feature of the invention consists in providing, with the foregoing, rolls for receiving the disks thus selected and depressed towards feeding means for moving the machine for forming or otherwise treating them.

Another feature of this invention consists in providing feeding means in such relation to the selecting disk that gravity will cooperate with the machine in feeding the disk or disks selected to said feeding rolls.

Another feature of the invention consists in the selecting disk supporting partially the stack of sheets from which said disk in its rotation selects one or more sheets at the bottom of the stack and separates them and enables them to be fed to the feed rolls for conveying them to the machine for treating them thereafter.

Another feature of the invention consists in providing means rotatable with said rotating disk for engaging and holding the lower sheets in the stack down flat on the selecting disk whereby it will be enabled to select one or more sheets as desired at the bottom of the stack at each operation and with certainty.

Another feature of the invention consists in providing a yielding pusher means cooperating with said last-mentioned means for keeping the lower sheets of the stack pushed into suitable position on said selecting disk so the edges of the few bottom sheets on the disk will be substantially terraced, to enable the selecting disk to perform its work with certainty and accuracy.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a side elevation of the machine with some parts broken away. Fig. 2 is a substantially horizontal section on the line 2—2 of Fig. 1, some parts being omitted. Fig 3 is a vertical section through a part of the selecting disk on the line 3—3 of Fig. 2 showing the selector plate adjusted so as to select and separate one sheet. Fig. 4 is the same as Fig. 3 with said selector plate adjusted so as to select and separate two sheets. Fig. 5 is partly in side elevation and partly in vertical section of parts of the mechanism shown in Fig. 1 in position for separating and directing the selected sheets to the feed rolls. Fig. 6 is the same as Fig. 5 in their position when the selected sheets are being fed by the feed rolls after parting altogether from the stack of sheets in the magazine. Fig. 7 is substantially like Fig. 2 with a selecting disk advanced so as to show a sheet extending through the radial slot thereof, parts being in horizontal section and the magazine cas-

ing being partly broken away and only the bottom disk of the stack being shown in plan view. Fig. 8 is a substantially vertical transverse section on line 8—8 of Fig. 1.

This feeding machine holds a stack of circular sheets 10 of paper stock and the purpose of the feeder is to mechanically select at each operation the lower sheet, or a predetermined number of lower sheets, and separate them from the stack and convey them to a suitable forming machine having a die 11 whereby the sheets are pressed into the shape of a dish, plate, pie pan or other desired shape. The invention is not limited to the treatment received by the sheets after they have been fed from the stack, as they might be printed or otherwise treated.

The magazine for containing the stack of circular sheets 10 of paper stock consists of a substantially cylindrical casing 12 with four guide rods 13 extending upward therefrom so that the stack of sheets can be built up above the casing 12 if a high stack is desired. Said casing 12 has a bottom external plate 14 and inwardly extending fingers 80 adapted to support the right hand portion of the stack of sheets and the stack of sheets is also supported at the left hand by resting on the circular selecting metal disk 15 as shown in Figs. 1 and 2. The selecting disk 15 and bottom of the magazine are in substantial alignment with each other and preferably inclined downward from right to left to some extent. The casing wall 12 is partially cut away or flattened at 16 as seen in Fig. 1.

Said sheets are kept from lateral displacement by two oppositely positioned fingers 17 secured to the bottom of the casing 12, there being one finger 17 on each side of said casing and said fingers are inclined downwardly and inwardly almost to said rotary selecting disk 15.

The selecting disk 15 is secured on the rotary shaft 20 by a nut 21 and it extends upward through the bearing member 22 on the flat plate 23 which is bolted to the casing 12 where it is cut away vertically at 16. The shaft 20 is driven by a bevel gear 24 secured thereon and meshing with a bevel gear 25 on the horizontal drive shaft 26, which is continuously driven by sprocket gear 77 and chain 76 driven by a suitable source of power, not shown herein. This will cause the selecting disk 15 to rotate in the direction indicated by the arrow in Fig. 2, the direction herein shown being counterclockwise, but it can be rotated in either direction so far as this invention is concerned.

