June 14, 1960 S. T. STOOTHOFF 2,940,754

APPARATUS FOR MOUNTING FILMS AND OTHER INSERTS IN CARDS

Filed March 29, 1957 3 Sheets-Sheet 1

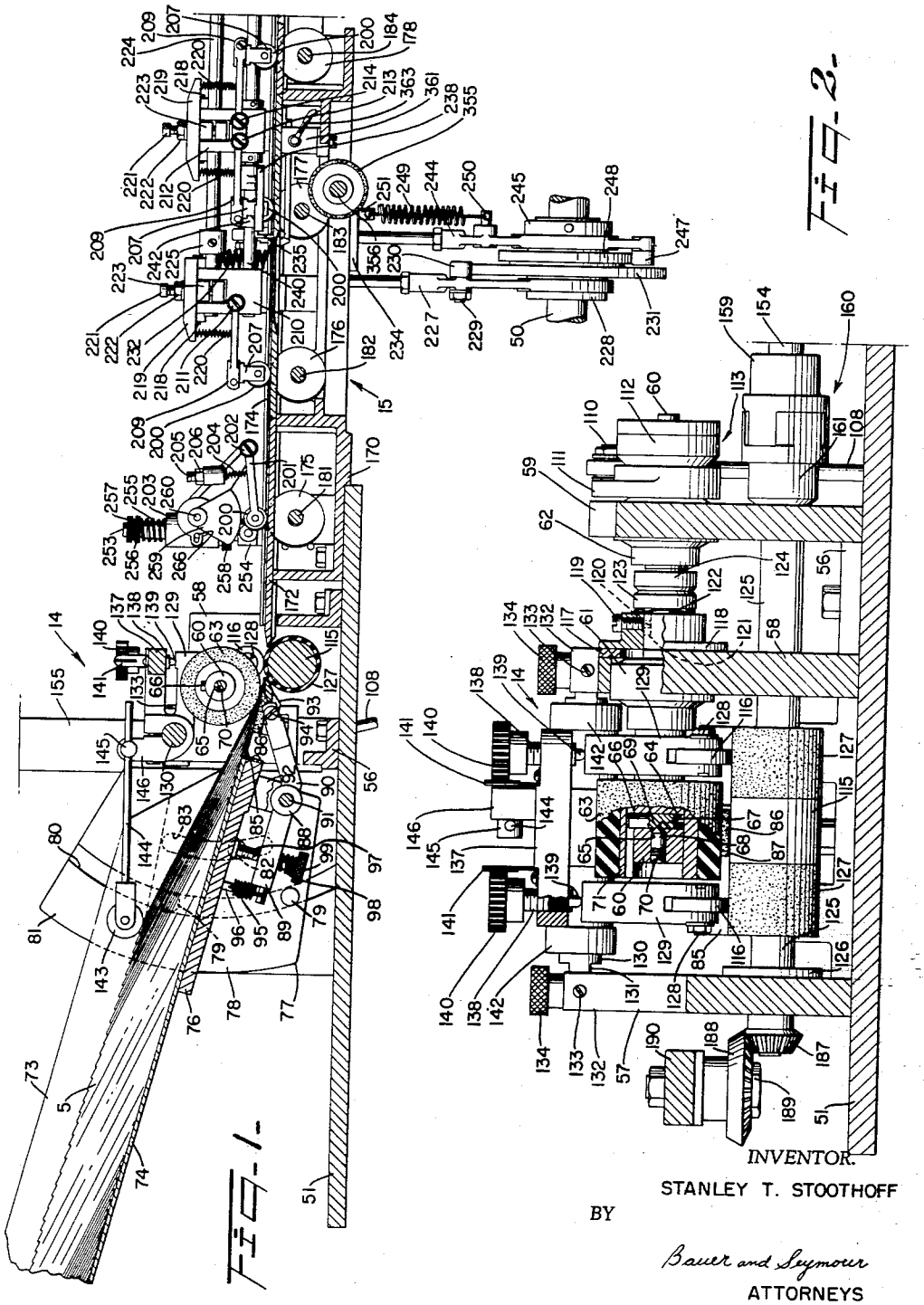

FIG. 1.

FIG. 2.

