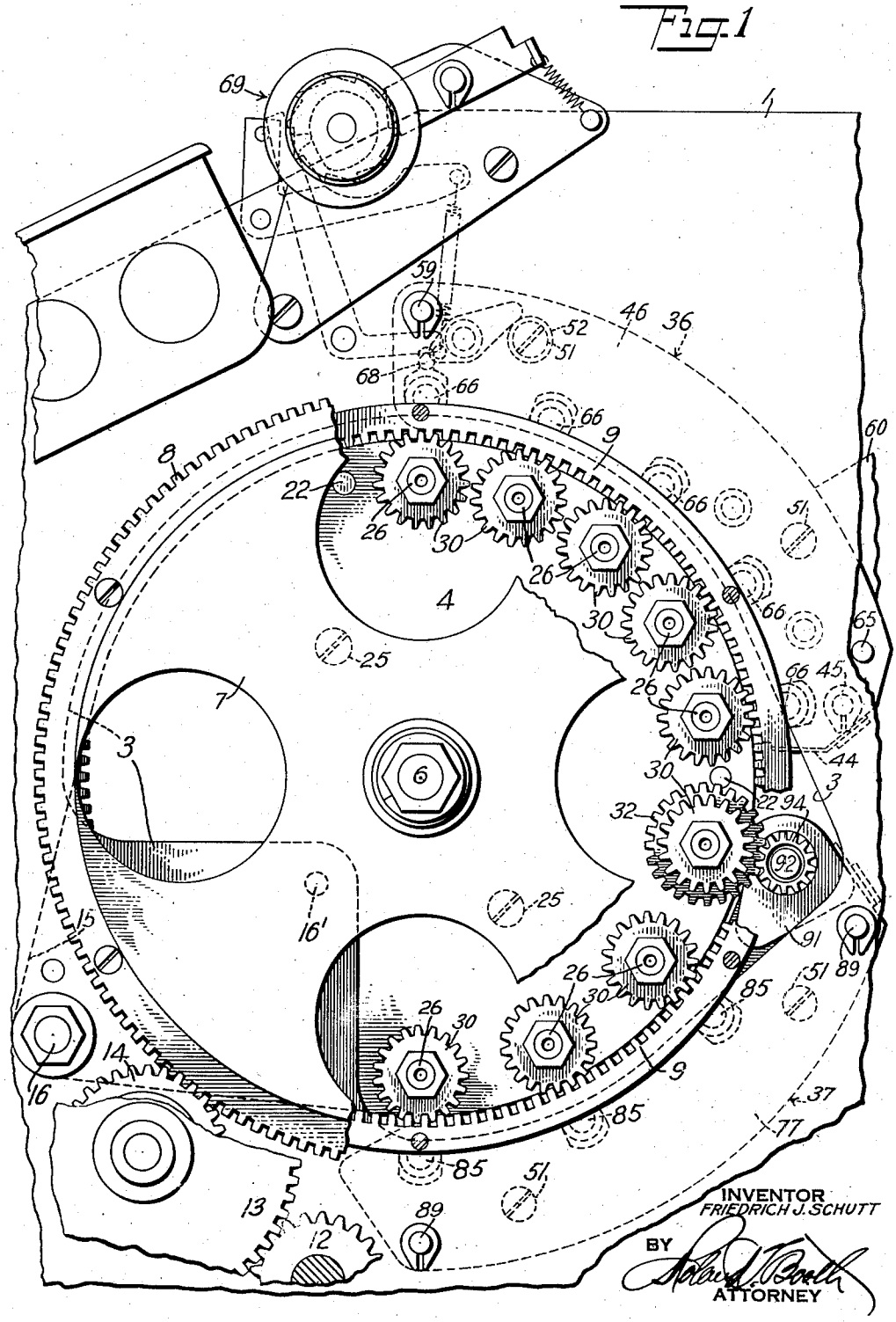
June 5, 1945. F. J. SCHUTT 2,377,525

DOCUMENT FEED FOR PHOTOGRAPHING MACHINES

Filed March 30, 1944 5 Sheets-Sheet 1

Fig. 1



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DOCUMENT FEED FOR PHOTOGRAPHING MACHINES

Filed March 30, 1944 5 Sheets-Sheet 2

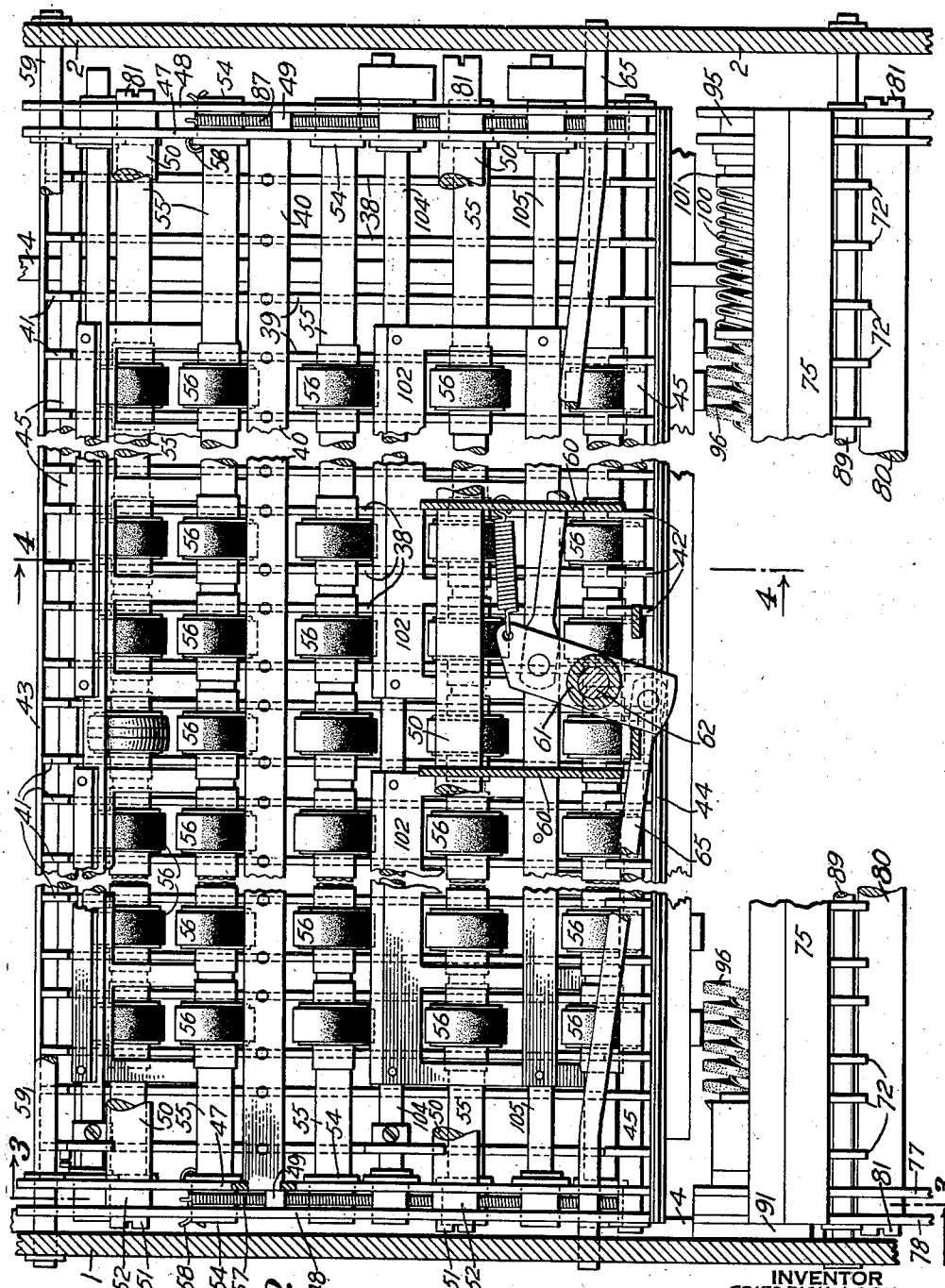

FIG. 2

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DOCUMENT FEED FOR PHOTOGRAPHING MACHINES

