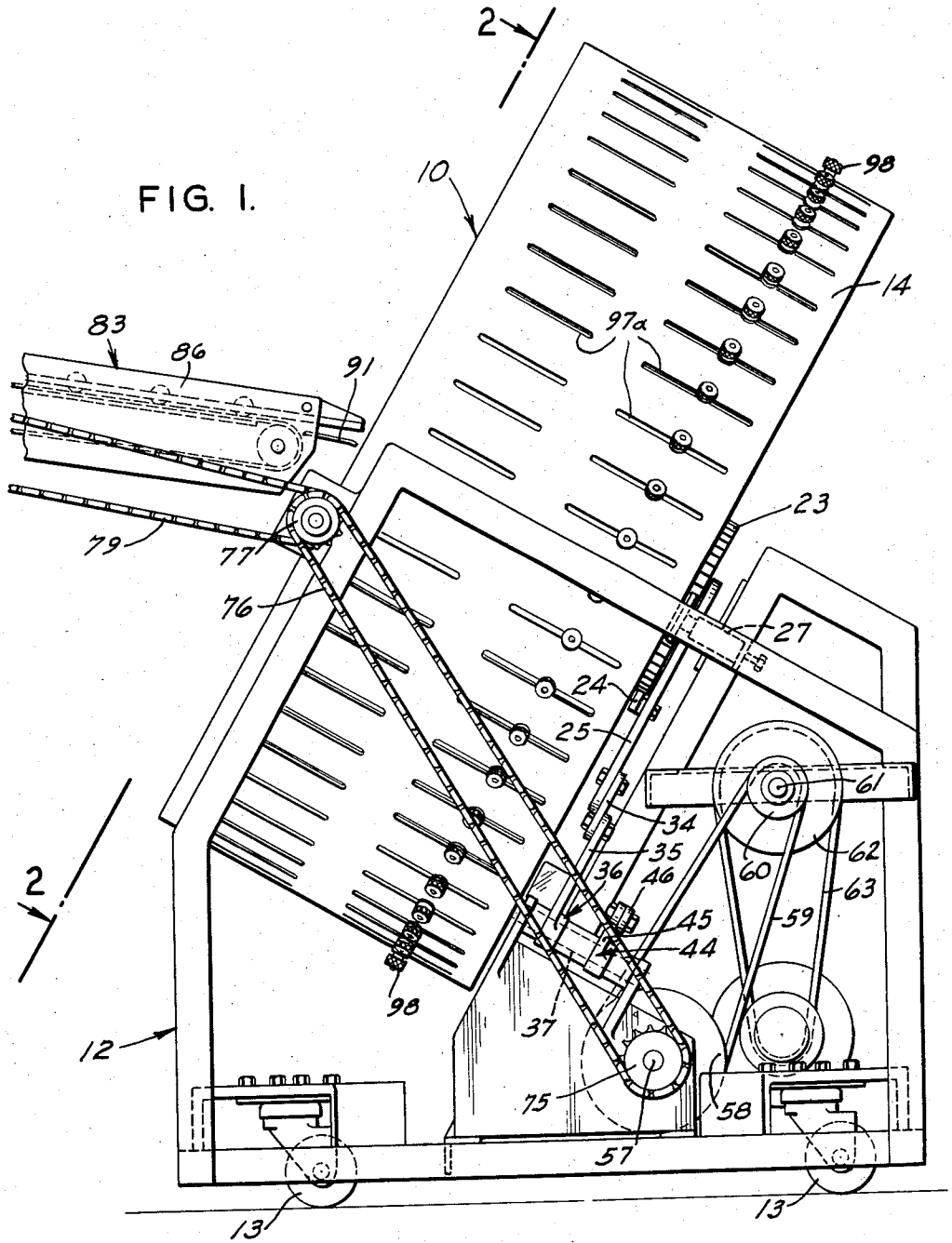
March 3, 1959 L. MESTRE 2,876,008

COLLATING APPARATUS

Filed Nov. 9, 1954 4 Sheets-Sheet 1

FIG. 1.