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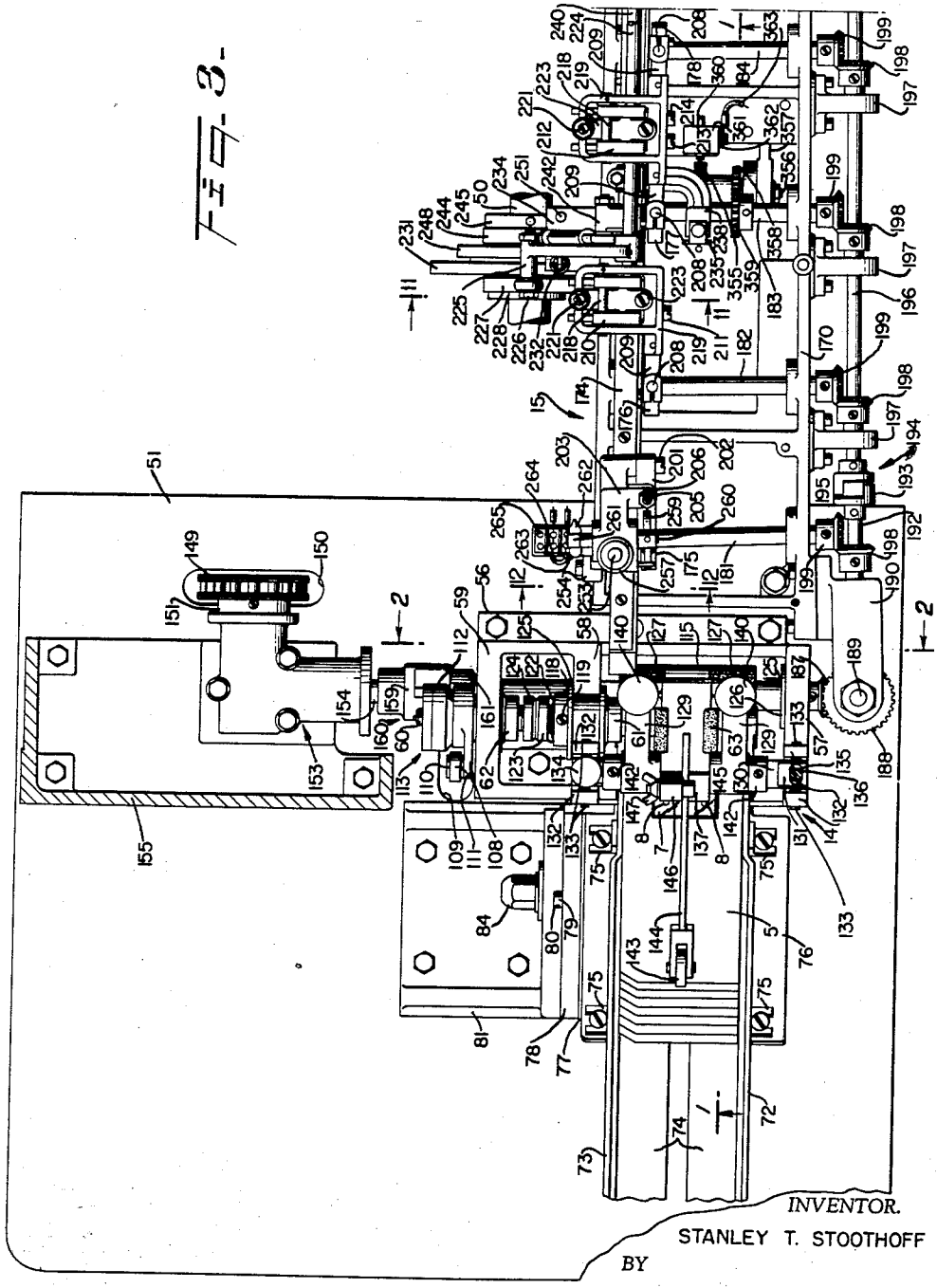
APPARATUS FOR MOUNTING FILMS AND OTHER INSERTS IN CARDS

Filed March 29, 1957 3 Sheets-Sheet 2

Fig. 3.



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Filed March 29, 1957 3 Sheets-Sheet 3

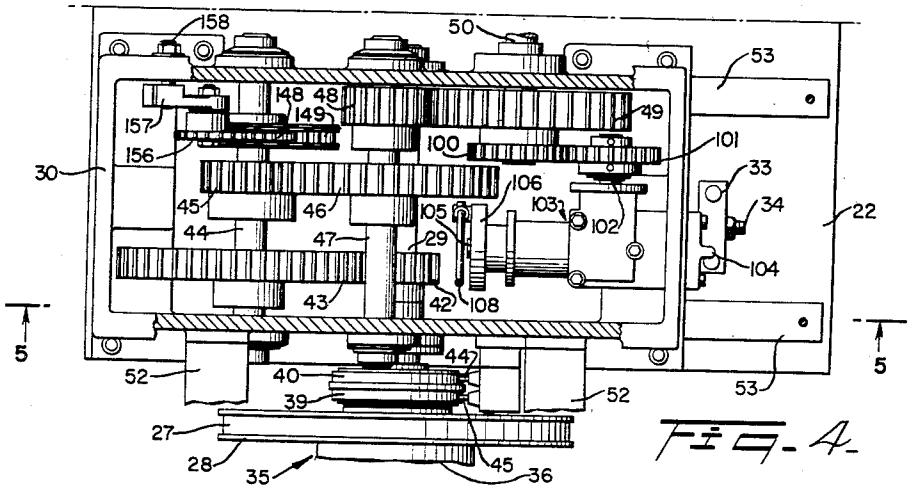

Fig. 4.

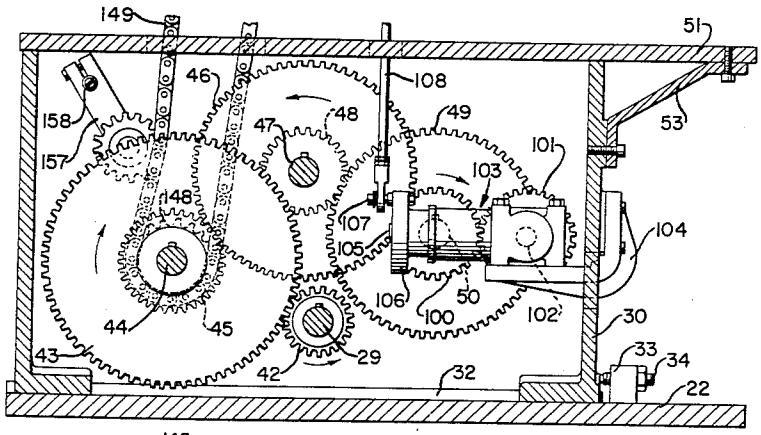

Fig. 5.

