

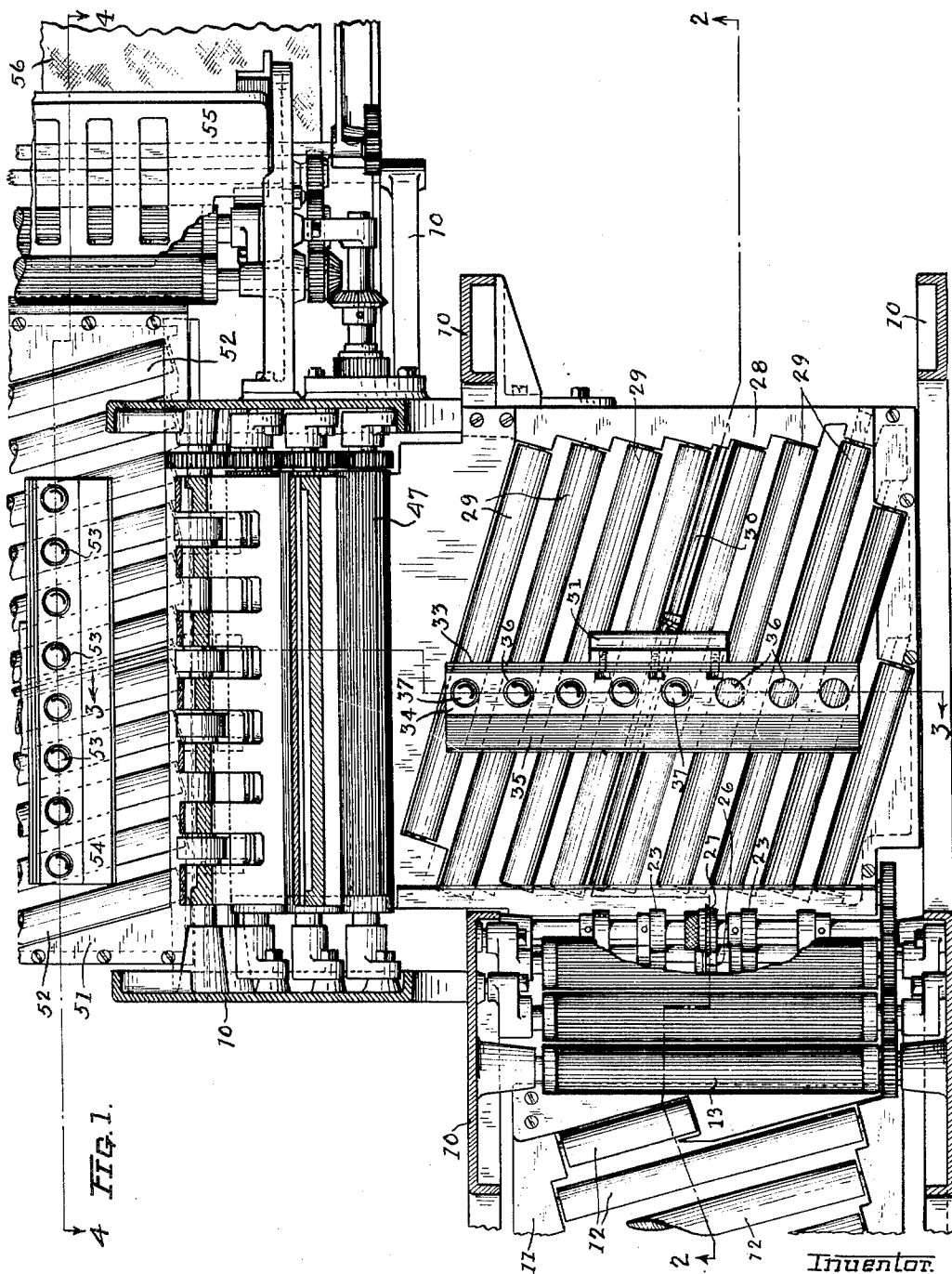
Aug. 7, 1928.

1,680,044

R. HITCHCOCK
PAPER HANDLING MACHINE

Filed Dec. 2, 1926

5 Sheets-Sheet 1



By *Kewis Hudson & Kent*
Attorneys.

Aug. 7, 1928.