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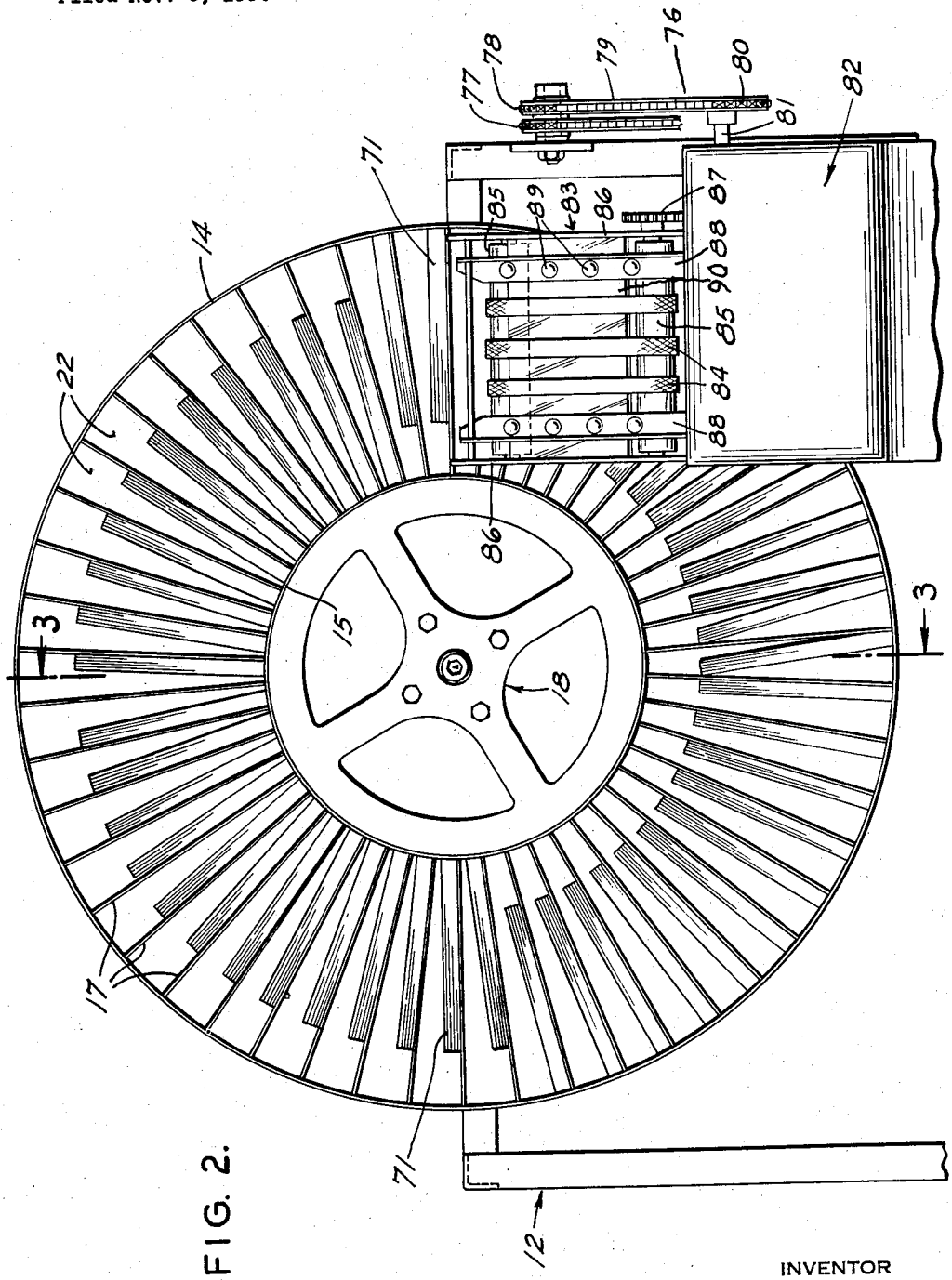

FIG. 2.

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FIG. 6.

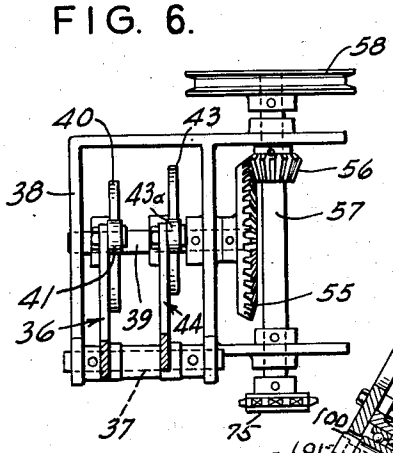

FIG. 3.