Filed March 30, 1944 5 Sheets-Sheet 3

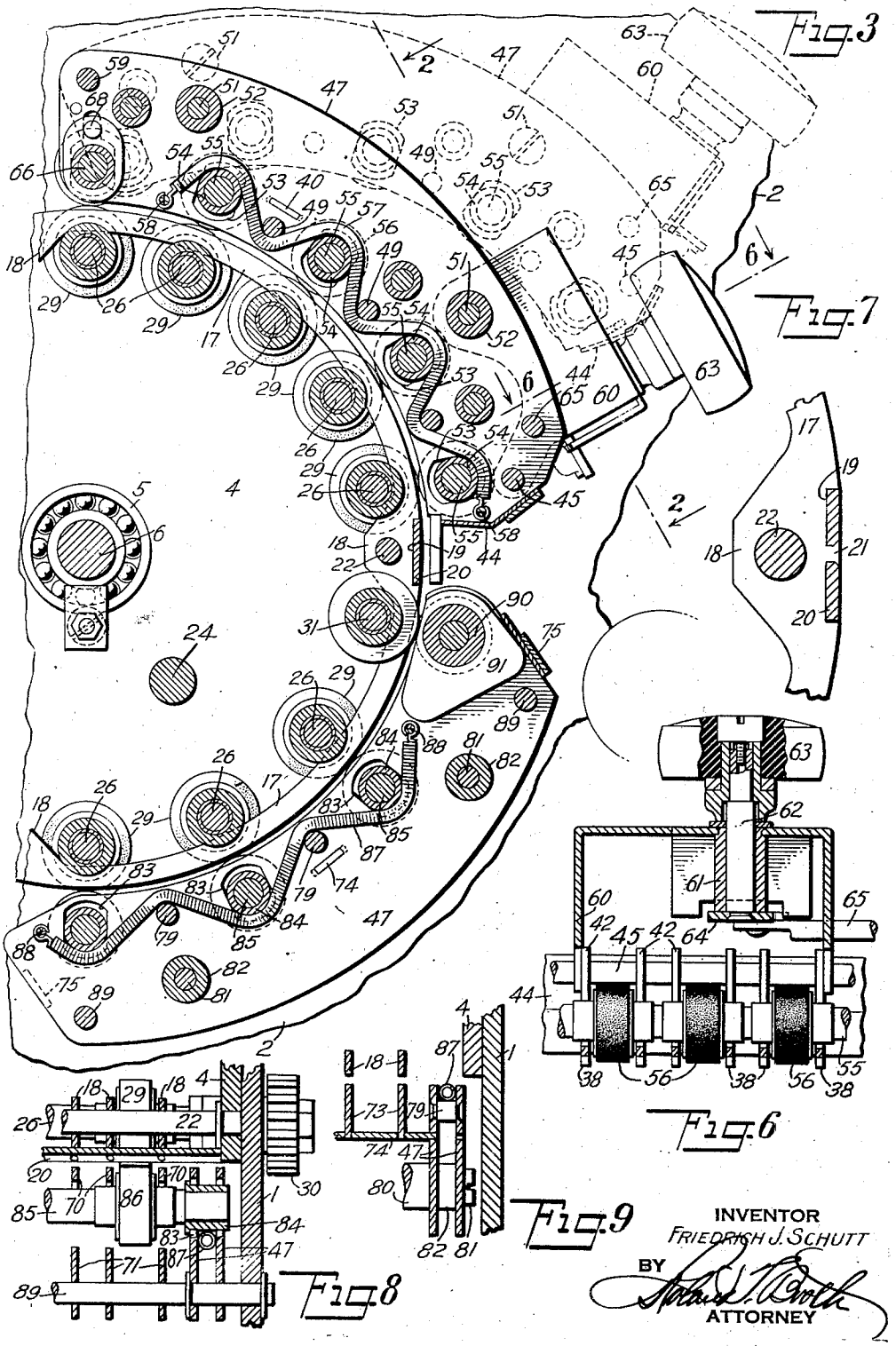

Fig. 3



Fig. 7



Fig. 6



Fig. 8



Fig. 9

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DOCUMENT FEED FOR PHOTOGRAPHING MACHINES

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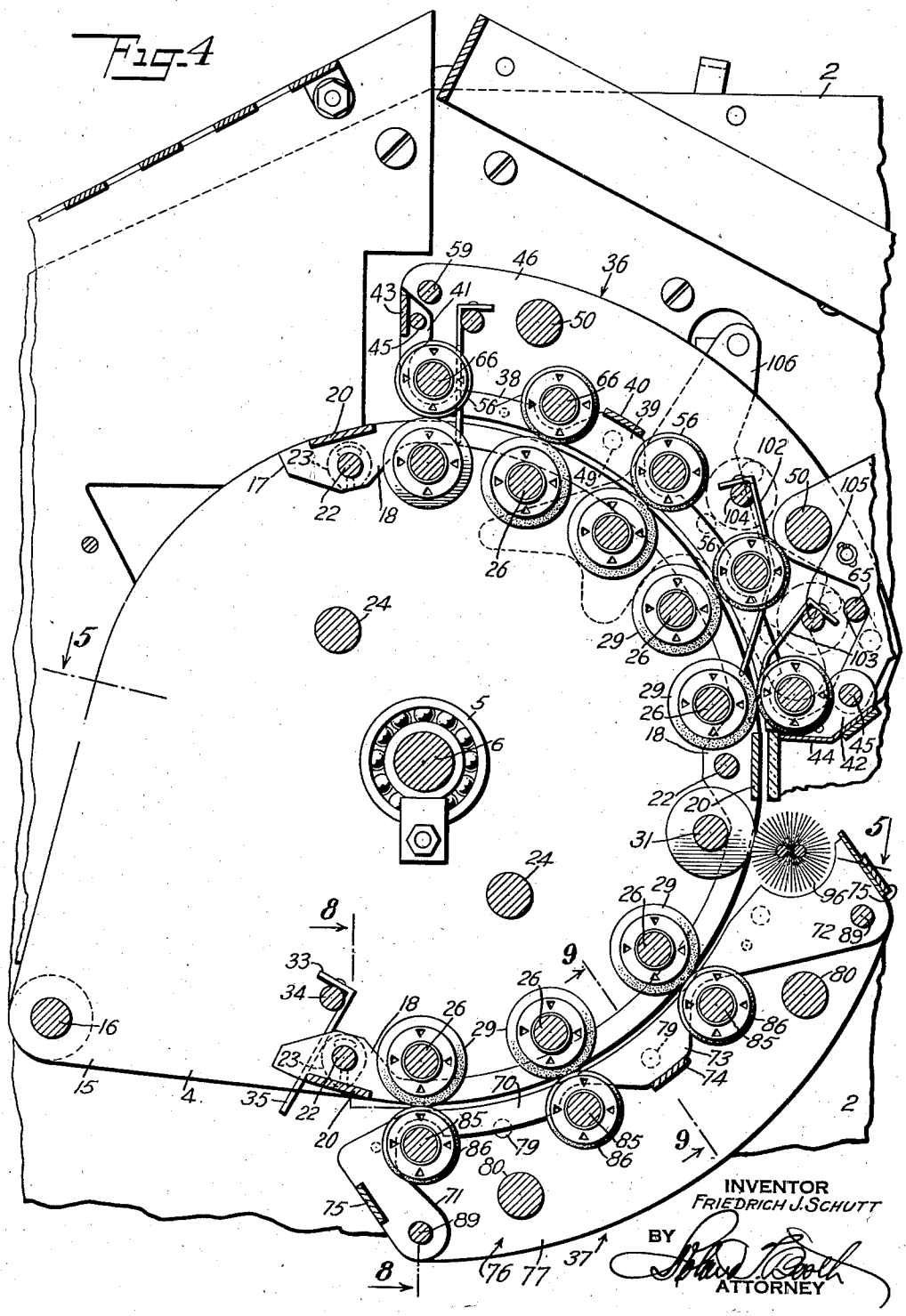
Fig. 4

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DOCUMENT FEED FOR PHOTOGRAPHING MACHINES

Filed March 30, 1944 5 Sheets-Sheet 5