The selecting disk 15 not only selects at each operation one or more lower sheets 10, as desired, of the stack, but partially supports the stack of sheets, from which it selectively feeds the sheets, as the machine is operating. Said disk 15 is cut away at 30 so as to leave an opening or slot almost radial and about one inch wide that extends from the periphery toward and almost to the center, through which slot the selected sheet or sheets can extend as they are being selected or separated from the stack, as shown in Fig. 7.

On the following edge of said slots the left hand edge of the disk 15, as herein shown, there is mounted an adjustable selector plate or member 31 as seen in Fig. 2. It is shaped in cross section substantially as shown in Figs. 3 and 4, and the left hand portion thereof is mounted on a shelf 115 formed by cutting away a portion of the upper surface of the disk above said shelf. There is also provided in said shelf 115 a substantially radial recess 32 concave in cross section in which there is mounted a substantially similarly formed convex rib 33 and it is secured therein by a pair of screws 34 extending through slots 35 in the shelf 115, whereby the angular relation of said shelf to said plate 31 with reference to said selecting disk 15 may be adjusted as shown in Figs. 3 and 4. Said selecting plate 31 slopes away rearwardly from said point 36 to some extent as seen in Fig. 2. The right hand portion of plate 31 is thicker than the left hand half thereof, as appears in Figs. 3 and 4; that is, the right hand portion is about as thick as the plate 15 and is bevelled on the underside as shown in Figs. 3 and 4, so that said plate 31 will have a substantially flat upper surface and a retreating bevelled lower surface as shown.

The purpose of the adjustment of the selecting plate 31 is to so direct the advance selecting point 36 that it will enter the stack of sheets 10 just above the lower sheet, if it be desired to select the lower sheet only, at each rotation of said disk 15. But if it be desired to select the two lower sheets, as in Fig. 4, the advancing edge of the plate 31 and point 36 is tilted upward somewhat. Thus, said advancing point 36 and the plate 31 can be adjusted to penetrate the stack where desired so that it will separate one sheet or two sheets or four sheets or any desired number of sheets at each operation.

In order that the sheets 10 may be accurately selected and fed by this machine, it is important that the sheets be terraced on the selecting disk 15 as seen in Fig. 1. To effect this result a finger 40 is secured on the end of a push rod 41 that has bearings in the right hand side of the casing 12 and the frame bar 42 secured to the right hand side thereof by bolts 43, and the downward rear portion of the bar 44 extending from the upper part of said bar 42. The push bar is operated forward by the yoke bar 45 which is fulcrumed at 46 in the lower end of bar 42 and at its lower end carries a roller

47 which rides on a cam 48 on the shaft 50 secured to the frame 51 which supports the sheet magazine bottom plate 14 by bolts 52.

The bar 45 is bent so that its outer end extends upwardly and fits loosely astride the rod 41 and the pins 53 in said rod 41 extend through slot 54 in the yoke bar 45. As the cam 48 revolves in the direction of the arrow thereon and the roller 47 rides over the flattened segments 148 thereof, the finger 40 on bar 41 will be given a sudden impulse inward or to the left. This movement is not very great but is sufficient to force the lower few sheets in the stack to the left or forward on the selecting disk 15 substantially as shown in Fig. 1. Said finger 40 and rod 41 are returned by the spring 55 on rod 41 acting between the stationary arm 44 and the nut 56 on the threaded outer end of rod 41.