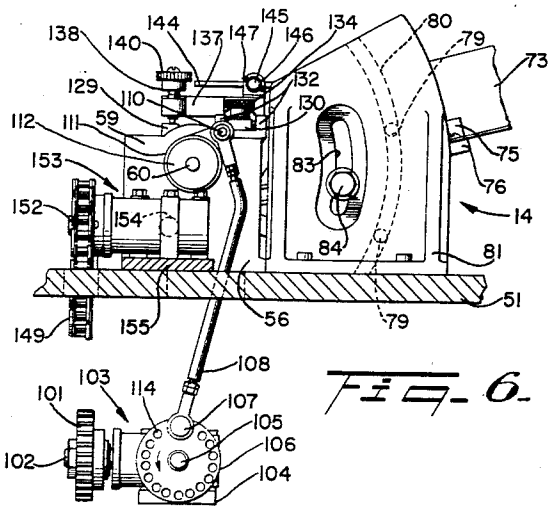

Fig. 6.

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United States Patent Office 2,940,754 Patented June 14, 1960

2,940,754

APPARATUS FOR MOUNTING FILMS AND OTHER INSERTS IN CARDS

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Filed Mar. 29, 1957, Ser. No. 649,372

5 Claims. (Cl. 271—36)

This invention relates to a sheet feeding apparatus and more particularly to a feeding apparatus adapted to feed cards to an apparatus for producing classification cards, and other cards, each having an image bearing frame of micro-film mounted in an aperture in the card and secured to an adhesive sheet carried by the card and extending over the aperture, whereby each card may advantageously contain a representative visible image or picture record of the data recorded or to be recorded, and each film frame may be conveniently filed, indexed, and classified as to subject matter.

One object is to provide an improved and simplified feeder of the friction separator roller type which is particularly, but not exclusively, adapted for feeding cards one after another from a supply stack thereof.

Another object is to provide an improved feeder of the friction separator roller type wherein the hopper for supporting a supply stack of blanks, such as cards, in fanned-out relation is adjustable about an arc concentric with the axis of rotation of the separator roller so that the angle of flow of the blanks toward the separator roller is always approximately tangent to said separator roller in all positions of adjustment of said hopper, whereby accurate and continued feeding of blanks one after another from said stack may be achieved and feeding of only single blanks is assured.

Another object is to provide a feeder of the above character having a feed roller and pressure rollers cooperating with and spaced axially of said feed roller, wherein said pressure rollers are mounted in a novel manner for adjustment independently as to pressure, and collectively as to location with respect to said feed roller, so that uniform straight-line forward movement of the blanks thereby is assured.

A still further object is to provide novel means for releasably and drivably connecting an annular member, such as the separator roller of a friction type feeder, to its operating shaft.

The above and further objects and novel features of the present invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

Fig. 1 is a vertical sectional view of the card feeding apparatus, said view being taken substantially along the line 1—1 of Fig. 3;

Fig. 2 is an enlarged fragmentary vertical sectional view taken along line 2—2 of Fig. 3, with certain portions broken away for purposes of clearer illustration;

Fig. 3 is a top plan view of the card feeding apparatus;

Fig. 4 is an enlarged detailed top plan of the gear drive mechanism for said card feeding mechanism, the top plate thereof being removed and portions of said gear box being broken away for purposes of clearer illustration;

Fig. 5 is a vertical sectional view of said gear drive mechanism, said view being taken substantially on the line 5—5 of Fig. 4; and

Fig. 6 is an enlarged detailed elevational view, partly in section, of the card feeder and the driving and operating means therefor as seen from the far side of the machine as shown in Fig. 1.

The apparatus constructed in accordance with the present invention and chosen for the purposes of illustration is particularly adapted for feeding cards of the type commonly employed in connection with statistical, tabulating and record card sorting systems and machines and wherein said cards are fed to an apparatus adapted to mount individual image bearing frames of the micro-film therein. It is to be understood that the invention is not so limited and that the principles herein described are applicable to the feeding of a variety of different materials.

A supporting base and main driving mechanism is best shown in Figs. 1, 4, and 5.

The supporting base **12** rests on the machine foundation of suitable structure to hold and maintain said apparatus in the desired position. The movable parts of the mechanisms for producing the card having a micro-film mounted therein, together with the card feeder **14** and conveyor **15**, are all preferably driven by the driving mechanism **13** which includes an electric motor **25**. The motor **25** is carried by the supporting base **12** beneath the platform **22**, and is preferably mounted on said base in a suitable manner for pivotal up and down movement for a purpose to be presently described. The motor **25** which is of the single phase type is supplied with electrical current from a suitable source and is controlled for starting and stopping purposes by a suitable manually operated switch which will be later explained in connection with the description of the electrical control circuit illustrated in Fig. 58, for the machine.

Fixed on the armature shaft of the motor **25** is a pulley **26** which is preferably of the well-known variable diameter or speed type whereby the speed of operation of the machine may be regulated, as desired, through raising or lowering of said motor. Passing around and driven by the pulley **26** is a belt **27** which also passes around and drives a larger diameter pulley **28**. This pulley **28** is loosely mounted on a short shaft **29** which extends longitudinally of the machine and is journalled in suitable bearings provided in the opposed walls of a gear box **30** and in a bracket **31** which is located outwardly of and spaced from said gear box. The pulley **28** is thus driven continuously by the motor **25** when the latter is started. The bracket **31** is bolted or otherwise suitably secured to the adjacent standard **24** of the base **12**, and the gear box **30** is mounted on and bolted to the platform **22** of said base. To facilitate locating of the gear box **30** in proper longitudinal and lateral positions in the machine, the platform **22** has secured to the upper surface thereof an elongated transversely extending key **32** and a stop block **33** disposed at right angles to said key and having threaded therein an adjustable stop bolt **34**. The gear box **30** is provided in the bottom surface thereof with a corresponding keyway to receive therein the key **32**, and when so engaged, the gear box is moved along said key and the platform **22** until it contacts the stop bolt **34**, thus easily locating the gear box in proper longitudinal position by means of the key **32** and in proper lateral position by means of the stop bolt **34**. Following this, the gear box **30** is immovably bolted to the platform **22**.