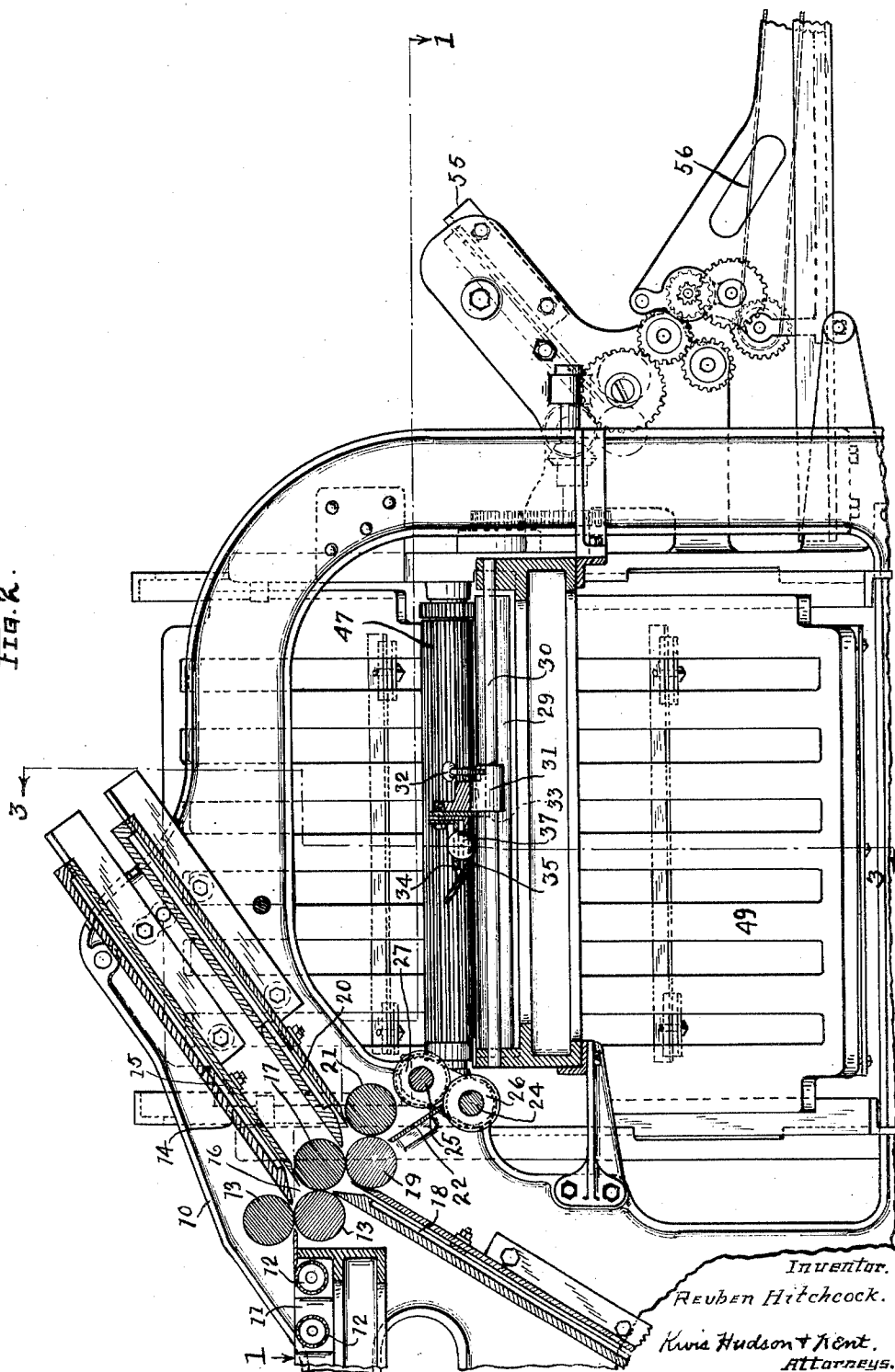
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5 Sheets-Sheet 2

FIG. 2.