It is important also that the sheets 10 be held flat on the selecting disk 15 and at a predetermined distance from its center. Therefore, there is a spring finger 60 secured on and coiled about the shaft 20 of disk 15 so as to rotate therewith. Finger 60 is a stiff wire with its middle portion resting on plate 15 and its extreme outer end is curved upward as shown in Fig. 1, so that the finger 60 will engage the few lower sheets 10 and hold them in a sloping or terraced position as shown in Fig. 1. That is, the lowest sheet in the stack will extend further toward the center of the selecting disk 15 than the sheet above it, and the second sheet will extend further toward said center than the sheet above it, so that the lower sheets of the stack are substantially tapered inward in the form of a terrace so the lower sheets extend further inward toward the center of the selecting disk 15 which renders them more readily selected by the selecting plate 31 and point 36 of the revolving disk 15 at each revolution thereof.

Said selecting disk 15 continuously revolves and the selecting point 31 is located slightly further from the center of disk 15 then the sheets and so it travels substantially tangentially of the stack of sheets 10 and passes between the two lower sheets thereof as shown in Fig. 3, if the machine be set for feeding single sheets or between the second and third sheets if it be set as in Fig. 4 for feeding two sheets at each operation.

As the disk 15 further revolves the selecting plate 31 moves in just above the selected sheets and bends down the near portion of the selected sheets away from the stack of sheets above, so they will extend through slot 30, as shown in Fig. 7, and then the portion of disk 15 following slot 30 will be above the selected sheet while the portion in advance of slot 30 will continue below the sheet. To render this effective, the advance portion of the selecting plate 31 is about a half inch thick. As the selecting disk 15 further revolves, the separating finger 65 gradually is moved by said disk above the depressed selected sheet or sheets and it gradually more and more bends said sheets down to the position shown in Fig. 5. The right hand edge of the sheet or sheets thus bent down is still frictionally held between the stack above and the bottom fingers 80 of the magazine and the left hand edge of said sheet or sheets is brought within the grasp of the circular feed roll 66 and segmental feed roll 67 above it. As said rolls are further actuated in the direction of the arrow shown in Fig. 5, their peripheries will engage as shown in Fig. 6 and feed the sheet or sheets downward and to the left over plate 68 and between said rollers 69 and 70 and thereby on to the die 11 or other treating means or machine.

The main frame 51 which supports the magazine and parts heretofore described has mounted in it not only the shaft 50 but also the shafts 71 and 72 on which the feed rolls 66 and 67 are mounted, and the shafts 73 and 74 on which the feed rolls 69 and 70 are mounted. The shafts 72 and 73 are adjustably mounted as shown. The main drive shaft 26 carries a sprocket wheel 77 which drives the sprocket chain 76 and it, in turn, drives the sprocket wheel 79 secured on the shaft 81 which also is mounted in frame 51, and said shaft 81 carries gear 82, (see Fig. 8) which drives gear 83 on shaft 74 and gear 83 drives gear 84 on shaft 73. Also gear 82 drives gear 84 on shaft 71 and gear 84 drives the large gear 86 on shaft 50, as seen in Fig. 8.

In operation, the paper sheets 10 are stacked in the magazine 12 and are supported partially by bottom fingers 80 extending inwardly from the wall of the magazine casing 12, as indicated in Fig. 2, but the stack is chiefly supported on the right hand portion of the selecting disk 15. As said selecting disk revolves the selecting point 36 on plate 31 selects one or more bottom sheets as indicated in Figs. 3 and 4, and divides them from the stack, and the portion of them adjacent the disk 15 is turned down so as to extend through slot 30 of disk 15 as seen in Fig. 7, and as the disk 15 rotates further the spring 65 further bends downward and separates said selected sheets and brings them to the position shown in Fig. 5, where they are grasped by the rollers 66 and 67 and fed through the rollers 73 and 75 to the die 11 of the machine for shaping or otherwise treating them.

The paper sheets at the lower end of the stack lie flat upon the disk 15 and are positioned by the pushing finger 40 on the right hand side and the curved finger 60 on the left hand side so that the lower sheets are terraced somewhat for the ready entrance be-

tween them of the selecting point 36 and plate 31 of the disk 15. The adjustability of said plate 31 and point 14 enables the machine to select one or more than one sheet at each operation of the disk 15. If the thickness of the sheets be changed, the machine will select and separate them satisfactorily because the selecting plate 31 and point 36 can be correspondingly adjusted.