The shaft 29 is driven by the pulley 28 through a conventional magnetic clutch and brake unit indicated generally at 35, said unit including an annular driving magnet 36 which freely surrounds said shaft and is bolted or otherwise suitably secured to said pulley, an annular braking magnet 37 which freely surrounds the shaft and is bolted or otherwise suitably secured to the bracket 31, and an annular clutch disc 38 of magnetic material which is disposed between the magnets 36 and 37 and is engaged over and drivably keyed to said shaft, said key connection providing for limited axial movement of said clutch disc on said shaft toward and away from said driving and braking magnets. Surrounding and suitably fixed to the hub of the pulley 28 and insulated therefrom is a pair of slip rings 39 and 40 for conducting electrical current to the driving magnet 36. It will thus be apparent that, as hereinafter explained in the description of the electrical control circuit, when the driving magnet 36 is energized the shaft 29 will be rotated through magnetic engagement of the clutch disc 38 with said driving magnet, and that when the braking magnet 37 is energized the shaft 29 will be stopped and held against further rotation through magnetic engagement of said clutch disc with said braking magnet. There is provided a handle 41 by means of which the shaft 29 and the various mechanisms connected therewith may be turned or operated manually, when desired, said handle being ordinarily removed from the shaft, and when used it is engaged over the outwardly projecting end of said shaft and is connected thereto in a suitable manner.

Disposed within the gear box 30 and keyed to the shaft 29 is a spur pinion 42 which meshes with and drives a spur gear 43 that is keyed to a short shaft 44 journalled at its opposite ends in suitable bearings in said gear box. Also keyed to the shaft 44 is a spur pinion 45 which meshes with and drives an idler spur gear 46 that is keyed to a short shaft 47 journalled at its opposite ends in suitable bearings in the gear box 30. Also keyed to the idler shaft 47 is a spur pinion 48 which meshes with and drives a spur gear 49 that is keyed to one end of a short shaft 50 which projects into and outwardly beyond the gear box 30 longitudinally of the machine and is journalled in a suitable bearing in said gear box. By virtue of the described gearing, the shaft 50 is driven to make one complete revolution for each cycle of operation of the machine and, hence, said shaft may be considered as the main cam shaft of the machine. It is from this shaft 50 that the mechanisms for producing the card having a micro-film mounted therein are operated at timed intervals.

The upper open end of the gear box 30 is normally closed by a plate 51 which is adapted to support the card feeder 14 for feeding the cards 5 one after another in timed relation from a supply stack thereof. The plate 51 is bolted or otherwise suitably secured to a series of brackets 52 and 53 which, in turn, are bolted or otherwise suitably secured to the gear box 30. The plate 51 projects rearwardly beyond the gear box 30 and has secured thereto a shelf 54 which is adapted to support a reserve stack 55 of the cards 5 in a convenient position for jogging thereon and loading into the card feeder 14 to replenish the supply of cards in said feeder during the normal operation of the machine.

The card feeder 14 is best shown in Figs. 1 and 2 and comprises a main bracket 56 which extends transversely of the machine and is bolted or otherwise suitably secured to the plate 51. The bracket 56 is formed with upwardly projecting transversely spaced portions 57, 58 and 59. Disposed within the space between the bracket portions 57 and 58 is the free unsupported end of a shaft 60 which projects transversely through and outwardly beyond the bracket portions 58 and 59 and is journalled in suitable anti-friction bearings 61 and 62 fixed in the bracket portions 58 and 59, respectively.

Disposed between the portions 57 and 58 of the bracket 56 and slidably engaged over the free end of the shaft 60 is a rubber covered friction type separator roll 63. The separator roll 63 is connected in a novel manner to the shaft 60 for rotation by said shaft and to facilitate immediate removal of the same therefrom. For this purpose, the shaft 60 is provided with a smooth annular bore 64 extending diametrally therethrough, and with a threaded axial bore 65 extending axially thereof and opening inwardly into the bore 64 and outwardly through the adjacent free end of said shaft. Slidably engaged in the smooth bore 64 is an annular key 66 provided adjacent the inner end thereof with an annular recess 67 which in cross-section is substantially V-shaped. Slidably engaged in the threaded bore 65 is a pin 68 having a conical inner end 69. Threadedly engaged in the threaded bore 65 is a headless set screw 70.

The length of the key 66 and the location of the recess 67 in said key are so chosen that with the conical end 69 of the pin 68 projecting partly into said recess, said key is engaged in a usual keyway 71 formed in the separator roll 63, thus drivably connecting said roll with the shaft 60 for rotation by said shaft. It will be apparent that when the set screw 70 is turned to move the same farther inwardly, the pin 68 will likewise be moved farther inwardly by said set screw and thereby cam the key 66, through engagement of the conical end 69 of said pin with the inclined surface of the recess 67, radially outwardly into firm engagement with the bottom of the keyway 71 in the separator roll 63, thus firmly locking said roll to the shaft 60 against axial displacement in either direction. When the set screw 70 is turned to move the same outwardly, the pressure of the pin 68 on the key 66 is released, thus freeing the separator roll 63 and abling axial movement thereof on and removal of the same from the shaft 60.