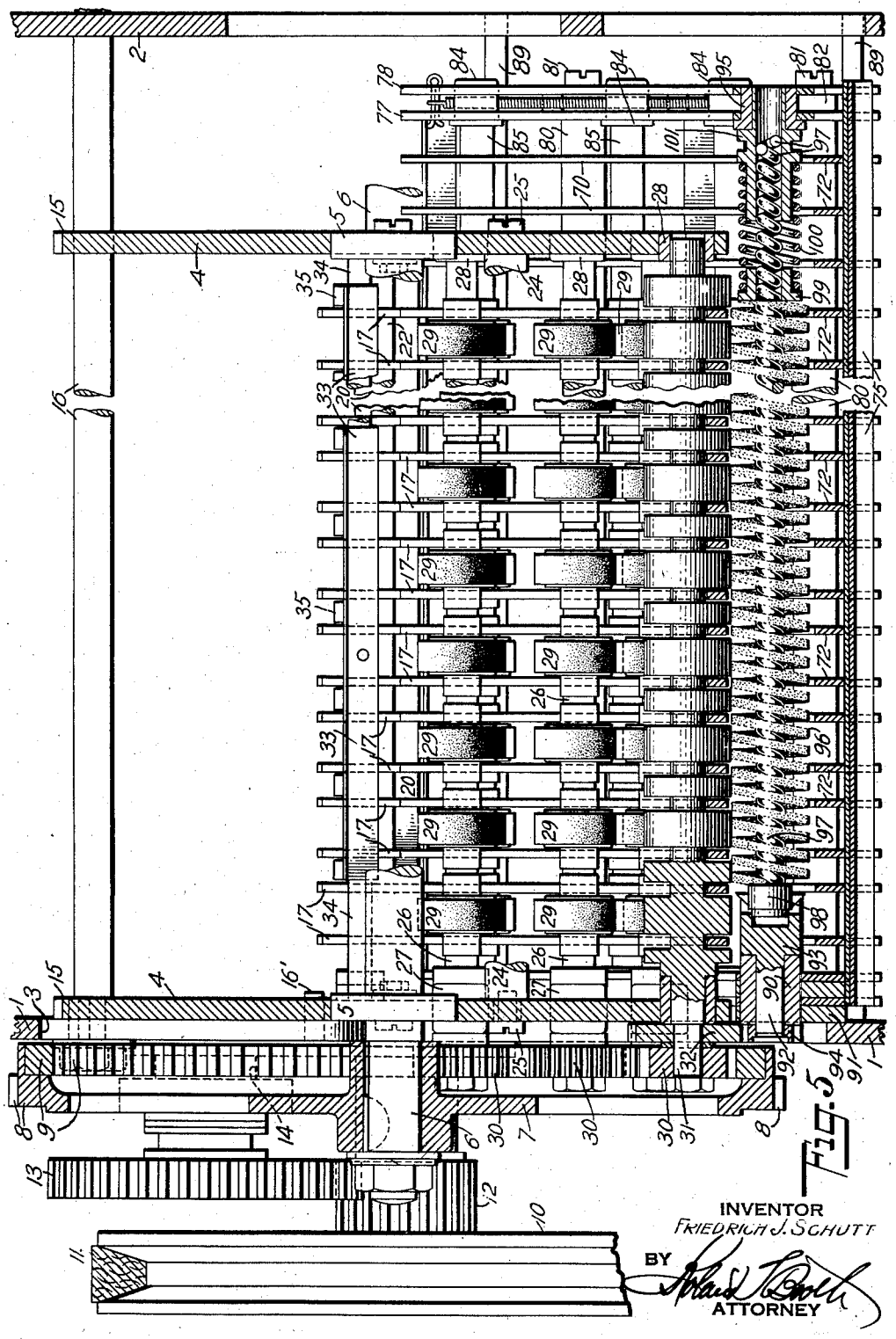

FIG. 5

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Patented June 5, 1945 2,377,525

# UNITED STATES PATENT OFFICE

2,377,525

## DOCUMENT FEED FOR PHOTOGRAPHING MACHINES

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Application March 30, 1944, Serial No. 528,681

5 Claims. (Cl. 271—51)

This invention provides improvements in document feeding mechanism for document photographing machines.

