Aug. 14, 1962 W. F. GOLDING 3,049,348

SHEET FEEDING APPARATUS

Filed Dec. 29, 1959 3 Sheets-Sheet 1

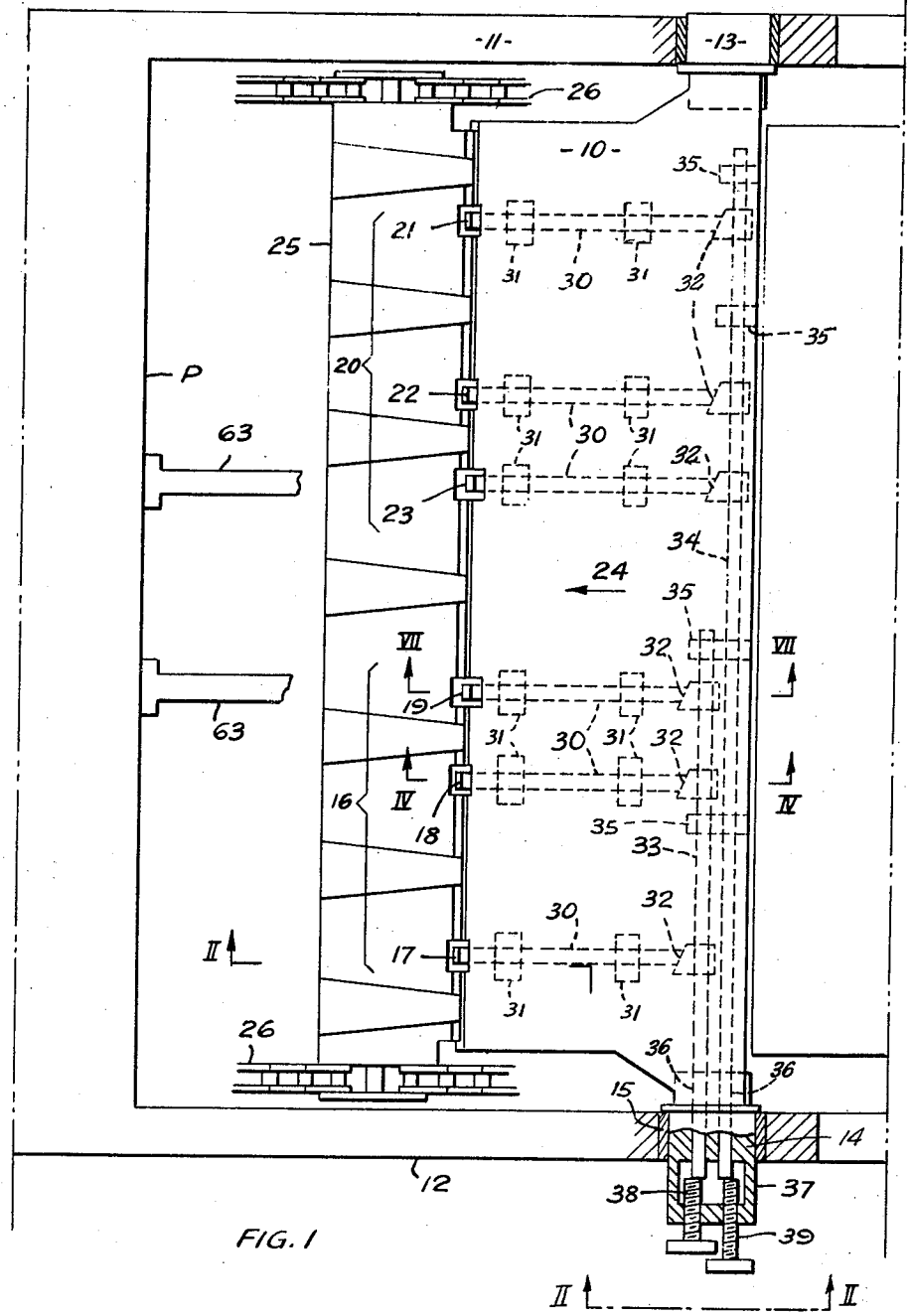


FIG. 1

Inventor
William Frank Golding
by Albert Drachs
Attorney

Aug. 14, 1962 W. F. GOLDING 3,049,348

SHEET FEEDING APPARATUS

Filed Dec. 29, 1959 3 Sheets-Sheet 2

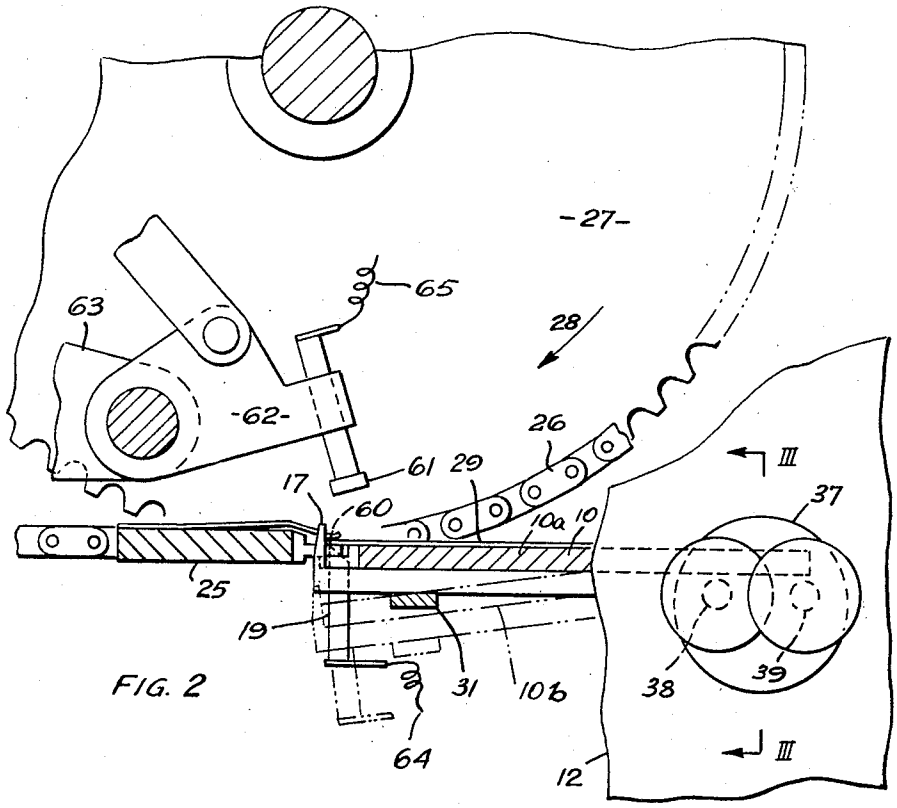


FIG. 2

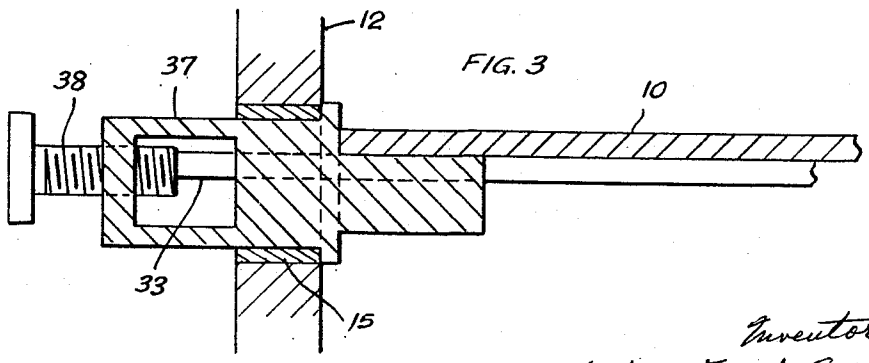


FIG. 3

Inventor
William Frank Golding
by Albert D. Jacobs
Attorney

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SHEET FEEDING APPARATUS