Arranged rearwardly of the separator roll 63 is an inclined magazine or hopper for supporting a supply stack of cards 5 in fanned-out overlapping relation and in position for feeding of the cards one after another from said stack by said separator roll. The magazine comprises angle side pans 72 and 73 which are laterally adjustable so that the stack of cards 5 placed therebetween may be centrally positioned with respect to the separator roll 63. The magazine comprising the side pans 72 and 73 is supported in a novel manner so that the upper surfaces of the inwardly projecting base portions 74 of said side pans lie in a plane tangent to the lower part of the separator roll 63, and that said magazine may be adjusted to any desired feeding angle of inclination while maintaining the described tangency of the side pans 72 and 73 in all angular positions of adjustment thereof. In this manner, gravity flow of the supply stack of cards 5 toward the separator roll 63 may be accurately controlled, the angle of flow of the cards to the separator roll is substantially unbroken in all inclined positions of the magazine, and continued feeding of cards 5 and only single cards at a time from the stack by the separator roll is assured.

To this end, the laterally adjustable side pans 72 and 73 are secured, as by means of slotted angle elements 75 thereon to a shelf 76 formed on a bracket 77 having a vertical plate-like portion 78 extending above and below said shelf. Secured in the vertical portion 78 of bracket 77 and projecting outwardly therefrom are at least two arcuately spaced pins 79 which are spaced at equal radial distances from the axis of rotation of the separator roll 63. The pins 79 are slidably engaged in an arcuate groove 80 which is concentric with the axis of rotation of the separator roll 63 and is formed in the adjacent inner surface of a bracket 81 which is bolted or otherwise suitably secured to the plate 51. Threaded or otherwise suitably secured in the vertical portion 78 of bracket 77 and projecting outwardly therefrom is a threaded

stud 82 which is slidably engaged in and projects through an arcuate slot 83 which is formed in the bracket 81 concentric with the groove 80 and with the axis of rotation of the separator roll 63. A nut 84 is threaded on the outwardly projecting end of the stud 82 and tightened against the bracket 81 to firmly hold the bracket 77 and the magazine side pans 72 and 73 in all angular positions of adjustment thereof.

It will thus be apparent that by virtue of the described mounting for the magazine side pans 72 and 73, said pans are, through engagement of the pins 79 in the groove 80, caused to tilt to a greater or lesser degree of inclination when raised and lowered, respectively, and that said tilting movement of said side pans occurs substantially about the periphery of the separator roll 63, thus maintaining the upper surfaces of the base portions 74 of the side pans 72 and 73 substantially in tangential relation to the separator roll 63 in all positions of angular adjustment of said side pans. The shelf 76 of the bracket 77 has suitably secured to the forward edge thereof a tongue 85 of resilient material, such as clock-spring steel for bridging the gap between the magazine side pans 72 and 73 and the separator roll 63 and for directing the foremost cards 5 of the supply stack into position for feeding action of the separator rolll 63 thereon.

Disposed below and cooperating with the separator roll 63 in the feeding of the cards 5 successively from the supply stack is a retard pad or element 86 made of friction material, such as rubber, which serves to provide between it and said separator roll a feed throat for the passage of single cards only and to retard or hold back a second or succeeding card against feeding movement simultaneously with a first or preceding card. The retard pad 86 projects through a suitable opening 87 in the tongue 85 and is normally spaced from the separator roll 63 a distance substantially equal to or slightly less than the thickness of a card 5.

In order to provide for accurate spacing of the retard pad 86 at any time from the separator roll 63, and positioning of said pad at the proper feeding angle, there is provided a lever 88 having a rearwardly projecting arm 89 and a forwardly and upwardly projecting arm 90 which is bifurcated at the free end thereof. The lever 88 is pivotally mounted on a stud 91 in a block 92 which is secured in a suitable manner to the lower surface of the shelf 76. The retard pad 86 is cemented to a block 93 which is disposed within the free end of the arm 90 of lever 88 and is pivotally mounted on a stud 94 in said arm, said stud being threaded into one side of the arm and utilized to also immovably clamp said block in its adjusted angular position to said arm. Connected to the free end of the arm 89 of lever 88 is one end of a coil extension spring 95 the opposite end of which is connected at 96 to the shelf 76. This spring 95 continuously tends to move the retard pad 86 downwardly away from the separator roller 63, said movement, however, being limited and regulated by an adjustable screw 97 threaded through a suitable opening in the arm 89 and engaging against the lower surface of the shelf 76. The adjusting screw 97 is normally held against rotation by the expanding action of a coil compression spring 98 surrounding said screw and disposed between the arm 89 and an operating head 99 on the screw. It will thus be apparent that an exceedingly accurate adjustment of the clearance between the retard pad 86 and the periphery of the separator roll 63 to permit only a single card to pass therebetween may be achieved by rotating the adjusting screw 97 in the proper direction by means of its operating head 99. When this adjustment has been made, the retard pad 86 will be maintained in its adjusted position by the contracting action of the spring 95 until such time that readjustment of the clearance is required to compensate for the wearing of said retard pad by the cards through continued feeding of the same thereover.

The separator roll 63 is intermittently rotated at timed

intervals in a counter-clockwise direction as viewed in Fig. 8 to feed the cards 5 one after another in timed relation from the supply stack thereof. For this purpose, the cam shaft gear 49 within the gear box 30 (Figs. 5 and 6) has secured thereto or formed integrally therewith a spur gear 100 which meshes with and drives a spur gear 101. This gear 101 is fixed on one shaft 102 of a conventional angle gear drive unit 103 which is disposed within the gear box 30 and is bolted or otherwise suitably secured to a bracket 104. The angle gear unit 103 is of well-known construction needing no detailed description herein and includes another shaft 105 which is disposed at right angles to the shaft 102. The gears 100 and 101 are of the same size and, hence, the shaft 105 of the angle gear unit 103 will also make one complete revolution for each cycle of operation of the machine. The bracket 104 is bolted or otherwise suitably secured to the gear box 30 exteriorly thereof and projects into said gear box through a suitable opening therein to receive said angle gear unit.