FIG. 7.

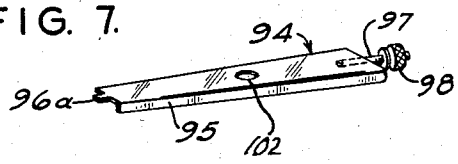

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FIG. 8.

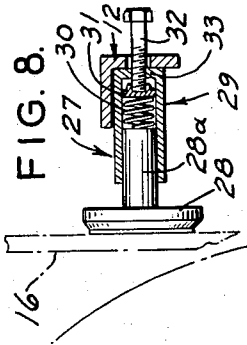

FIG. 4.

FIG. 5.

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United States Patent Office 2,876,008 Patented Mar. 3, 1959

2,876,008

COLLATING APPARATUS

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Application November 9, 1954, Serial No. 467,786

11 Claims. (Cl. 271—64)

This invention relates to sheet collating means and the principal object of the invention is to provide simple and effective means of the character specified.

Another object of the invention is to provide sheet collating means occupying a limited amount of floor space but capable of collating the sheets into a relatively large number of groups, each of which may comprise consecutive different leaves of a book.

Still another object of the invention is to provide sheet collating means wherein there is an endless series of pockets into which sheets are inserted in succession as the pockets are moved past a supply point.

Yet another object of the invention is to provide a sheet collating means wherein there is an endless series of pockets into which sheets are inserted in succession as the pockets are moved past a supply point, and the sheets are jogged longitudinally and transversely to bring them into register.

A further object of the invention is to provide a novel and advantageous collating device comprising a rotatable collating drum divided into radial pockets to receive sheets in a direction parallel to the axis of the drum.

A still further object of the invention is to provide a novel and advantageous collating device comprising a rotatable collating drum divided into radial pockets to receive sheets in a direction parallel to the axis of the drum, the axis of the drum being inclined so that the sheets are urged by gravity toward the bottom of the drum.

Yet another object of the invention is to provide a rotary collating drum with radial sheet receiving pockets, and operating means to advance the drum pocket by pocket and lock it in corresponding positions to receive sheets therein.

Other objects, features and advantages will appear upon consideration of the following detailed description and of the drawings in which:

Figure 1 is a side elevation of one embodiment of the collating means of the present invention;

Fig. 2 is a view taken along the line 2—2 of Fig. 1;

Fig. 3 is a section taken along the line 3—3 of Fig. 2;

Fig. 4 is a section taken along the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary view taken along the line 5—5 of Fig. 4;

Fig. 6 is a view taken along the line 6—6 of Fig. 4;

Fig. 7 is a perspective view of one of the adjustable bottoms of the pockets of the drum; and

Fig. 8 is a sectional view taken along the line 8—8 of Fig. 4.

Referring to the drawings, a rotatable collating drum **10** is mounted upon an inclined shaft **11** fixed in a frame **12** which may be mounted on casters **13**. The drum **10** comprises an outer cylinder **14** and an inner cylinder **15** fixed to a circular base **16** and radial partitions **17** secured at their inner edges to the cylinder **15** and at their outer edges to the cylinder **14** and at their lower edges to said base or bottom **16**.

At the upper end of cylinder **15** a spider **18** is secured

thereto. The upper end of said shaft **11** passes through a central opening in the spider **18** and through a thrust bearing **19**, preferably a ball bearing, secured to said spider. Shaft **11** also passes through a central opening in the circular base **16**; the shaft carries a ball bearing **20** for mounting the drum. Said shaft **11** is fixed to frame members **21** and **21***a* (Fig. 3). The radial partitions **17** divide the space between the outer cylinder **14** and the inner cylinder **15** into a convenient number of pockets **22** here shown as 50 in number.

In operation the collating drum **10** is advanced one step at a time to bring successive pockets **22** to a selected position at which sheets are to be inserted. For this purpose a ratchet wheel **23** is secured to the central portion of circular base **16** and this ratchet wheel is operated by means of a pawl **24** pivoted on a lever **25** mounted to turn about the shaft **11**. The pawl **24** is pressed against the ratchet wheel **23** by spring means **24***a*. Said arm **25** is urged toward its rearmost position by means of a spring **26** attached to the end of said lever **25** and to a fixed portion of the frame.