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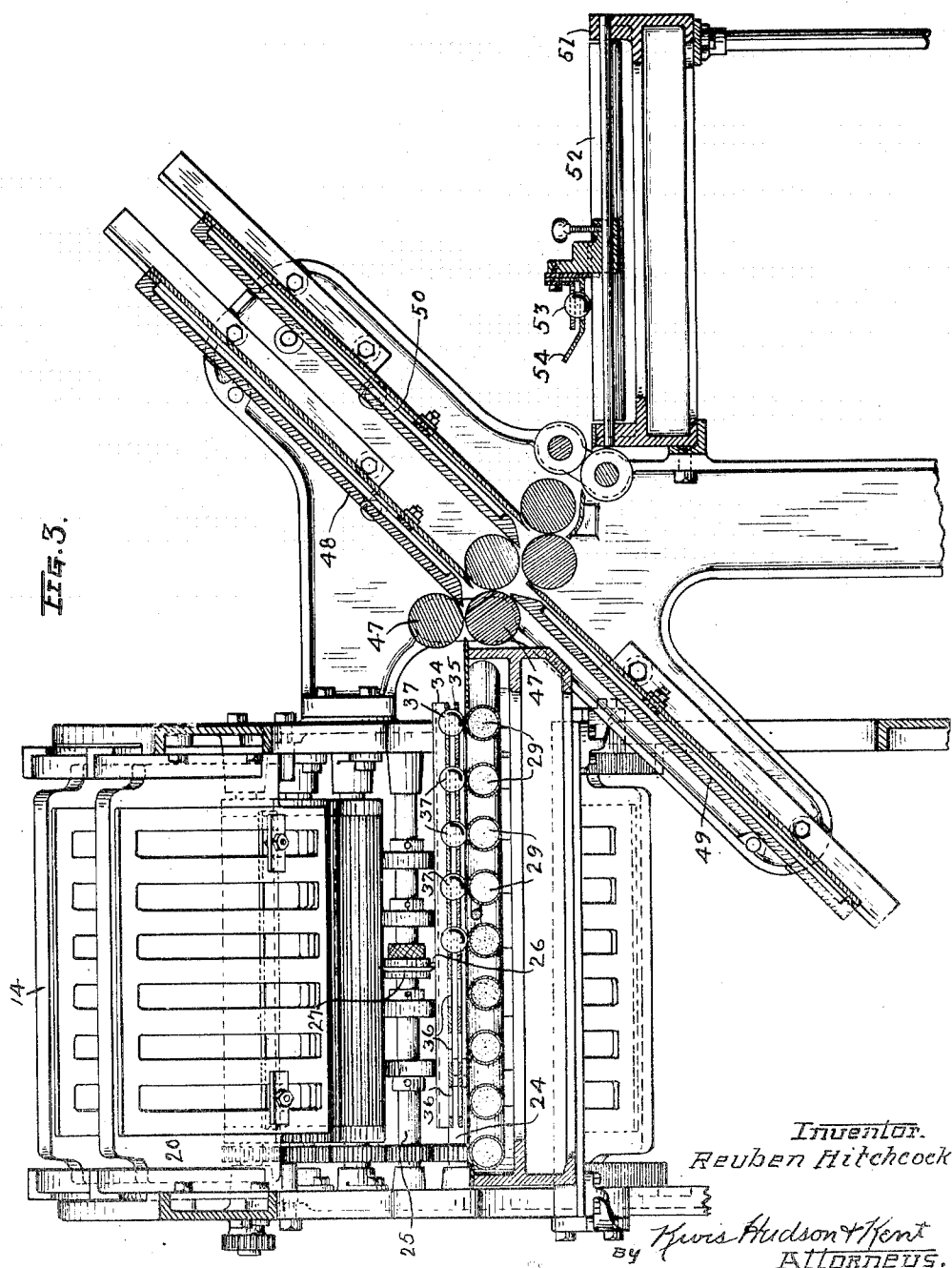
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5 Sheets-Sheet 3



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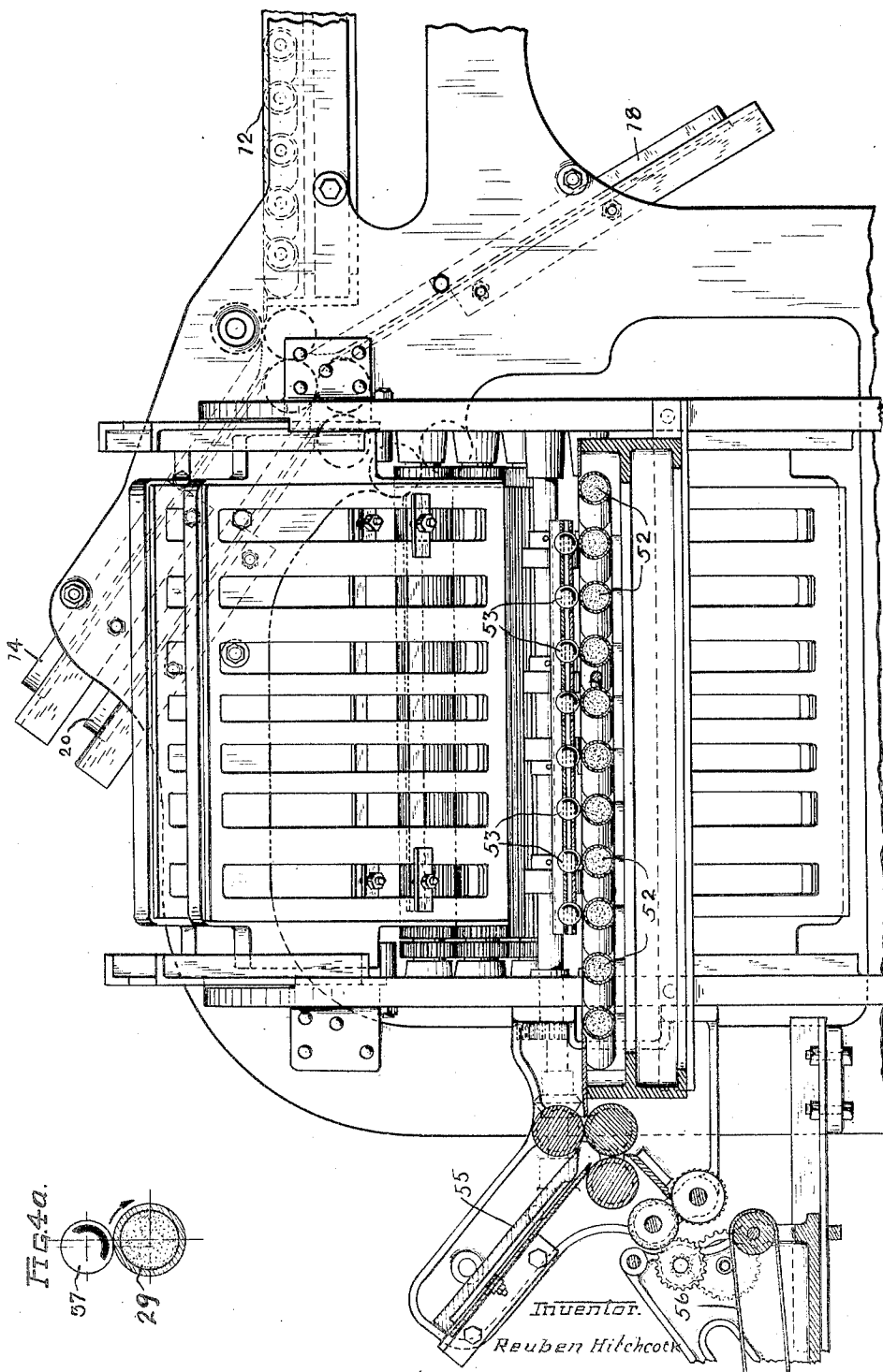
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5 Sheets-Sheet 4