Keyed or otherwise suitably secured to the shaft 105 of the angle gear unit 103 is a crank disc 106 to which is pivotally connected by a stud 107 the lower end of a connecting rod 108. The connecting rod 108 extends upwardly through a suitable clearance opening 109 in the plate 51 and is pivotally connected at its upper end by a stud 110 to the free end of a lever 111. This lever 111 is engaged over and keyed to the hub of one member 112 of a conventional unidirectional wedging roller type of clutch 113. The clutch member 112 is loosely mounted on the separator roll shaft 60, and the clutch 113 is of well-known construction having internal elements (not shown) one of which is keyed or otherwise suitably secured to said shaft and is connected with and rotated by the clutch member 112 upon rocking movement of said member in one direction only. In the illustrated embodiment, the shaft 60 and the separator roll 63 thereon will be rotated only on the down stroke of the lever 111 and will not be rotated on the up stroke of said lever, and as viewed in Fig. 10 which is a rear view of the card feeder 14, the active down stroke of the lever 111 and resulting rotation of the shaft 60 and separator roll 63 occurs in a clockwise direction. It will thus be apparent that upon and during each active down stroke of the lever 111, a card 5 will be advanced from the top of the supply stack by the separator roll 63 through rotation thereof and frictional contact of the same with said card. The series of holes 114 in the crank disc 106 provides for placing of the stud 107 in any one of said holes to thereby adjust the time of operation of the separator roll 63 if deemed necessary or desirable. As shown in Fig. 7, the cards 5 are placed in the magazine face-wise with the adhesive sheet 7 at the top and with their longer dimension extending in the feeding direction and so that the transverse edge or shorter dimension nearest the adhesive sheet is leading.

The extent of rotation of the separator roll 63 upon each operation thereof as above described, is sufficient to advance the uppermost card 5 from the supply stack a short distance and present its leading edge between a continuously driven lower feed roll 115 and cooperating upper pressure rollers 116 which complete the withdrawal of the card from the supply stack and further advance the same to the conveyor 15. It is to be noted that when the separator roll 63 has advanced the leading edge of a card 5 between the roll 115 and rollers 116, said separator roll, due to the described overrunning clutch drive therefor, will be rotated independently of said drive by the card as the same is pulled from beneath the separator roll by the advancing action of the feed roll 115 and pressure rollers 116 thereon. Under these conditions, the separator roll 63, due to the momentum gathered thereby, will continue to coast after the card has been advanced from between the same and the retard pad 86, and by such action a second card would very likely be

advanced prematurely and out of time. Novel brake means is therefore provided to stop rotation of the separator roll 63 as soon as an advancing card has passed out of the influence of said roll.

As shown, said brake means comprises a disc 117 of a suitable friction material, such as fiber, which freely surrounds the shaft 60 and is loosely disposed within an annular recess formed in the outer surface of the portion 58 of the bracket 56. Mounted on the shaft 60 for limited sliding movement relative to said shaft and located adjacent the disc 117 is a metal disc 118 which is of the same diameter as that of the disc 117. The disc 118 is connected to the shaft 60 for rotation therewith by a machine screw 119 which is threaded in the hub of said disc and is formed with a reduced inner end 120 which is engaged in a relatively short keyway 121 formed in and extending axially of said shaft. The disc 118 is yieldingly and continuously pressed against the disc 117 and the latter, in turn, is so pressed against the bracket portion 58 by a deformed washer-like spring 122 which is loosely engaged over the shaft 60 and is disposed between the hub of the disc 118 and a pair of adjusting and lock nuts 123 and 124, respectively, threaded on a threaded portion of said shaft. The pressure of the discs 117 and 118 is adjusted so that the frictional drag imposed thereby upon the shaft 60 is just sufficient to instantly stop rotation of said shaft and the separator roll 63 as the trailing edge of an advancing card leaves said separator roll. Since the disc 118 operates against the disc 117, and the latter operates against the bracket portion 58, there is provided in effect a double braking action and, hence, a minimum or relatively light pressure is only required for the described purpose, thus avoiding any strain on the described driving means for the separator roll 63.

The feed roll 115 extends transversely of the feeder bracket 56 and is formed at opposite ends thereof with shaft-like extensions 125 of reduced diameter which extend through suitable clearance openings formed in the portions 57, 58 and 59 of said bracket, said openings being of a diameter in excess of the diameter of the feed roll 115 to provide for initial mounting of said feed roll in the bracket 56 through either side thereof. The feed roll 115 is journalled at one end thereof in a suitable antifriction bearing 126 which is carried by and retained in a suitable manner in the bracket portion 57. The mounting for the antifriction bearing 126 is preferably chosen so that said bearing may be engaged over and removed from the feed roll shaft 125 through the outer surface of the bracket portion 57, thus enabling and facilitating subsequent removal of the feed roll 115 from the feeder through the bracket portion 57 for repairs or replacement purposes. In order to provide increased feeding traction of the feed roll 115 on the cards 5, said roll is provided with two axially spaced narrow sleeves or tires 127 of soft rubber which are pressed over and suitably bonded to reduced portions of said feed roll.