The invention provides an improved document feed construction for a photographing machine having feed units detachably mounted in the machine and formed to provide guide surfaces for guiding documents thereover through a photographing position with feed rolls for feeding the documents over the guiding surfaces in which each unit is constructed of a series of parts that are inexpensive to manufacture, are readily assembled into unit form and arranged to provide convenient access to the working parts of the machine and the document feed for repair, adjustment and replacement of parts.

The invention comprehends the provision of improved document feed units having a plurality of curved guide bars mounted in spaced parallel relation on transverse retaining bars interengaged at the ends with end plates and arranged so that securing means will rigidly secure the several parts together in assembled relation in a manner providing for disassembling the parts for service, replacement and repair.

The invention provides a grid unit for guiding documents having a plurality of spaced parallel curved guide bars mounted in assembled relation and rigidly secured on a plurality of transversely extending retaining bars interengaged at the ends with end members to provide an assembled grid unit for supporting a plurality of document feed shafts with journals in the end members on one side of the bars and the peripheries of document feed rollers thereon projecting through the spaces between the guide bars beyond the opposite edges for engagement with and feeding of documents over said guide bars.

The invention also provides for the construction of a document feed from sheet metal by forming a plurality of sheet metal parts in the form of guide and retaining bars and end plates rigidly assembled together to provide a grid unit for guiding of documents over one side thereof while a plurality of feed rolls are mounted on the other side of the guide bars with the peripheries of feed rolls carried thereby projecting between the bars for engaging and feeding documents over the other side, all arranged for convenient manufacture and assembly for effecting economy in construction, assembly and repair.

The invention comprehends a number of other features residing in the construction of the guide bars, the retaining bars and the end members for providing a grid unit for guiding and feeding documents in a document photographing machine that are hereinafter more fully described and claimed.

In the drawings:

Fig. 1 is a fragmentary side elevation showing the right-hand end of the document feed mechanism partly in elevation and partly in dotted lines with the main drive gear for the feed rolls broken away and other portions shown in cross-section, for illustrating details of construction.

Fig. 2 is a fragmentary rear elevation of the document feed looking forwardly from a rear upper portion of the machine showing the latch for retaining the upper guide unit in position in cross-section, the view being taken substantially along the line 2—2 of Fig. 3.

Fig. 3 is a vertical transverse cross-section taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a vertical central transverse cross-section taken substantially along the line 4—4 of Fig. 2.

Fig. 5 is a cross-section taken substantially along the line 5—5 of Fig. 4.

Fig. 6 is a detail cross-section taken substantially on the line 6—6 of Fig. 3.

Fig. 7 is a fragmentary detail view showing the method of attaching the retaining and guide bars.

Fig. 8 is a detail cross-section taken on line 8—8 of Fig. 4.

Fig. 9 is a detail cross-section taken on line 9—9 of Fig. 4.

The document feed structure disclosed in the present application is an improvement over the document feed construction shown in co-pending application Serial Number 472,359, filed January 14, 1943, and is adapted for substitution for the document feed disclosed in the aforementioned co-pending application in a photographing machine constructed as disclosed therein. The document feed structure disclosed herein is also used in connection with the disclosures of document photographing machines shown in applications executed and filed simultaneously herewith.

As disclosed in the aforementioned co-pending applications the document photographing machine using the feed structure of the present invention, employs right and left-hand side walls 1 and 2 mounted in spaced parallel relation and carried by a suitable base, not shown. Right-hand side wall 1 is formed with a large opening 3 for receiving the pinions on the main document feed unit.

The main feed unit incorporating the present invention has a pair of spaced parallel end members 4 formed with a central opening to receive bearing members 5 for rotatably supporting main drive shaft 6 of the document photographing machine. Main drive shaft 6 extends through opening 3 in side wall 1 at the right-hand side of the machine where it mounts main drive gear 7 for the machine having external annular gear teeth 8 and an internal annular gear 9 mounted on the inner side thereof adjacent side wall 1,

for driving various parts, as shown in Figs. 1 and 5.

A pulley 10 forms the main drive pulley for the document photographing machine and is driven by belt 11 from a suitable electric motor. Pulley 10 carries pinion 12 intermeshed with gear 13 rotatable on a stub shaft carried by side wall 1. Gear 13 is connected to pinion 14 in mesh with gear teeth 8 on main drive gear 7. By this chain of gears the motor drives main drive gear 7 and main drive shaft 6 in a manner disclosed in the aforementioned co-pending applications.

End members 4 of the main feed unit have a free edge at the upper, rear and bottom portions arranged in concentric relation to the center of shaft 6 and a forwardly projecting portion 15 mounted on supporting rod 16 having opposite ends secured to the front portions of side walls 1 and 2. A pin 16' extending inwardly from a portion of side wall 1 overlapping right-hand end member 4 engages in an opening in said end member for cooperation in mounting the main feed unit on the side walls.