FIG. 4.



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5 Sheets-Sheet 5

FIG. 5.

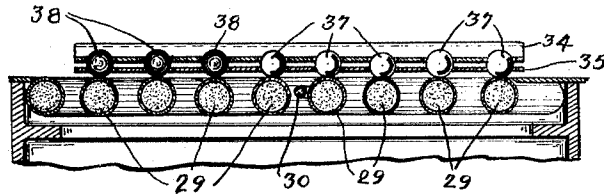


FIG. 6.

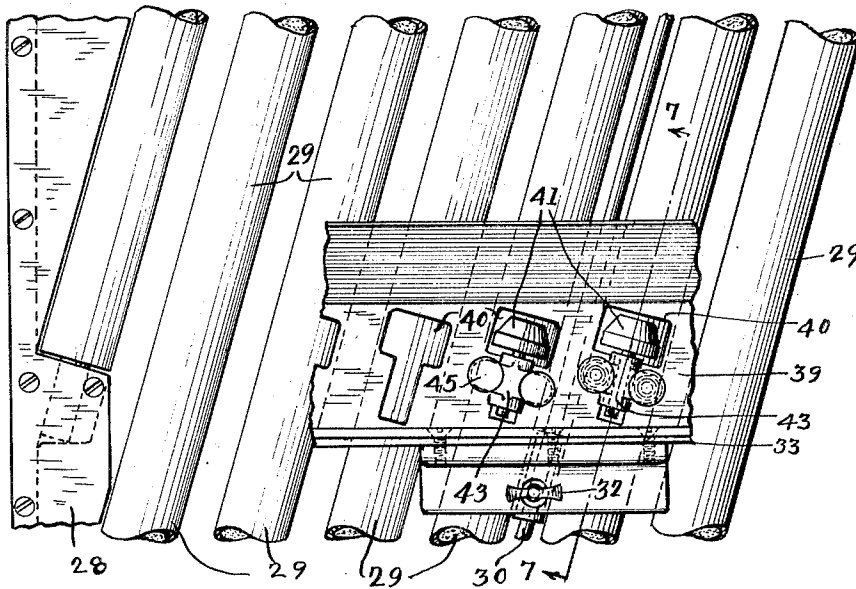


FIG. 8.

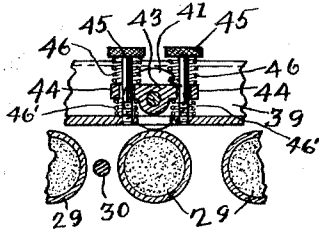
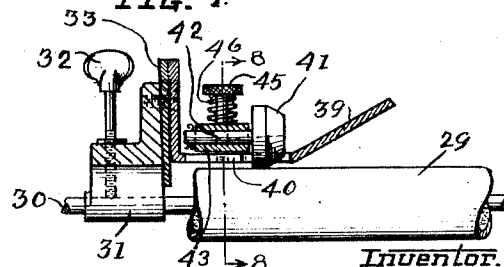


FIG. 7.



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Patented Aug. 7, 1928.

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UNITED STATES PATENT OFFICE.

REUBEN HITCHCOCK, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND FOLDING MACHINE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

PAPER-HANDLING MACHINE.

Application filed December 2, 1926. Serial No. 152,184.