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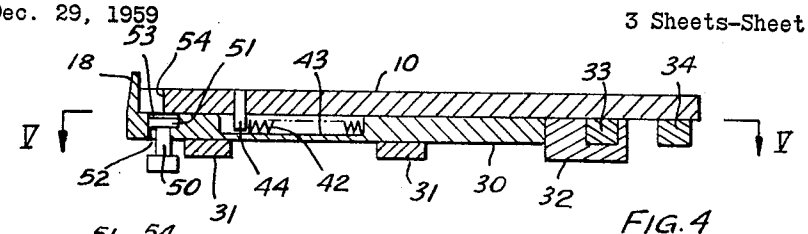


FIG. 4

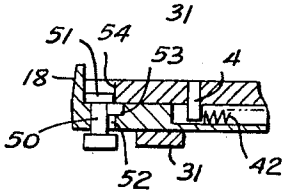


FIG. 6

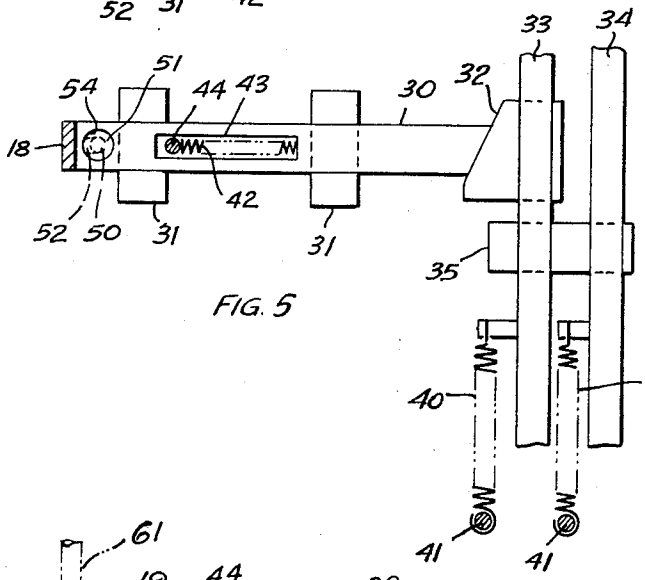


FIG. 5

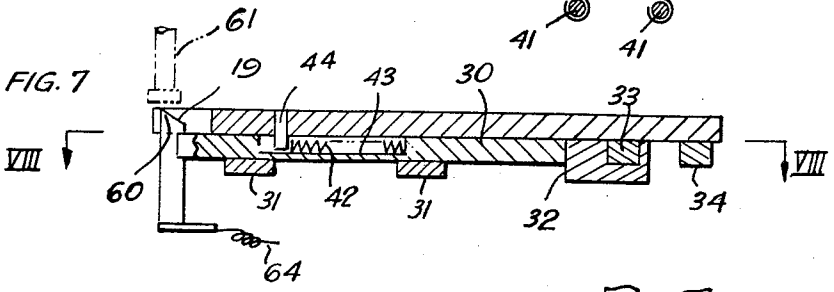


FIG. 7

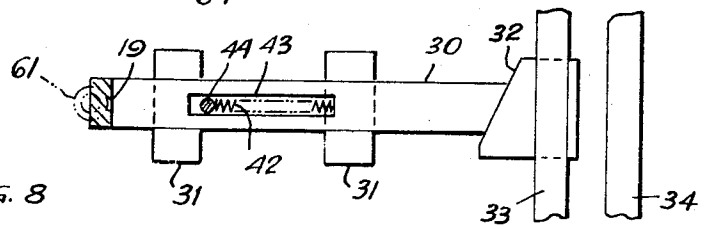


FIG. 8

Inventor
William Frank Golding
By Albert Jacobs
Attorney

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3,049,348

SHEET FEEDING APPARATUS

William Frank Golding, 22 Parry's Close,
Stoke Bishop, Bristol, England

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Claims priority, application Great Britain Jan. 2, 1959
14 Claims. (Cl. 271—60)

This invention relates to sheet feeding apparatus wherein sheets are fed sequentially through a path including a position wherein each sheet is temporarily stopped by front lays provided on a table over which the sheets pass and which is capable of oscillation to move the lays between operative and inoperative positions relative to the path of the sheets.