The main feed unit has a plurality of arcuate guide bars 17 of duplicate form in construction mounted in spaced parallel relation between end plates 4 concentrically with reference to the center of main drive shaft 6. Each arcuate guide bar 17 is formed of sheet metal arranged in radial relation with ears 18 extending inwardly at the ends and in the central portion. Ears 18 are formed with perforations and the outer periphery of the bar is recessed at 19 in the portions formed with the ears to receive transversely extending retaining bars 20. A projection 21 on each bar 17 in the central portion of recesses 19 extends through a slot in retaining bar 20 as shown in Fig. 7 and is riveted into the countersunk outer portion of the slot in bar 20 for rigidly securing the central and end portions of each arcuate guide bar 17 to each of the three transversely extending retaining bars 20. This retains the arcuate guide bars in spaced parallel and rigid assembled relation with retaining bars 20. The outer faces of retaining bars 20 are arranged to lie flush with the outer edges of arcuate guide bars 17 to provide a smooth outer guide surface over which documents may be moved. A plurality of positioning rods 22 are provided, each engaged through one row of aligned apertures in ears 18 at the top, center and bottom portions of arcuate guide bars 17. Each of the positioning rods 22 projects beyond the end of guide bars 17 and through apertures in the marginal portions of each end plate 4. At the inner faces of end plates 4 each rod 22 is provided with an annular groove having a detachable retaining washer 23 engaged therein and cooperating to retain rods 22 against end-wise movement between end members 4. Upper and lower retaining bars 20 have the opposite ends extending into engagement with the inner faces of end members 4. Central transverse retaining bar 20 has the ends extending into recesses in end members 4 similar to recesses 19 in guide bars 17. Rods 22 and the cooperation between the ends of transverse retaining bars 20 with end members 4 secures a rigid assembled relation of the guide and retaining bars on end plates 4.

A pair of securing bars 24 extends between central portions of end members 4 at opposite sides of main drive shaft 6 and has the ends abutting the inner faces of the end members. Bars 24 are formed with axial threaded openings registering with apertures in end members 4 to receive securing screws 25 for rigidly securing end members 4 to securing rods 24. Securing screws 25 and rods 24 cooperate in retaining the entire main feed unit in assembled relation since end members 4 may be disengaged from positioning rods 22 and the ends of retaining bars 20 by reason of the fact that the connection between these parts is a slidable interfitting connection allowing the end members to be moved outwardly and disengaged from the retaining bars and positioning rods whenever screws 25 are removed from securing bars 24.

A plurality of feed roll shafts 26 have opposite ends journalled in bearings 27 and 28 respectively, in end plates 4. These feed roll shafts 26 are arranged in concentric relation to the outer edges of arcuate guide bars 17 and in concentric relation to main drive shaft 6 as clearly shown in Figs. 1, 3 and 4. Nine shafts are illustrated in the drawings, arranged in concentric relation to main drive shaft 6 from the top portions of end plates 4 about the rear marginal portions to the bottom portions thereof. A plurality of feed rolls 29 are mounted in spaced relation along each of the shafts 26 and are arranged to have the peripheries of the rolls extend between guide bars 17 so that a portion of the periphery of each feed roll 29 projects outwardly beyond the outer periphery of guide bars 17 in order to engage and feed documents about the outer surface of the grid feed unit.

Bearings 27 are at the right-hand side of the machine and are shown at the left-hand side in Fig. 5 while bearings 28 are at the left-hand side of the machine and shown at the right of Fig. 5. Bearings 28 are flanged sleeve members fitting in end plate 4 with the flanges engaged against the inner face of end plate 4 so as to slidably receive the reduced shouldered ends of feed roll shafts 26. Bearings 27 are in the form of sleeves or needle bearings mounted in openings in end plates 4 at the right-hand side of the machine adjacent side wall 1 with opposite ends projecting in spaced relation beyond both sides of side wall 1, as clearly shown in Fig. 5. Feed roll shafts 26 have reduced ends on each shaft rotatable in bearings 27 and 28 and portions projecting beyond the outer ends of bearings 27 rotatably mounting a plurality of pinions 30 intermeshed with internal gear 9 for direct driving of the feed rolls by the main drive gear. Feed rolls 29 on all except the feed roll shaft indicated at 31 are formed of suitable rubber or other composition material providing a friction surface adapted to grip and effectively feed documents. Feed roll shaft 31 is a metallic shaft having the feed rolls integral or mounted thereon in any suitable manner so as to provide feed roll portions projecting between arcuate guide bars 17, for a purpose hereinafter described. The end of shaft 31 carrying pinion 30 is constructed to mount a larger driving pinion 32 between pinion 30 and end wall 4, and for this purpose, bearing 27 for shaft 31 does not project beyond the outer face of end wall 4 to the same extent as the remaining bearings, Fig. 5.

This main feed unit has the end plate at the right-hand end thereof mounted against right-hand side wall 1 with pin 16' engaged in an opening in end plate 4, shown in Fig. 5, with pinions 30 projecting through opening 3 for engagement with internal gear 9. In this way it will be seen that the unit may be engaged in assembled unit form into operative position against side wall 1. It may be readily mounted or removed from the

machine as a unit with drive shaft 6 whenever rod 16 is removed therefrom and end wall 4 disengaged from pin 16' after the drive and clutch structure at the left side of the machine have been disengaged. The outer edges of guide bars 17 form a partially cylindrical path for feeding a document through the machine. As disclosed in the aforementioned co-pending applications these documents are fed from the top front portion of the machine into this feed mechanism and then they are fed by the feed rolls through the partially cylindrical path about the outer edges of guide bars 17 to the lower portion thereof where they are discharged. A deflector plate 33 is mounted on a rod 34 having opposite ends engaged in openings in end plates 4. The deflector plate 33 has a plurality of deflector fingers 35 extending outwardly therefrom and arranged to project between and beyond the lower edges of guide bars 17 so that documents being discharged at the lower portion of the feed mechanism are deflected downwardly by the ends of deflector fingers 35, as clearly shown in Fig. 4.

The central portion of the main guide unit provides a photographing position at the portion where transverse retaining bar 20 extends transversely across the central portion of guide bars 17.

Upper and lower guide complementary units 36 and 37 are mounted in cooperative relation at the upper and lower rear portions of the main guide unit for cooperating therewith in feeding documents about the outer surfaces of guide bars 17. These units are spaced apart at the central portion on opposite sides of the photographing position through which the documents are fed for photographing.

The upper guide unit is constructed in a similar manner to the main guide or grid unit in that it is of grid construction having a plurality of radially extending guide bars 38 arranged in spaced parallel relation. Each guide bar 38 has an intermediate outwardly projecting ear 39 formed with a projection on the outer end thereof adapted to engage in and be riveted in a slot in transverse retaining bar 40 secured to the ends of all of the projections 39 on all of guide bars 38 for rigidly securing them in radially extending spaced parallel relation. Each guide bar 38 has lateral extensions on opposite free ends, as indicated at 41 and 42, respectively. Extensions 41 and 42 are each formed with an aperture and on the outer edges are provided with projections for engaging in slots in transversely extending retaining bars 43 and 44, respectively. The ends of the projections are swaged to rigidly attach bars 43 and 44 to the lateral extensions 41 and 42 in the same manner that transverse retaining bars 20 are secured to guide bars 17. Positioning rods 45 extend through apertures in lateral extensions 41 and 42 in transversely extending relation and have the ends projecting beyond the end guide bars 38 and with the ends of transverse retaining bars 43 and 44 are interengaged with end members 46 at each end of the upper guide unit.