This invention relates to paper handling machinery for transferring sheets of paper to different mechanisms which operate thereon.

5 While the invention is applicable to paper handling machines in general, it is especially applicable to paper folding machines and will be illustrated and described in that connection.

10 It is one of the objects of the invention to provide a simple and efficient means for spacing or separating sheets on a feed table so that they will follow into the mechanism which operates on them in proper sequence
15 to avoid interference between successive sheets.

A further object of the invention is to provide a relatively simple device adapted to separate the sheets, as above referred to,
20 that will be readily applicable to existing types of feed mechanisms without material alteration thereof.

A further object of the invention is to provide improved means for use in connection
25 with a feed table embodying diagonally arranged rollers, or similar feeding devices, which will be adapted to check the transverse movement of the sheets by which they are delivered onto the table, such checking of
30 the sheets to occur just before they reach the side guide, and the checking means also serving to prevent a rebound of the sheets from the side guide.

A further object of the invention is to
35 provide an improved means for checking sheets, as just referred to, that will be adapted to cooperate with the feed rollers of the table to accurately maintain the sheets against the side guide as they are moved
40 longitudinally of the table. In prior feeding devices, difficulty has been experienced in preventing oblong sheets from skewing on the feed table when they are moved longitudinally of the table with their longer edges
45 extending transversely of the table, and it is one of the objects of this invention to provide means for accurately feeding oblong sheets and avoid this tendency of the sheets to become skewed on the table.

50 A further object of the invention is to provide improved feeding means that will be adapted to handle relatively thin sheets without buckling the edge which engages the side guide.

55 Other objects of the invention and the

features of novelty will be apparent from the following description taken in connection with the accompanying drawings, of which:

Fig. 1 is a plan view of a portion of a
60 paper folding machine embodying my invention, some of the parts being shown in section on the line 1—1 of Fig. 2;

Fig. 2 is a vertical section on the line
2—2 of Fig. 1;

Fig. 3 is a vertical section on the line
3—3 of Fig. 2;

Fig. 4 is a vertical section on the line
4—4 of Fig. 1;

Fig. 4a is an enlarged detail section
70 through one of the table feed rollers with a ball in the preferred relation thereto;

Fig. 5 is a fragment of Fig. 3 but illustrating a slight modification of the arrangement illustrated in Fig. 3;

Fig. 6 is a plan view of a fragment of a
75 feed table showing another form of construction in which my invention may be carried out;

Fig. 7 is a section on the line 7—7 of Fig.
80 6; and

Fig. 8 is a section on the line 8—8 of
Fig. 7.

Referring to the drawings, the portions
85 of the frame of the machine are indicated at 10. A horizontally arranged feed table is indicated at 11 and comprises the rollers 12 for feeding the sheets of paper. The table 11 may be the delivery table of a feeding mechanism for separating sheets from a
90 pile and forwarding them to the folding or other mechanism which operates on the sheets. In the present illustration of my invention, the sheets are delivered by the table 11 to a pair of feed rollers 13 which
95 forward the sheet to the fold-plate 14 which is one of the characteristic elements of the well-known type of folding machines in which the folding operations are performed by causing the sheet to be buckled. In this
100 type of machine, the forward edge of the sheet strikes a stop 15 which is positioned across the slot in the fold-plate 14, thereby causing a buckle to form in the sheet in the space 16, this buckle producing a fold which
105 enters between the lower roll 13 and the roll 17, these rolls serving to form the crease in the sheet and to feed it into a second fold-plate 18 from which the sheet is carried by
110 the roll 17 and the roll 19 into a third fold-

plate 20. From the latter fold-plate the sheet is carried by the roll 19 and the roll 21, which cooperates therewith, against a deflecting plate 22 which directs the sheet between the pairs of rubber rolls 23 on the parallel shafts 24 and 25.

It will be understood that, in accordance with the usual practice in connection with this type of folding machine, any one or more of the fold-plates 14, 18 and 20 may be rendered inoperative at will and in accordance with the requirement as to the number and character of the folds that are to be made in the sheets.

It is frequently desirable to cut the sheet into two or more pieces either before it has been folded or after it has received a desired number of folds, and, for this purpose, I have shown a pair of cutting disks 26 and 27 on the shafts 24 and 25 respectively. These cutting disks 26 and 27 serve to cut the sheet in two as it passes between the pairs of rolls 23. After the sheet has passed the cutting disks 26 and 27, there are then a plurality of sheets that move forwardly side by side onto a feed table 28 having feed rollers 29 which are arranged at an angle to the longitudinal axis of the table, in accordance with the usual practice. It will be understood that the feed rollers 12 and 29 of the above-mentioned tables are rotated by any suitable means such as is common in machines of this kind and so well-known to those skilled in the art that they have been omitted for the purpose of avoiding unnecessary complication of the drawings.