Said drum is held against free movement by means of friction braking devices **27** (Figs. 1 and 4) as shown in detail in Fig. 8. The bottom of the drum **10** is engaged by frictional members **28** mounted on pins **28***a* slidable in fixed cylinders **29** and urged toward the cylinder base **16** by means of springs **30** in said cylinders and engaged at their outer ends by discs **31** on the inner ends of screws **32** threaded into the bases **33** of cylinders **29**. Said cylinders **29** may be fixed to a member forming part of the main frame.

The pawl carrying lever **25** is operated in a driving direction by a link **34** connected to an upright arm **35** of a bell crank **36** mounted on a pivot **37** on the frame **12**. Mounted on said main frame **12** is an auxiliary frame **38** (Figs. 4 and 6) in which is mounted a shaft **39** carrying a cam **40** which engages a follower **41** on the generally horizontal arm **42** of said bell crank **36**. Said shaft **39** also carries a cam **43** which engages a follower **43***a* on a bellcrank lever **44** having an upwardly extending arm **45** which is pivotally connected to a link **46** operating a spring pressed member shown as a detent **47** (Fig. 5) in the form of a pin. Said detent pin **47** is slidably mounted in a frame member and engages a cooperating means carried by the bottom and engaged by the detent or pin **47**. To this end the pin has a reduced end to fit into any one of a series of cooperating means shown as holes **48** in the bottom of the drum. As shown in Fig. 4 there is an opening **48** at the bottom of each pocket **22** so that the drum may be held in proper position during the insertion of each sheet. Said detent pin **47** is controlled by means of a bell crank **49** urged to hold the detent **47** in effective position by means of a spring **50** the detent being moved to ineffective or released position out of the hole by link **46** which has a slotted connection with a pin **52** in the upright arm of bell crank **49**.

Said shaft **39** is driven by means of a bevel gear **55** thereon (Fig. 6) meshing with a bevel gear **56** on a shaft **57**. A pulley **58** on shaft **57** is connected by means of a belt **59** with a pulley **60** on a shaft **61**. Shaft **61** has fixed thereon a pulley **62** connected by a belt **63** with a speed regulating pulley **64** on shaft **65** (Fig. 4) of a motor **66**. Said motor **66** is mounted on a support **67** pivoted on the frame **12** and adjustable to different positions by means of a screw **68** threaded through said support **67**. The lower end of screw **68** is rotatable in a bracket **69** of the frame but the screw is held against longitudinal movement. Said pulley **64** may be any suitable adjustable pulley for changing the effective radius or pitch of the pulley by having belt **63** of V-cross section so that by lowering the motor by means of a

head 70 on screw 68 the speed of operation will be decreased and by raising the motor the speed of operation will be increased.

Sheets to be collated may be fed manually one by one into successive pockets 22 as said pockets successively reach a selected position, for example, as indicated at the right of Fig. 2. If the drum 10 is used to maximum capacity for each sheet, fifty sheets of one kind are placed in the fifty pockets, fifty sheets of another kind are inserted in the same way and this procedure is followed until the desired number of sheets are collected in each pocket. Obviously a smaller number of pockets can be used, care being taken to start and stop the supply of sheets at the proper pockets.

The sheets 71 may also be supplied by any suitable single sheet feeder of which there are many forms. The feeder used may be similar to that of my prior copending application Ser. No. 385,430, filed October 12, 1953, the means for ejecting a plurality of sheets advanced at one time being omitted. To this end a sprocket wheel 75 fixed on shaft 57 (Fig. 6) may be connected by means of a sprocket chain 76 with a sprocket wheel 77 rotatably mounted on frame 12. Connected to sprocket wheel 77 to rotate therewith is a sprocket wheel 78 which is connected by a sprocket chain 79 to a sprocket wheel 80 on shaft 81 of sheet feeding means, indicated in general by 82 (Fig. 2), which includes means 83 for conveying single sheets 71 to the drum 10 and means (not shown) for picking up single sheets 71 from a stack and feeding them to said conveying means 83.

The sheet feeder of said copending application includes a feeding platform adapted to hold a stack of several thousand sheets, and means for raising said platform step by step to supply top sheets of the stack in position to be fed to said drum 10. By building up said stack with groups of sheets, each of which includes identical sheets corresponding to successive sheets or pages of a book, the same result can be obtained as by loading various feed compartments with corresponding groups of sheets. An important feature of applicant's apparatus is that his machine provides for great economy of floor space.