The end members of the upper guide unit are formed of a pair of spaced parallel plates 47 and 48 respectively, riveted together at their inner edges in spaced relation by a plurality of rivets 49. Rivets 49 are formed with reduced ends extending through apertures in plates 47 and 48 and have the free ends of the reduced portions riveted or swaged to rigidly unite plates 47 and 48 together to form an end member 46. A pair of securing rods 50 extend in spaced parallel relation transversely between end members 46 for engagement at the ends with the inner faces of end plates 47 at the inner side of end members 46. The ends of rods 50 are provided with threaded bores extending axially therein to threadedly receive securing screws 51 extending through apertures in plates 47 and 48 in registry with the threaded bores in the ends of rods 50. Spacing sleeves 52 are engaged between plates 47 and 48 about securing screws 51 for cooperation to retain the plates in spaced parallel relation at the outer portion when the securing screws are tightened against the end of rods 50. Securing rods 50 and screws 51 rigidly retain the end members and the transversely extending bars and positioning rods in interengaged rigid assembled relation to form a rigid upper guide unit. It will be noted that the spacing rods are positioned at the end portions of the upper guide unit toward the outer edges of the end members in spaced relation outwardly beyond the outer edges of guide bars 38.

Both end plates 47 and 48 of each end member are formed with radially arranged slots 53 slidably receiving bearing sleeves 54 formed at the inner ends with annular flanges slidably engaging the inner faces of plates 47. A plurality of idler feed shafts 55 have opposite ends reduced and journalled in bearing sleeves 54, the shafts extending in spaced parallel relation between opposite end members 46 at the outside edges of guide bars 38 which are formed with recesses in the outer edges to accommodate these shafts. There are four of these idler feed shafts in the upper guide unit arranged in substantially radial relation to four corresponding feed roll shafts 26 progressing upwardly from the photographing position as shown in Fig. 3. These idler feed shafts have their bearings 54 slidably mounted in the end members in order that they may move toward and away from feed roll shaft 26 when the guide unit is in position for feeding documents so that as documents engage between feed rolls 29 on feed roll shafts 26 and idler feed rolls 56 on idler feed shafts 55 the idler feed shafts can be moved slidably with the rolls to accommodate the document thickness being fed. A length of coil spring 57 is mounted between spaced parallel plates 47 and 48 in each end member and has opposite ends secured adjacent the ends of each end member by cotter pins 58 extending transversely through registering apertures in plates 47 and 48. Each coil spring 57 is engaged over each bearing sleeve 54 for idler feed roll shaft 55 and under each rivet 49 as clearly shown in Fig. 3. This applies spring tension to all of the bearing sleeves 54 for normally holding idler feed rolls 56 in peripheral engagement with feed rolls 29 and for providing a firm gripping action on documents fed between feed rolls 56 and 29 for positively feeding the documents between arcuate guide bars 17 and 38. Feed rolls 56 are positioned on idler feed shaft 55 in the same order and spaced relation as feed rolls 29 are mounted on feed roll shafts 26 in order to be in opposed relation for feeding cooperation. Feed rolls 56 project through the spaces between radial guide bars 38 in a manner clearly shown in Fig. 2.

A pivot rod 59 is extended transversely through the upper corners of end members 46 through plates 47 and 48 and has the outer ends thereof extending through apertures in side walls 1 and 2 for detachably and pivotally mounting the upper

guide unit in the side walls. Annular grooves are provided in pivot rod 59 adjacent end members 46 as well as side walls 1 and 2 to receive snap-on washers for securing the rod in the side walls and holding the upper guide unit in position thereon. The upper guide unit may therefore be swung about pivot rod 59 to the dotted line position shown in Fig. 3 or even to a higher position to open up the document feed mechanism in order to provide access to the parts thereof for inspection, assembly and disassembly of the unit between side walls 1 and 2, as well as for removal of documents if necessary.

A suitable form of latch mechanism is provided for retaining the upper guide unit 36 in the operative full line position as shown in Figs. 3 and 4. For this purpose a U-shaped sheet metal bracket 60 has the free ends of the legs formed with apertures receiving lower positioning rod 45 adjacent the lower end of the upper guide unit and the photographing position. The adjacent securing rod 50, also extends through the legs of bracket 60 as clearly shown in Figs. 3 and 4. U-shaped bracket 60 is provided with a cylindrical bearing sleeve 61 shown in Fig. 6, rotatably mounting a stub-shaft 62 carrying handle 63 on the outer end and lever 64 on the inner end having opposite ends extending radially from the inner end of shaft 62. Latching links 65 each have one end pivotally connected to one end of lever 64 from which they extend in opposite directions transversely of the upper guide unit with the outer ends slidably engaged in apertures in plates 47 and 48 in each end member and extend outwardly beyond the outer sides of the end members for engagement in apertures in side walls 1 and 2 when upper guide unit 36 is in the operative position for feeding documents as shown in Figs. 3 and 4.

Handle 63 may be rotated to move lever 64 to retract latching links 65 for disengaging the ends from the apertures in side walls 1 and 2 whereupon upper guide unit 36 may have its lower rear end swung upwardly about pivot rod 59 so as to open up the document feed mechanism. The upper guide unit 36 may be readily removed from between side walls 1 and 2 by operating handle 63 to disengage latching links 65 from side walls 1 and 2 and then by removing pivot rod 59 from the apertures in side walls 1 and 2 and end members 46. The assembled upper guide unit may be removed as a complete unit after the pivot rod has been removed, thereby providing a very convenient assembly for efficient operation and a feed structure that is quickly accessible for inspection, adjustment, repair and replacement of parts.

The uppermost feed shaft 66 mounted in the upper guide unit is aligned with the upper feed roll shaft 26 in substantially radial relation and has opposite ends journalled in flanged bearing sleeves slidable in radial slots in plates 47 and 48, in the same manner as idler feed shafts 55 are journalled in bearing sleeves 54. A slide member 67 is slidably mounted between plates 47 and 48 of each end member and has an aperture receiving the bearing sleeve for shaft 66. Slide members 67 have actuating pins 68 extending outwardly through slots in outermost end plates 48. These pins are used to operate suitable mechanism to control the machine to prevent more than two documents from being fed through the machine at the same time, part of this mechanism being disclosed in Fig. 1 and indicated generally at 69 while the pin on the opposite end operates a switch closing device for controlling the document feed. This feed control mechanism is disclosed in a co-pending application filed on even date herewith and is not claimed in this application.