A rod 30 is arranged in the table 28 between two of the rollers 29, and a bracket 31 is slidably mounted on this rod and secured in any desired position by means of the screw 32. The bracket 31 carries a stop plate 33 which is arranged longitudinally of the table 28 and is adapted to interrupt the transverse movement of the sheets by which they are fed onto the table 28. The plate 33 also serves as a guide for the sheets as they move longitudinally of the table 28, the inclination of the rollers 29 keeping the sheets in contact with the guide as they are moved forwardly on the table. The bracket 31 also carries a holding device comprising the angle members 34 and 35 which have a series of openings 36 therein to receive the balls 37, these balls being arranged above the rollers 29 so that each ball cooperates with one of the rollers. The balls 37 may be made of steel, glass, or other suitable material, but I have found that steel balls of about 1" or 1 1/4" in diameter give highly satisfactory results on account of their weight and freedom from the liability of marking or soiling the sheets of paper. As shown in Fig. 4^a, I prefer to have the center of each of the balls 37 slightly off-center

with respect to the axis of the cooperating roller 29 so that there will be a tendency to bend the leading corner of the edge of the sheet, that is engaged by the balls, upward and thus prevent this corner from getting under the guide plate 33.

From Figs. 1 and 3, it will be noted that the balls 37 are arranged in only a portion of the openings 36, and, according to one way of practicing this invention, I would use these balls in the positions where they will cooperate only with the leading sheet of a plurality of sheets that are fed onto the table 28 simultaneously. In other words, referring to Fig. 3, it will be noted that the balls 37 are located only in the openings 36 that are to the right of the cutter disks 26 and 27 and that there are no balls in the openings to the left of these cutter disks.

When the sheets are delivered onto the table 28, the front edge of the sheet which is to the right of the cutter disks 26 and 27 (referring again to Fig. 3) will pass under the balls 37 and its transverse movement will be checked thereby until it reaches the stop plate 33, the balls 37 thus preventing a rebound of the sheet from the plate 33. On account of the balls 37 being loosely arranged in the openings 36, they are free to rotate in any direction, and, therefore, the sheet readily passes under the balls lifting the latter so that they will then engage the upper surface of the sheet and press the sheet against the rollers 29 with which the balls cooperate. The effect of the balls 37 in checking the transverse movement of the sheets is of especial advantage in the case of relatively thin sheets because they are prevented from striking the plate 33 with such force as would result in the formation of a buckle in the edge portion of the sheet and such thin sheets are, therefore, fed longitudinally of the table 28 in perfectly flat condition so that they may be properly delivered from the table 28 to the other mechanisms which operate on them. The sheet which is to the left of the cutter disk 26 and 27 will be delivered against the stop plate 33, but since there are no balls to initially press this following sheet against the feed rollers 29 which are beneath it, the leading sheet which is held against the feed rollers 29 by the balls 37 will be given a much more rapid acceleration longitudinally of the table, which will separate the sheets a sufficient distance to prevent subsequent interference as they pass through the remaining portions of the folding machine.

From the foregoing, it will be understood that the sheets which have been delivered onto the table 28 in side by side arrangement will be moved longitudinally of the table in single file arrangement, and as soon as the edge portion of the second sheet of

the two moves forward on the table 28 a slight distance it will be engaged, in succession, by the balls 37, and after the latter sheet has been accelerated up to the speed of the first the two sheets will continue their forward movement at the same velocity but spaced apart the necessary distance to avoid subsequent interference of the sheets.

Referring to Fig. 5, it will be seen that I have shown balls in each of the openings 36, but the three balls 38 which are to the left of the balls 37 are made of a different material than the balls 37, preferably a material, such as rubber, cork, wood, or a suitable composition, which has a higher coefficient of friction than steel or glass and, therefore, will not rotate quite as freely in the openings 36 as do the balls 37. The friction between the balls 38 and the edges of the openings in which they are held produces a retarding effect on the rotation of these balls and thus results in a greater separation of the sheets than when the balls 38 are omitted, and the amount of separation of the sheets will vary with the variation in the materials of which the balls 38 are made.

Referring to Figs. 6, 7 and 8, it will be noted that the modification therein illustrated comprises a supporting member 39 which extends longitudinally of the table 38 and is carried by the bracket 31. The supporting member 39 has openings 40 above the rollers 29 through which conical rolls 41 project into contact with the feed rollers 29. Each of the rolls 41 is carried by a shaft 42 which is preferably arranged parallel with the rolls 29 and is mounted in a bearing member 43, these bearing members having apertured ears 44 which slide on the screws 45. There are coil springs 46 surrounding the screws 45, above the ears 44, which serve to lightly press the rolls 41 against the feed rollers 29. Additional springs 46' are arranged on the screws 45, below the ears 44, and these springs are adapted to lift the rollers 41 out of engagement with the rollers 29. The springs 46 and 46', therefore, permit an accurate adjustment of the pressure of the rolls 41 on the rollers 29 by the adjustment of the screws 45. The rolls 41 serve to press the sheet against the feed rollers 29, and, therefore, effect a rapid acceleration of the leading sheet and space the sheets apart, as previously described, and also check the transverse movement of sheets.