It is also important that the selecting sheet 15 be opposite to and appreciably spaced from the stack supporting fingers 80, so as to provide ample room for the selected sheet to be bent downward at the left hand while the right hand portion is still held by fingers 80.

The ability of the machine to separate and feed simultaneously a plurality of sheets at each operation, say four or five sheets, renders the machine of value in increasing the production of paper dishes and the like, for if a strong press is employed in shaping the sheets, it will simultaneously press four or five dishes at each operation as well as one. Since the purchase of such paper dishes and the like is in enormously large quantities by ten cent stores and the like, this feature of the invention is valuable.

The invention claimed is:

1. In a machine of the class described, a magazine adapted to contain a stack of separate flexible sheets of paper stock, means at the bottom of the magazine for supporting at one side thereof the bottom sheet and said stack of sheets, a rotatable sheet selecting disk on which the opposite portion of the bottom sheet and stack of sheets is supported in flat position, sheet selecting means on said disk revoluble by said disk, substantially tangentially of the stack and adapted to pass above the sheet or sheets to be selected from the bottom of the stack and depress the same, and means for adjusting the angular relation of said selecting means to said disk for selecting and separating sheets of varying thickness and a varying number of sheets at each rotation of the disk.

2. In a machine of the class described, a magazine adapted to contain a stack of separate circular, flexible sheets of paper stock, a rotatable sheet selecting disk on which at one side of the center a portion of the bottom sheet and the stack is supported in flat position and having a substantially radial slotted opening from the periphery almost to the center of said disk, and said disk being mounted in such position that said slotted opening will revolve substantially tangential of and pass through the stack, a selecting plate secured to the following edge of said slotted portion of the disk with a selecting point near the inner end thereof adapted at each revolution of the disk to pass above and separate one or more sheets as desired from the bottom of the stack, and the portion of the disk in advance of said slot will pass under the selected sheets, and means for adjusting the angular position of said selecting plate and point with reference to said disk so as to adapt it to select and separate varying numbers of sheets and sheets of varying thickness.

3. In a machine of the class described, a magazine adapted to contain a stack of separate sheets of paper stock, a rotatable disk adapted to support upon it at one side of its center a bottom sheet and a stack of sheets, sheet selecting means on said disk revoluble substantially tangentially of said stack and adapted at each revolution of the disk to pass above one or more sheets of the said stack as desired and separate them from the bottom of the stack, and means for positioning the sheets near the bottom of the stack so that they will be in substantially terraced position on said disk for facilitating the selecting and separation thereof by the disk.

4. In a machine of the character described, a magazine adapted to contain a stack of separate flexible sheets of paper, means at the bottom of the magazine for supporting one side portion of the bottom sheet and stack of sheets, a rotatable sheet selecting disk on which the opposite portion of the bottom sheet and stack is supported, means carried by said disk revoluble tangentially of said stack of sheets and adapted to pass above and separate one or more sheets as desired from the bottom of the stack and to depress the same at each revolution of the disk, an inclined pushing finger for engaging a few sheets at the bottom of the stack and pushing them toward the center of said disk so that they will lie thereon in substantially terraced position.

5. In a machine of the character described, a magazine adapted to contain a stack of separate flexible sheets of paper, means at the bottom of the magazine for supporting one side portion of the bottom sheet and stack of sheets, a rotatable sheet selecting disk on which the opposite portion of the bottom sheet and stack is supported, means carried by said disk revoluble tangentially of said stack of sheets and adapted to pass above and separate one or more sheets as desired from the bottom of the stack and to depress the same at each revolution of the disk, a finger revoluble with said disk and inclined upwardly and away from the center thereof for stopping a few of the lower sheets of said stack at the proper distance away from the center of the disk and holding them flat on said disk.

In witness whereof, I have hereunto affixed my signature.

PAUL R. SIMMONS.