The lower guide unit 37 is constructed in a substantially similar manner to the upper guide unit and will now be described.

The lower guide unit has a grid structure forming the document guiding surfaces wherein a plurality of arcuate radially arranged spaced parallel guide bars 70 have lateral projections 71 at the lower end of said guide bars while the opposite ends are provided with enlarged sections 72. The central portions of arcuate guide bars 70 have ears 73 projecting outwardly and formed with a projection on the ear of each guide bar riveted in a slot of transversely extending retaining member 74 for holding the central portions of guide bars 70 in spaced parallel relation. Transversely extending end retaining bars 75 are formed with a plurality of apertures to receive projections on the edges of enlarged sections 72 and lateral projections 71 for riveting therein to rigidly secure the ends of the retaining bars in spaced parallel relation in cooperation with retaining bars 74. This provides a rigid assembled grid construction cooperating to form a unit with end members 76.

Each end member 76 of lower guide unit 37 is formed with a pair of spaced parallel plate members providing inner and outer end plates 77 and 78, respectively. End plates 77 and 78 of each end member are riveted together at spaced intervals along the inner edges by spacing rivets 79 in the same manner as the end plates of the upper guide unit. A pair of securing bars 80 extend between inner end plates 77 of the end members adjacent opposite ends thereof and are located toward the outer edges, as shown in Fig. 4. Bars 80 have threaded sockets in the ends registering with apertures in the inner and outer end plates 77 and 78 to receive securing screws 81 extending through spacing sleeves 82 positioned between inner and outer plates 77 and 78, in the same manner as described above in connection with the upper guide unit. Securing screws 81 and spacing rods 80 cooperate to rigidly secure the guide and transversely extending retaining bars in assembled relation with the end members so that the ends of the transversely extending securing bars are engaged with the inner faces of the end members for rigidly assembling the bars and end members to form a rigid lower guide unit.

A plurality of radially extending guide slots 83 are formed in both the inner and outer end plates 77 and 78 of each end member 76 for slidably receiving flanged bearing sleeves 84. These sleeves are arranged for receiving three idler feed roll shafts 85 therein having a plurality of idler feed rolls 86 mounted thereon and projecting through the spaces between the spaced parallel guide bars so the peripheries will extend inwardly beyond the inner arcuate edges of guide rods 70 for engagement with the peripheries of feed rolls 29 on the bottom feed roll shafts 26 in paired relation as clearly shown in Fig. 4. These idler feed rolls are normally retained in resilient engagement with feed rolls 29 by means of a length of coil spring in each end member indicated at 87 in Fig. 3 engaged under spacing rivets 79 intermediate the ends thereof. Between the spacing rivets, spring 87 is engaged over each of the bearing sleeves

84 with opposite ends of the spring secured to cotter pins 88. Cotter pins 88 extend through aligned apertures in both inner and outer end plates 77 and 78. Each spring 87 engages flanged bearing sleeves 84 so as to normally move them toward the inner arcuate edges of guide bars 70 for maintaining idler feed rolls 86 engaged with feed rolls 29. Whenever documents are fed therebetween they will be resiliently gripped between the main feed rolls and the idler feed rolls through the resilient operation of the idler feed roll shafts and will hold the documents in firm contact with feed rolls 29 so the documents will be fed between arcuate guide bars 17 and 70 in the lower portion of the document feed structure.

The lower guide unit is detachably mounted between side walls 1 and 2 by supporting rods 89 extending transversely through end members 76 at the outer upper and lower corners. Rods 89 have the free ends extending beyond the lower guide unit to engage in apertures in side walls 1 and 2. In this way the lower guide unit is detachably and rigidly retained in place for feeding cooperation with the main guide unit.

The upper end of the right-hand end member of the lower guide unit has a bearing 90 mounted in transversely extending relation therethrough with a filler plate 91 engaged between inner and outer end plates 77 and 78 and apertured to receive bearing 90 for cooperation in holding the bearing in place in the end member. A short shaft section 92 is rotatably mounted in bearing 90 and has a shouldered socket member 93 on the inner end and a pinion 94 on the outer end thereof for engagement in the assembled relation of the lower guide unit with pinion 32 having a gear ratio for rotating shaft 92 at a greater speed than feed roll shaft 31. The left-hand end member of the lower guide unit has the upper corner provided with a sleeve bearing flanged at the inner end rigidly mounted in plates 77 and 78, as indicated at 95 in Fig. 5.

A rotary feed brush 96 has a plurality of radially extending bristles mounted in a twisted wire shaft member 97. A drive head 98 is mounted on the right-hand end of twisted wire shaft 97 and is formed with drive projections at diametrically opposite sides to engage in the slots formed in socket 93 for driving cooperation to rotate feed brush 96 in the rotation of shaft 92. A collar 99 is rigidly mounted in the left-hand end of twisted wire shaft 97 as shown at the right of Fig. 5. One end of a coil spring 100 is engaged on collar 99 and engages against the flange at the inner end for compression to hold slidable bearing member 101 on wire shaft 97, in engaged relation in bearing sleeve 95, in the manner shown in Fig. 5. Slidable bearing 101 supports one end of feed brush 96 for rotary movement in the operation of the document feed for engaging documents leaving the photographing position and by reason of being driven at a higher speed than feed rolls 29 the document will be kept in a stretched condition in the photographing position against wrinkling, buckling and the like in order to maintain the portion of the document in photographing position in proper focus with the camera.

The invention therefore provides a main guide unit and upper and lower cooperating complementary guide units each detachably mounted between side walls 1 and 2 of the photographing machine to receive documents fed between the main and upper guide units at the top portion of the machine from a suitable feed table as disclosed in the aforementioned application Serial Number 472,359, or fed thereto by an automatic card feeding device of a suitable character similar to that shown in the copending application filed under even date herewith. Documents are fed in at the top between the curved guide bars of the main and upper guide units, through the photographing position, and then between the curved guide bars of the main and lower guide units for discharge from the bottom portion of these guide units at the front portion of the machine. This guide mechanism receives documents fed into the document feed mechanism from the front of the machine at the top portion and delivers the documents at the bottom front portion.