The sheets are fed successively from the table 28 between the rollers 47, and, after passing through one or more of the fold-plates 48, 49 and 50, the sheets are delivered onto the table 51 which comprises a series of feed rollers 52 for moving the sheets at right angles to the direction of movement on the table 28. It is desirable, in order to

avoid interference, between successive sheets in any folding mechanism to which the sheets may be delivered by the table 51, that each sheet be started longitudinally of the table 51 as quickly as possible after it is delivered onto this table, and, to accomplish this, I have provided the balls 53 in a holder 54 which may be constructed of angle members similar to the members 34 and 35. The balls 53 are similar to the balls 37 and operate on the sheets in the same manner as the balls 37 so that a detailed description of this feature of the mechanism does not appear to be necessary.

From the table 51 the sheets pass in succession into an additional folding mechanism which is illustrated by the fold-plate 55, and from this fold-plate the sheets may be delivered onto a delivery belt 56 or other device such as is commonly used in machines of this character for finally discharging the folded sheets.

In case the cutting disks 26 and 27 are omitted and single sheets are delivered transversely onto the table 28, any suitable number of the balls may be inserted in the openings 36, depending upon the size of the sheet and the weight of the stock, and these balls will cooperate with the rollers 29 to check the transverse movement just before the sheet reaches the plate 33 and prevent a rebound, and will also insure that the sheets will move longitudinally of the table 29 in proper position against the plate 33. This is particularly desirable in the case of oblong sheets which are fed longitudinally of the table 28 with their longer edges arranged transversely of the table since the angular arrangement of the rollers 29 would otherwise have a tendency to skew such sheets on the table 28.

Having thus described my invention, I claim:

1. In paper handling machines, the combination of a feed table comprising sheet moving means, means for feeding a plurality of sheets simultaneously onto said table transversely of the direction of movement given to the sheets by said sheet moving means, a stop for interrupting such transverse movement of the sheets, and rotatable members arranged above said sheet moving means adjacent said stop to engage the leading sheet on said table to give to that sheet a rapid acceleration longitudinally of said table for the purpose of separating said leading sheet from the sheet which follows it.

2. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement, and added means cooperating with the last-mentioned feeding means

to cause the latter to start the movement of said sheets longitudinally of said table at different rates of acceleration.

3. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement and separate means cooperating with the last-mentioned feeding means to cause the latter to start the movement of the leading sheet on said table at a more rapid rate of acceleration than that of a following sheet.

4. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement, and means associated with said table to engage the upper surface of the leading sheet and cause that sheet to initially move longitudinally of said table more rapidly than the following sheet for the purpose of increasing the distance between the sheets.

5. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement, and means associated with said table to engage the upper surface of said sheets and effect a separation of the sheets longitudinally of said table.

6. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement, and revoluble means cooperating with the last mentioned feeding means to start the movement of said sheets longitudinally of said table at different rates of acceleration.

7. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement, and revoluble means cooperating with the last-mentioned feeding means to start the movement of the leading sheet on said table at a more rapid rate of acceleration than that of a following sheet.

8. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single

file arrangement, and revoluble means associated with said table to engage the upper surface of the leading sheet and cause that sheet to initially move longitudinally of said table more rapidly than the following sheet for the purpose of increasing the distance between the sheets.

9. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, feeding means for moving said sheets longitudinally of said table in single file arrangement, and revoluble means associated with said table to engage the upper surface of said sheets and effect a separation of the sheets longitudinally of said table.

10. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means, a stop arranged longitudinally of said table, a plurality of feeding rollers associated with said table to move the sheets longitudinally thereof, and a rotatable member arranged above one of said rollers and between which and the said roller an edge portion of one of the sheets is received, said rotatable member cooperating with said roller to give to said sheet a relatively rapid accelerating movement longitudinally of said table to separate said sheet from the sheet which follows it.

11. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means and comprising a plurality of rollers for moving the sheets on said table at right angles to the direction in which the sheets move in being delivered to said table, a stop for the sheets arranged longitudinally of said table for guiding the sheets in their movement longitudinally thereof, and a plurality of rotatable members positioned adjacent said stop and each of which cooperates with one of the rollers to give to the leading sheet on the table an initial movement that will separate the leading sheet from the sheet following it.

12. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means and comprising a plurality of rollers for moving the sheets on said table at right angles to the direction in which the sheets move in being delivered to said table, a stop for the sheets arranged longitudinally of said table for guiding the sheets in their movement longitudinally thereof, and a plurality of loosely held balls positioned adjacent said stop and each of which cooperates with one of said rollers to give to the leading sheet on the table an initial move-

ment that will separate the leading sheet from the sheet following it.

13. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means and comprising a plurality of rollers for moving the sheets on said table at right angles to the direction in which the sheets move in being delivered to said table, a stop for the sheets arranged longitudinally of said table for guiding the sheets in their movement longitudinally thereof, a plurality of loosely held balls positioned adjacent said stop and each of which cooperates with one of said rollers to give to the leading sheet on the table an initial movement that will separate the leading sheet from the sheet following it, and a plurality of rotatable members positioned adjacent said stop for cooperation with a sheet which follows the leading sheet on said table to give to said following sheet an initial movement longitudinally of the table which is retarded relatively to the movement given to the leading sheet.

14. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means and comprising a plurality of rollers for moving the sheets on said table at right angles to the direction in which the sheets move in being delivered to said table, a stop for the sheets arranged longitudinally of said table for guiding the sheets on their movement longitudinally thereof, a plurality of loosely held balls positioned adjacent said stop and each of which cooperates with one of said rollers to give to the leading sheet on the table an initial movement that will separate the leading sheet from the sheet following it, and a plurality of balls positioned adjacent said stop for cooperation with a sheet which follows the leading sheet on said table to give said following sheet an initial movement longitudinally of the table which is retarded relatively to the movement given to the leading sheet.

15. In paper handling machines, the combination of means for feeding a plurality of sheets in side by side arrangement, a feed table to which said sheets are delivered by said means and comprising means for feeding the sheets longitudinally of said table and at right angles to the direction of movement of the sheets in being delivered to the table, an adjustable stop for the sheets arranged longitudinally of the table, said stop constituting a guide for the sheets in their movement longitudinally of the table, a plurality of balls arranged in a line substantially parallel with said guide, means associated with said guide and adjustable there-

with for loosely holding said balls, means at one end of said table for operating on the sheets and to which the sheets are delivered in succession, a second table to which the sheets are delivered from the last-mentioned means and comprising a plurality of rollers for moving the sheets at rights to their movement on the first-mentioned table, and balls associated with some of said rollers to engage the upper surface of the sheets and rapidly move them longitudinally of the second-mentioned table for the purpose of giving to each of the sheets, in succession, a quickly accelerated movement longitudinally of said table.

16. In paper handling machines, the combination of a feed table, a sheet guide arranged longitudinally of the table, a plurality of feed rollers arranged diagonally with respect to said guide for feeding sheets longitudinally of the table with an edge thereof engaging said guide, means for delivering sheets onto said table transversely of the longitudinal axis of the table, and means positioned above some of said rollers and adjacent said guide for checking the movement of the sheets as they approach the guide.

17. In paper handling machines, the combination of a feed table, a sheet guide arranged longitudinally of the table, a plurality of feed rollers arranged diagonally with respect to said guide for feeding sheets longitudinally of the table with an edge thereof engaging said guide, means for delivering sheets onto said table transversely of the longitudinal axis of the table, and revoluble members positioned above some of said rollers and adjacent said guide for engaging the sheets as they approach the guide to check their movement and prevent them from rebounding from the guide.

18. In paper handling machines, the combination of a feed table, a sheet guide arranged longitudinally of the table, a plurality of feed rollers arranged diagonally with respect to said guide for feeding sheets longitudinally of the table with an edge thereof engaging said guide, means for delivering sheets onto said table transversely of the longitudinal axis of the table, and balls loosely positioned above some of said rolls and adjacent said guide to engage the sheets as they approach the guide and check their transverse motion.

19. In paper handling machines, the combination of a feed table, a sheet guide arranged longitudinally of the table, a feed roller, and a ball arranged adjacent said guide for cooperation with said roller to move the sheets, the center of said balls being offset relative to the axis of said roller away from the delivery end of said table.

20. In folding machines, the combination

of a feed table, means for feeding a plurality of sheets onto said table in side by side arrangement, means for feeding the sheets longitudinally of said table in single file arrangement and for increasing the distance between the sheets, means for operating on said sheets into which means the sheets are delivered by said feed table, a second feed table to which the sheets are delivered from said operating means, means associated with said second feed table for moving the sheets thereon at right angles to the direction of movement of the sheets by the first mentioned feed table, and further means for operating on said sheets to which the sheets are delivered by said second feed table.

21. In folding machines, the combination of a feed table, means for feeding a sheet onto said table and for cutting it into a plu-

rality of sheets as it is so fed, means for feeding said plurality of sheets longitudinally of said table in single file arrangement and for increasing the distance between the sheets, means for operating on said sheets into which means the sheets are delivered by said feed table, a second feed table to which the sheets are delivered from said operating means, means associated with said second feed table for moving the sheets thereon at right angles to the direction of movement of the sheets by the first mentioned feed table, and a further means for operating on said sheets to which the sheets are delivered by said second feed table.

In testimony whereof, I hereunto affix my signature.

REUBEN HITCHCOCK.