The main object of this invention is to provide improved means for the adjustment of the lays backwards and forwards in respect of the direction of sheet feed.

Said table is usually mounted between side frames and it is an object of this invention to provide improved means for adjusting the lays in the manner aforesaid from a position outside said frames.

According to this invention, I provide sheet feeding apparatus wherein sheets are fed sequentially over a table oscillating about an axis at right angles to the direction of sheet feed to introduce front lays provided on the table periodically into the path of the sheets for successive sheets to be stopped and thus registered by said lays, comprising a supporting frame situated laterally of the table, an annular bearing cooperating to support the table for the oscillation thereof on said frame, means for adjusting the lays for position in a direction at right angles to said axis of oscillation, said means including a member supported on the table and movably actuable to adjust the position of the lays, the said member extending from the table through the interior of said bearing to the side of the frame remote from the table and being dimensioned to be accessible for manual actuation at said remote side of the frame.

One form of apparatus according to this invention will now be described with reference to the accompanying drawings wherein:

FIG. 1 is a plan view of the apparatus.

FIG. 2 is an enlarged section on the line II—II in FIG. 1.

FIG. 3 is a section on the line III—III in FIG. 2.

FIG. 4 is an enlarged section on the line IV—IV in FIG. 1.

FIG. 5 is a section on the line V—V in FIG. 4.

FIG. 6 is a section similar to FIG. 4 but showing a different operational position.

FIG. 7 is an enlarged section on the line VII—VII in FIG. 1.

FIG. 8 is a section on the line VIII—VIII in FIG. 7.

It is to be understood the apparatus is a part of a machine comprising means for feeding sheets automatically into a registered position, a press for working on the sheets, and gripper means operating to grip the registered sheets and forward them to the press. Since the invention is concerned with the part of the machine where the sheets are registered, only that part is described and illustrated.

Referring to the drawings, there is shown a feed table **10** positioned between side frames **11, 12** (FIG. 1) and secured to journals **13, 14** seated in bearings **15** in the frames **11, 12**. The journals **13, 14** support the table **10** on the frames **11, 12** for oscillating motion between operative and inoperative positions **10***a* and **10***b*, respectively (FIG. 2). The table **10** is provided with two groups **16, 20** of sheet engaging devices. The devices of the group **16** comprise two front lays **17, 18** and a sheet detector contact **19**. The devices of the group **20** comprise two front lays **21, 22** and a sheet detector contact **23**.

A gripper **25** is secured to a pair of endless chains **26** trained over sprockets **27** (one shown in FIG. 1) rotatable in the direction of the arrow **28**. FIGS. 1 and 2 show the gripper **25** in a sheet receiving position. The chains **26** operate to move the gripper **25** along an arcuate path determined by the lie of the chains around the sprockets **27** into the sheet receiving position and thence along a straight path in the direction of the arrow **24**. The movement of the chains **26** is timed for the chains to stop when the gripper **25** is in the sheet receiving position. A sheet **29** fed across the table **10** in the direction of the arrow **24** is stopped by the lays hereby to be registered, i.e. positioned, in relation to the gripper **25** as situated in the sheet receiving position, and the gripper **25** operates to grip the sheet **29** so registered. Thereafter, resumption of travel by the chains **26** causes the sheet **29** to resume travel under the control of the gripper **25**, and the chains **26** operate to move the gripped sheet to a cutting and creasing press diagrammatically indicated at P (FIG. 1).