In the operation of this document feed mechanism the documents operate primary and secondary control members 102 and 103 respectively, mounted on transversely extending shafts 104 and 105 respectively, each having opposite ends mounted in end members 46 of upper guide unit 36 in advance of the photographing position. Control members 102 and 103 are successively engaged by the leading edge of documents fed by the coaction of the feed rolls for operating control lever 106 mounted on side wall 2 to close a light switch and operate a clutch for starting the film feed in the machine. Control member 103 also operates lever 106 for maintaining the control lever in position to maintain operation of the lights and feed of the film until the trailing edge of a document leaves the end of control member 103 which terminates slightly in advance of the photographing position. The operation of control members 102 and 103 is such that the document has the trailing edge fed through the photographing position to complete photographing of the document before control member 103 allows control lever 106 to return to the position where the film feed is stopped and the lights are turned out. This operation of the control members will be more clearly understood by reference to the co-pending applications hereinabove mentioned.

The document feed has a unit construction wherein radially extending sheet metal guide bars are utilized to provide a grid structure in combination with the end members to provide units that are readily assembled and disassembled for replacement of parts, for inspection of the parts, and servicing thereof, to thereby provide a feed mechanism that is readily accessible, detachably mounted in the photographing machine, and adapted to facilitate efficient operation of the photographing machine.

The invention claimed is:

1. A document feed for photographing machines, comprising a plurality of spaced parallel curved guide bars, a plurality of transverse retaining bars having all of said guide bars rigidly secured thereto in cooperation to provide outer uniformly curved document guiding surfaces for guiding documents thereover through an intermediate photographing position thereon, a pair of end members detachably receiving the ends of said transverse bars, means securing said end members together in engaged relation on the ends of said transverse bars to form a grid unit, a plurality of feed shafts rotatably mounted in said end members in spaced parallel relation at the inner edges of said guide bars, feed rolls mounted on said shafts between said guide bars and having the peripheries projecting slightly beyond the outer edges of said bars, and means mounting a plurality of cooperating feed rolls for engaging

the feed rolls on said shafts for cooperation in gripping and feeding documents therebetween from one end of said guide bars to the opposite ends thereof to be photographed in passing through the photographing position.

2. A document feed for photographing machines, comprising a plurality of spaced parallel arcuate guide bars, a plurality of transversely extending retaining bars rigidly secured to all of said guide bars in spaced parallel relation and formed for cooperation to provide outer uniformly curved document guiding surfaces for guiding documents thereover from one end of the bars to the opposite ends through an intermediate photographing position thereon, a pair of end members each engaged at one end of said transverse bars in spaced parallel relation to each other and said guide bars, means on the assembled guide and retaining bars slidably interengaged with cooperating portions on said end members for detachably securing said bars to said end members, means for securing said end members together in rigid spaced parallel relation, a plurality of spaced parallel feed shafts journalled in said end members at opposite ends and extending between said end members inside of said guide bars and having the axes of said shafts arranged in concentric relation to said guide bars, and feed rolls mounted on said shafts having peripheral portions projecting through the spaces between said guide bars slightly beyond the outer document guiding surfaces thereon, and means cooperating with said feed rolls and shafts for driving said shafts and holding documents in engagement with the periphery of said feed rolls for movement over the document guiding surfaces of said bars.

3. A document feed for photographing machines, comprising a plurality of spaced parallel radially arranged arcuate guide bars, each of said bars being recessed in transversely aligned relation at a plurality of positions on the outer periphery thereof, a plurality of transversely extending retaining bars engaged in said recesses and rigidly secured therein to all of said guide bars with the outer faces of said retaining bars formed to have the surfaces thereof flush with the outer peripheries of said guide bars for cooperation to provide a partially cylindrical structure for guiding documents thereover through an intermediate photographing position thereon, and end plates engaged with opposite ends of said transversely extending bars in spaced parallel relation to said guide bars and formed for interengaging cooperation therewith for mounting said bars thereon in detachable relation, means for rigidly mounting said end plates in spaced parallel relation and cooperating to retain said end plates and bars in rigid assembled relation to form a grid unit, a plurality of spaced parallel feed shafts extending between said end plates adjacent the inner edges of said guide bars having opposite ends journalled in said end plates with shaft centers arranged in concentric relation to the outer peripheries of said guide bars, a plurality of feed rolls mounted on said feed shafts and having the peripheries thereof projecting between said guide bars and slightly beyond the outer peripheries thereof for feeding documents over the outer peripheries of said bars through an intermediate photographing position thereon, and cooperating feed and drive means for engaging and driving said feed rolls and feed roll shafts to feed documents from one end of said guide bars to the opposite ends thereof through the photographing position.

4. In a document feed for document photographing machines, a grid unit comprising a plurality of spaced parallel curved guide bars, a plurality of transverse retaining bars rigidly secured to all of said guide bars in spaced parallel relation for cooperation to provide curved document guiding surfaces along one of the edges of said bars, end members at opposite ends of said bars having the ends of said transverse retaining bars cooperating therewith in interengaged relation to support said end members in spaced parallel relation, retaining means for securing said end members in rigid assembled relation with said retaining bars to form a rigid grid unit, a plurality of feed shafts having opposite ends journalled in said end members for radial sliding movement relative to the document guiding edges of said bars and beyond the opposite edges thereof, a plurality of feed rolls mounted on said shafts having the peripheries projecting between said bars past the document guiding edges thereon for cooperation to engage and feed documents over said document guiding edges, and resilient means mounted on said end members for resiliently moving said shafts in said end members to project the peripheries of the feed rolls thereon beyond the document guiding edges of said bars.

5. In a document feed for document photographing machines, a grid unit comprising a plurality of spaced parallel curved guide bars, a plurality of transverse retaining bars rigidly secured to all of said guide bars in spaced parallel relation for cooperation to provide curved document guiding surfaces along one of the edges of said bars, end members at opposite ends of said retaining bars each formed of a pair of spaced parallel plates having one of said plates formed for interengagement with the ends of said retaining bars in spaced parallel relation to said guide bars, spacing means interengaged with said guide bars and ends members for spacing said end members in spaced parallel relation relative to said guide bars, means securing said end plates of each end member and said guide and retaining bars in rigid assembled relation, a plurality of feed shafts mounted in spaced parallel relation at one side of said guide bars and having the ends extending through slots formed in said end plates, bearings slidably mounted in said end plates providing journals for said feed shafts in the end plates of each of said end members, a plurality of feed rolls mounted on said feed shafts having the peripheries thereof projecting between said guide bars and beyond the opposite edges thereof for cooperation in feeding documents over the opposite edges of said guide bars, and a coil spring in each end member having opposite ends secured at opposite ends of said end members and extending between said end plates, means securing said spring intermediate the ends thereof between said shaft bearings to said end plates and said spring having a plurality of intermediate portions engaging the said shaft bearings for normally and resiliently moving all of said shaft bearings toward one end of the slots in said end plates for normally projecting the peripheries of said feed rollers beyond the opposite sides of said guide bars.

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