Said conveying means 83 comprises bands 84 extending around rolls 85 rotatably mounted in side members 86, the roll remote from the drum 10 having fixed thereto a gear 87 through which it is driven from other parts of the feeder mechanism not shown. In the conveying mechanism illustrated there are five bands 84 of which the edge bands are hidden by bars 88 with openings holding balls 89 which rest on sheets on the upper reaches of said bands and a plate 90 supporting said upper reaches, thus assuring an effective friction drive. A plate 91 (Fig. 1) may be used to bridge the gap between the bands and the drum.

The bottom 16 of the drum 10 is reinforced by a circular plate 92 fitting in the bottom of the cylinder 15 and utilized for securing said ball bearing 20 and ratchet wheel 23 to said bottom 16.

To facilitate removal of stacks of sheets 71 from pockets 22, the upper edges of said partition are provided with cut-outs 93 (Fig. 3). In order to use sheets 71 of different lengths, the depths of said pockets 22 may be adjusted. This may be done by use of false bottoms 94 (Fig. 7) for each pocket 22. Such false bottoms 94 are shaped to fit across said pockets and as shown are provided with reinforcing flanges 95 extending along their sides and outer ends. Their inner ends have narrow projections 96*a* adapted to fit in corresponding opening 96 arranged around wall 15 in circles at different heights. The outer wall 14 of the drum 10 is provided with groups of slots 97*a* adapted to receive threaded pins 97 extending from the outer ends of false bottoms 94.

To install a false bottom 94 in a pocket 22, the false bottom may be inserted in the pocket with its inner end inclined upwardly or downwardly as required, its inner end projection 96*a* being inserted in an opening 96 of cylinder or cylindrical wall 15. The pin 97 is then placed in the corresponding slot 97*a* and the outer end of false bottom 94 shifted to the proper position. A nut 98 is then placed on threaded pin 97 and tightened to hold the false bottom in position. To remove a false bottom from the drum, the procedure may be reversed.

Said drum 10 is easily applied to or removed from said inclined shaft 11. To this end the inner ring or race of the ball bearing 20 fits over an intermediate portion of shaft 11 and rests against a shoulder provided by a shaft portion of greater diameter and the inner ring or race of ball bearing 19 fits on a reduced outer end of shaft and rests against a shoulder provided by the larger shaft portion over which the inner race of ball bearing 20 fits. The drum 10 is held on shaft 11 by means of a ring 100 secured to the outer end of shaft 11 by means of a screw 101 and overlying the inner ball race of ball bearing 19.

The sheet feeder is operated from the drive for the collating drum and is synchronized therewith. As illustrated in Figure 2, the sheets 71 in the various pockets are agitated and jogged into registration along an edge parallel to the axis of said drum. Due to the inclination of the shaft 11, the agitation of sheets 71 caused by rotation of drum 10 will also effect jogging of sheets in a direction parallel to shaft 11 and into registration along an edge perpendicular to the axis of said shaft. The shapes of cams 40 and 43 and their connections with drum 10 and detent pin 47 are such that detent pin 47 is removed from a hole in bottom 43 just before pawl 24 acts to advance the drum and just after actuation of pawl 24, the detent pin is permitted to move against bottom 16 of the drum so that it will move into an opening 48 as soon as the opening comes into proper position.

As shown in Fig. 2, the pockets 22 between the radial partitions 17 are wider at the outer cylinder 14 than at the inner cylinder 15 and any sheets 71 in a pocket at the feed level are positioned against the outer cylinder 14 and provide more available space for additional sheets than if the pack of sheets were nearer to the inner cylinder 15.

For convenience in handling each false bottom 94 may be provided with an opening 102.

It should be understood that various changes can be made and certain features used without others, without departing from the true scope and spirit of the invention.

What is claimed is:

1. Sheet collating means comprising a collating drum having a cylindrical outer wall, and at the drum interior a plurality of radial walls providing radial pockets with open ends at one end of said drum, means supporting said drum for rotation about a fixed axis, means connected with the drum to continuously rotate the same, and the supporting means having an inclined axis for jogging the sheets into register at the bottom and at a side of each of said pockets, each pocket having a false bottom, and means carried by the drum at each pocket and by each false bottom for adjusting the depth of each pocket.