Said oscillation of the table **10** is required for two reasons. Firstly, the table **10** must move out of the way of the gripper **25** as it approaches the sheet receiving position along said arcuate path, and secondly the lays provided on table **10** must be moved out of the way of the sheet **29** when the latter is to resume travel after having been gripped by the gripper **25**.

It is to be understood that a plurality of grippers, as **25**, are provided at regular intervals along the length of the chains **28**, and that sheets, as **29**, are fed sequentially across the table **10** to be received by successive grippers. The oscillation of the table **10** is timed for the able **10** to lower away from the position **10***a* after a sheet has been gripped by one of the grippers, and to rise again into the position **10***a* immediately after the next gripper has reached the sheet receiving position.

The presentation of sheets sequentially to grippers with the aid of an oscillating table provided with lays is of course known per se and mechanism for the actuation of the chains and grippers and for producing the table oscillations is well understood in the art.

Below the table **10** there are provided six bars **30** extending from the front edge of the table **10**, i.e. from the edge adjacent the gripper **25**, rearwardly towards the axis of the journals **13, 14**. The bars **30** are arranged for sliding motion in the direction of their length in guides **31** provided on the underside of the table **10**. The devices **17, 18, 19** and **21, 22, 23** are secured to the front ends of the respective bars **30**. At the rear end of each bar **30** there is provided a ramp **32** engaged by said rear end of the bar **30**. The ramps **32** associated with the devices **17, 18, 19** of group **16** are secured to a first operating member or rod **33** extending under the table **10** in a direction parallel to the axis of the journals **13, 14**. The ramps **32** associated with the devices **20, 21, 22** of group **20** are secured to a second operating member or rod **34**. The rods **33, 34** extend below the table **10** in a direction parallel to the axis of the journals **13, 14** and the rods **33, 34** are supported for sliding motion in the direction of their length in guides **35**. Further, the rods **33, 34** lie within the axial projection of the journal **14** and extend through apertures **36** in the journal **14**, the apertures **36** also defining guides for longitudinal movement of the rods **33, 34**. The journal **14** extends through its bearing **15** to the outside of the frame **12** and is there dimensioned to define a housing **37**. The rods **33, 34** terminate in the housing **37**. Two hand screws **38, 39** are threaded through the housing **37** in positions substantially in alignment with the rods **33, 34**, respectively. The ends of the screws **38, 39** inside the housing abut the adjacent ends of the respective rods **33, 34**.

The ends of the screws 38, 39 outside the housing 37 are provided with knurled heads for manual rotation of these screws.

Each rod 33, 34 is provided with a tension spring 40 (FIG. 5) connected between the rod and a spring post 41 secured to the table 10, the springs 40 operating to urge the rods 33, 34 into abutment with the screws 38, 39. Each of the bars 30 is provided with a compression spring 42 lying in a longitudinal recess 43 in the bar 30 between the rear end of the recess 43 and a spring post 44 secured to the table 10 (FIGS. 4 to 7). The springs 42 operate to urge the bars 30 against the respective ramps 32.

When the screws 38, 39 are rotated so as to urge the respective rods 33, 34 in a direction away from the housing 37, the ramps 32 cooperate to push the bars 30 forwards, i.e. in the direction of the arrow 24. The springs 42 keep the bars 30 always in contact with the ramps 32, and the springs 40 keep the rods 33, 34 always in contact with the respective screws 38, 39. As a result the springs 40, 42 cooperate to move the bars 32 rearwards when the screws 38, 39 are rotated to allow the rods 33, 34 to slide in a direction towards the housing 37. Thus the lays of the groups 16, 20 are adjustable forwards and backwards, i.e. the longitudinal register of the sheet 29 relative to the gripper 25 is adjustable, from a position outside the frame 12. Further, it is clear that the lays of each group 16, 20 are adjustable independently by the respective screws 38, 39 so that the register of the sheet 29 can be adjusted angularly too.