The idler pressure rollers 116, of which there are two in the illustrated embodiment, coact with the rubber sleeves 127 of the feed roll 115 to further advance the cards 5 delivered successively thereto by the separator roll 63. These pressure rollers 116 are mounted in a novel manner so as to provide for adjustment thereof independently as to the pressure applied thereby on the cards, and collectively in the plane of the top of the feed roll 115 to proper operating position with respect to said feed roll. Accordingly, each pressure roller 116 is journalled on a stud 128 secured in the lower free end of an inverted L-shaped lever 129. The levers 129 for both pressure rollers 116 are pivotally mounted at their rearwardly projecting ends on a round cross bar 130 milled flat at each end thereof as indicated at 131. The cross bar 130 rests on top of the portions 57 and 58 of the bracket 56 with the flat ends 131 thereof engaged between upwardly projecting lugs 132 formed on each of said bracket portions and spaced apart a distance greater than the diameter of said cross bar. Each lug 132 has threaded therein a set screw 133 which is adapted to engage the adjacent side of the cross bar 130. It will thus be apparent that by simply loosening certain of the set screws 133 and tightening others thereof, the cross bar 130, the levers 129, and other parts carried by said cross bar to be hereinafter described, may be moved as a unit in small increments relative to the bracket 56 not only back and forth in a direction longitudinal of the machine, but may also be inclined in a horizontal plane, if necessary, to accurately locate the idler pressure rollers 116 in proper operating position on the feed roll 115. The cross bar 130 is held against upward displacement from the bracket 56 and is immovably clamped in adjusted position to said bracket by the knurled operating heads 134 of clamp screws 135 which are engaged in clearance slots 136 formed in the flat ends 131 of the cross bar 130 and are threaded into the bracket portions 57 and 58.

Disposed between the levers 129 and clamped to the cross bar 130 is an arm 137 which, in plan view, is T-shaped so as to overlie said levers at points substantially directly over the idler pressure rollers 116. This arm 137 has threaded in suitable threaded openings in the laterally extending branches thereof adjustable hollow screws 138 which are provided with spring-pressed plungers 139 that project through the lower ends of said screws into yielding engagement with the forward ends of the levers 129. The idler pressure rollers 116 are thus yieldingly pressed against the feed roll 115 independently of each other through engagement of the plungers 139 with the respective levers 129, and the pressure of said rollers on said feed roll may be independently adjusted by rotating the respective screws 138 which are provided with knurled operating heads 140 for this purpose. The knurling on the heads 140 of screws 138 is of the straight type and thus provides spaced minute teeth around the peripheries of said heads so as to receive in the spaces between said teeth resilient detents 141 for yieldingly holding said screws in the adjusted positions thereof, said detents being suitably secured to the arm 137. The levers 129 are held in spaced relation by the arm 137, and against axial outward displacement by collars 142 which are releasably secured to the cross bar 130.

Bunching of the fanned-out cards 5 in and at the discharge end of the supply magazine is prevented by a hold-down roller 143 which is journalled at one end of a rod 144. The rod 144 extends longitudinally of the card supply magazine and is slidably engaged in a suitable clearance opening formed in one end of a transverse stud 145 which is slidably and rotatably engaged in a suitable clearance opening formed in an upward extension 146 of the arm 137. The stud 145 has threaded on the other end thereof a wing nut 147 which is engaged with the adjacent surface of the arm extension 146 so as to move said stud axially toward said arm extension and thereby releasably clamp the rod 144 against the latter in the adjusted position thereof with respect to the cards 5 in the supply magazine.

The feed roll 115 is driven continuously and at a surface speed faster than that at which the separator roll 63 is rotated in feeding the cards 5 successively from the supply stack. In this manner, each card 5 presented to the feed roll 115 and pressure rollers 116 by the separator roll 63 will be rapidly and completely withdrawn from the supply stack before the separator roll 63 is again operated to feed the next card 5 from the supply stack in the next feeding cycle and, hence, the successively fed cards 5 will follow each other a predetermined distance apart. The feed roll 115 is driven in the manner described from the gear box 30, and for this purpose, the shaft 44 of said gear box has also fixed thereon a sprocket 148 around which passes a chain 149. The chain 149 extends upwardly from the sprocket 148 through a suitable

clearance opening **150** in the plate **51** and also passes around a sprocket **151**. This sprocket **151** is keyed or otherwise suitably secured to one shaft **152** of a conventional angle gear drive unit **153** having another shaft **154** which is disposed at right angles to the shaft **152**. The angle gear unit **153** is located so that the axis of its shaft **154** is coaxial with the axis of the feed roller **115**, and is bolted or otherwise suitably secured in such position to the base of a vertical bracket or standard **155**. The bracket or standard **155** is bolted or otherwise suitably secured to the upper surface of the plate **51** and is utilized to support one end of the card stacking conveyor, as shown in Fig. 1, to be hereinafter described. Slack in the chain **149** is compensated for by a small diameter sprocket **156** which is located within the gear box **30** and is engaged with said chain. The sprocket **156** is journalled on and at the free end of an arm **157** which is adjustably clamped to a stud **158** secured in any suitable manner to the gear box **30**. The shaft **154** of the angle gear unit **153** has keyed or otherwise suitably secured thereto one part **159** of a conventional coupling **160**, the other part **161** of which is keyed or otherwise suitably secured to the outwardly projecting end of the feed roll shaft **125**, thus completing the drive from the gear box to the feed roll and effecting continuous rotation of said feed roll.