2. Sheet collating means comprising a collating drum having a cylindrical outer wall, and at the drum interior a plurality of radial walls providing radial pockets with open ends at one end of said drum, means for adjusting the depths of said pockets comprising a false bottom in each pocket and means for securing each of said false bottoms in a predetermined position in a corresponding pocket including a projection carried by one end of the false bottom, the drum having a hole in each pocket to receive the projection, a second projection on the other end of the false bottom, the drum having at least one elongated slot to receive the second projection, and

means to secure the second projection in the elongated slot.

3. Sheet collating means comprising a collating drum having a round bottom, an outer and an inner cylindrical wall projecting from said bottom and coaxial therewith, radial walls dividing the space between said cylindrical walls into pockets, false bottoms for said pockets, and means for securing said false bottoms in said pockets in predetermined positions including a longitudinal projection at the inner end of each false bottom and at its outer end a longitudinally projecting threaded pin, said inner cylindrical wall being provided with circles of openings one for each pocket at each predetermined level and adapted to receive said projections and to prevent turning thereof, said outer cylinder having series of vertical slots of such length that after a false bottom has been inserted in a longitudinally inclined direction in a pocket and the projection at its inner end inserted into one of said openings in the inner cylindrical wall, the threaded pin at the outer end of said false bottom may be inserted into a corresponding slot and swung to desired position, and a nut screwed on each threaded pin to secure the false bottom in position.

4. Sheet collating means comprising a collating drum and means for rotating said drum about an inclined axis, said drum comprising a circular bottom, an outer cylindrical wall secured to said bottom, an inner cylindrical wall coaxial with said outer wall, radial partitions secured to said outer and inner walls and providing pockets therebetween, in combination with means including means operatively connected with the drum to rotate the same step by step, a spring-pressed member to detain said drum between step movements of said drum to place one pocket after another in position to receive a sheet for collation with other sheets, cooperating means for each pocket carried by said circular bottom in a position to be engaged by said spring pressed member, and means for retracting said spring-pressed member to release said drum and then releasing said member to rest on said circular bottom and engage the next cooperating means brought into position for such engagement.

5. Sheet collating means comprising a collating drum with a bottom and open at its top; an inclined stationary shaft having a lower supported portion, a reduced intermediate portion producing a shoulder at its lower end and a reduced tip producing a second shoulder at its lower end; said drum having a circular bottom with a central ball bearing fitting over said intermediate portion, a ball bearing fitting over said tip and secured to the drum at its open top; a ring over the reduced tip of said shaft and the corresponding ball bearing; and releasable means connecting said ring to said tip.

6. Sheet collating means comprising a shaft; means supporting said shaft in inclined position; a collating drum mounted to rotate about the axis of said shaft; said drum having a bottom, an outer wall and a plurality of sheet-receiving pockets arranged around the inner wall of the drum and open at the top of the drum; means for actuating said drum step-by-step; detent means for holding said drum in successive positions; and means for operating said actuating means and detent means in timed relation.

7. Sheet collating means according to claim 6 in combination with friction means engaging said drum to avoid overrunning of the drum.

8. Sheet collating means according to claim 6 in combination with sheet feeding means to supply sheets to successive pockets of said drum, and a connection from said operating means to said sheet feeding means to synchronize them.

9. Sheet collating means according to claim 6 wherein said operating means comprises speed-regulating means.

10. Sheet collating means according to claim 6 wherein said means for actuating said drum comprises a pawl and ratchet device and said detent means comprises a part of the bottom of said drum provided with a recess for each pocket, the recesses being disposed circularly, and a spring-pressed pin mounted in the shaft supporting means in position to enter said recesses.

11. Sheet collating means according to claim 10 wherein said operating means comprises means for retracting said pin just before the pawl and ratchet device becomes effective and then releases the pin to rest against the bottom of the drum preparatory to entering the next recess brought into register therewith.

References Cited in the file of this patent

UNITED STATES PATENTS

1,375,226	May	Apr. 19, 1921
1,443,698	Avery	Jan. 30, 1923
2,288,755	Taggart	July 7, 1942
2,449,594	Druliner	Sept. 21, 1948
2,496,490	Phillips	Feb. 7, 1950
2,496,491	Phillips	Feb. 7, 1950
2,589,676	Crissy	Mar. 18, 1952
2,661,209	McGalliard	Dec. 1, 1953
2,771,029	Carroll	Nov. 20, 1956