Although the feeder **14** has been primarily described above in connection with the handling of cards therein and the use thereof in a machine for preparing cards and mounting inserts therein, it is to be understood that said feeder is not limited to such articles or to such use, but that the same has application in other arts and that the described principles thereof are applicable to the feeding of sheets, envelopes, letters, and other relatively thin articles of a variety of different sheet materials to various machines for the performance of operations thereon.

In the normal operation of the feeder **14**, the cards **5** are separated and advanced successively at timed intervals from the supply stack by the separator roll **63** and presented by said separator roll to and between the feed roll **115** and pressure rollers **116**, said feed roll and pressure rollers serving to further advance the cards in succession and deliver them in like manner to the card conveyor **15** which serves to advance and present said cards successively to the mechanism for producing a card having a micro-film mounted therein.

While only one embodiment of the present invention has been described in the foregoing specification and illustrated in the accompanying drawings in connection with one specific purpose, it will be apparent that various omissions and substitutions and changes in the form and details of the machine illustrated and its operation may be made by those skilled in the art without departing from the spirit and scope of the invention. It is not intended, therefore, that the present invention shall be limited to the embodiment shown nor otherwise than by the terms of the appended claims.

What is claimed is:

1. In a feeder of the friction type for cards, sheets and the like articles, a support, an inclined magazine arranged adjacent said support at the rear thereof for supporting a supply stack of such articles in fanned-out relation with the first article of said stack at the top thereof and leading, continuously driven article advancing means arranged at the front of said support and adapted to grip an article and advance it forwardly of said magazine, a shaft extending transversely of said support and journalled therein, a separator roll secured to said shaft for rotation thereby and arranged to frictionally contact the topmost article of said supply stack, driving means for intermittently rotating said shaft and therewith said separator roll an extent to feed the topmost article from said supply stack to said advancing means, said driving means providing for free rotation of said shaft and said separator roll by the fed article through advancing movement thereof by said advancing means, and brake means for stopping rotation of said shaft and said separator roll substantially the instant that the trailing edge of the advancing article is clear of said separator roll, said brake means comprising a brake disc mounted on said shaft for rotation therewith and for limited axial movement relative thereto toward said support, a friction disc disposed between said support and said brake disc and loosely receiving said shaft, and resilient means surrounding said shaft and continuously acting on said brake disc to yieldingly press the same against said friction disc and the latter against said support.

2. In a feeder of the friction type for cards, sheets and the like articles, a support, an inclined magazine arranged adjacent said support at the rear thereof for supporting a supply stack of such articles in fanned-out relation with the first article of said stack at the top thereof and leading, article advancing means arranged at the front of said support and comprising a continuously driven feed roll and pressure rollers cooperating therewith for advancing an article forwardly of said magazine, a shaft extending transversely of said support and journalled therein, a separator roll secured to said shaft for rotation thereby and arranged to frictionally contact the uppermost article of said supply stack, driving means including an overrunning clutch for intermittently rotating said shaft and therewith said separator roll an extent to feed the topmost article from said supply stack to and between said feed roll and said pressure rollers, and brake means for stopping rotation of said shaft and said separator roll substantially instantaneously with the movement of the trailing edge of the advancing article out of contact with said separator roll, said brake means comprising a brake disc mounted on said shaft for rotation therewith and for limited axial movement relative thereto toward said support, a friction disc loosely receiving said shaft and disposed between said brake disc and said support and loosely confined in a recess formed in said support, and resilient means surrounding said shaft and continuously acting on said brake disc for yieldingly pressing the same against said friction disc and the latter against said support.

3. In a feeder as defined in claim 1 wherein said article advancing means comprises a driven feed roll extending transversely of said support and journalled thereon, a cross bar mounted on said support for adjustment horizontally toward and away from said feed roll and angularly in its plane with respect to said feed roll, at least two levers pivotally mounted on said cross bar in spaced relation, pressure rollers journalled on said levers and engaged with said feed roll, an arm fixed on said cross bar and disposed between said levers, spring-pressed plungers adjustably mounted in said arm and engaged with said levers for applying a yielding pressure thereon in the direction of said feed roll, means adjustably mounted on said support and engaged with the opposite ends of said cross bar at opposite sides thereof for effecting said horizontal and angular adjustment of said cross bar, means mounted on said support and engaged with said cross bar for releasably clamping the same to said support.

4. In a feeder for cards, sheets and like articles, an inclined magazine for supporting a supply stack of such articles in fanned-out relation with the first article of said stack at the top thereof and leading, a support adjacent the discharge lower end of said magazine, a separator roll rotatably mounted in said support and capable of feeding said articles from said supply stack through frictional contact of said roll with successive articles, a retard element disposed in an opening in said magazine and in opposed relation to said separator roll, means mounting said magazine so that the upper surface of the supply stack supporting base thereof is parallel to and spaced from a plane which is tangent to the periphery of said separator roll and providing for bodily adjustment of said magazine to various angles of inclination about the axis of said separator roll, continuously driven article ad-

vancing means arranged at the front of said support and adapted to grip an article and advance it forwardly of said magazine, driving means for intermittently rotating said separator roll an extent to feed the topmost article from said supply stack to said advancing means, said driving means providing for free rotation of said separator roll by the fed article through advancing movement of the latter by said advancing means, and brake means for stopping rotation of said separator roll substantially the instant that the trailing edge of the advancing article is clear of said separator roll.

5. A sheet feeder as defined in claim 4 wherein said article advancing means comprises a driven lower feed roll and a pair of upper pressure rollers cooperating with said feed roller, and means for supporting said pressure rollers so as to enable independent vertical adjustment of the pressure applied by each pressure roller upon said feed roller and horizontal adjustment of said pressure rollers as a unit relative to and transversely of the axis of said feed roll.

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