The rods 33, 34 and screws 38, 39 participate in the oscillating motion of the table 10, but since the rods 33, 34 extend through the journal 14 and are therefore situated in close proximity to the axis thereof, and since the screws 38, 39 are situated substantially in line with the rods 33, 34, arcuate movement of the screws 38, 39 on account of said oscillation is reduced to a minimum and adjustment can be made without difficulty while the table 10 is operating, i.e. oscillating.

The lays 18, 22 are relatively close together and are intended for use with relatively narrow sheets, whereas the more widely spaced apart lays 17, 21 are intended for appropriately wider sheets. When using the lays 17, 21 it is desirable to render inoperative the lays 18, 22 so that if the front edge of the sheet 29 is not straight the latter lays do not interfere with the registration of the sheet by the lays 17, 21. To this end each of the lays 18, 22 are provided with a pin 50 provided with a head 51. The pin 50 is situated in a slot 52, in the associated bar 30, and the head 51 is accommodated in a recess 53 of the same bar. When the lays 18, 22 are to be made inoperative, they are each pulled forward by hand against the action of the associated spring 42, and each pin 50 is raised so that the head 51 is situated above the upper surface of the bar 30 and between the lay and an adjacent face 54 of the table 10 (FIG. 6). The head 51 is so dimensioned that when the lay is let go again, the interposition of the head 51 between the lay and the face 54 prevents the return of the lay into the operative position under the action of the spring 42. However, the spring 42 acts to pull the lay into a position wherein the recess 53 is out of alignment with the head 51 so that the latter cannot drop again, as for instance on account of any vibration.

The contacts 19, 23 are of course adjustable simultaneously with the adjustment lays of the respective groups 16, 20. Referring to the contacts 19, 23 in greater detail, they are each made of an electrically conductive material and the bars 30 to which they are secured are made of an insulating material. Further, each contact 19, 23 comprises a knife edge 60, and above each contact 19, 23 there is provided a contact 61 (FIGS. 2, 7) intended to be lowered onto the adjacent knife edge 60. The contacts 61 are each mounted on an insulated arm 62 pivoted to a bracket 63 secured to the press P. The brackets 63 are partially shown in FIG. 1. The arms 62 are oscillated so that every time a sheet is supposed to be present at the lays, the contacts 61 are lowered momentarily onto the contacts 19, 23. Said knife edges 60 are positioned to lie at the level of the upper surface of the table 10 and a predetermined small amount behind the lays. Electric leads 64, 65 connect the contacts 19, 23 and 61, respectively, in an electric circuit controlling the drive of the machine as a whole and operating to stop the machine if the circuit is established by engagement of either of the knife edges 60 with the respective contacts 61. Such establishment of the circuit would occur if no sheet is present at the lays or if the sheet is out of register by an amount greater than the distance by which the knife edges 60 are situated behind the lays.

What I claim and desire to secure by Letters Patent is:

1. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, at least one front lay provided on the table, the table being supported at opposite sides thereof for oscillating motion about an axis at right angles to the direction of sheet feed, a support member situated at one of said sides of the table, a cylindrical bearing member lying concentrically with said axis and connected between the table and the support member and co-operating to support the table on said support member for said oscillating motion, an aperture being provided in said bearing member longitudinally thereof, an operating member situated at a side of the support member remote from said table and supported for movement relative thereto, an intermediary member extending through said aperture and connected between said operating member and said lays, said at least one lay being adjustably supported on the table for movement in the direction of sheet feed thereby to be adjustable for position, said intermediary member co-operating to transmit said movement of the operating member to the said at least one lay for the position of the lays to be adjusted by movement of said operating member.

2. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, at least one front lay provided on the table and adjustably supported thereon for movement in the direction of sheet feed thereby to be adjustable for position, the table being supported at opposite sides thereof for oscillation about an axis at right angles to the direction of sheet feed, a support member situated at one of the sides of the table, a journal secured to the table at said one side thereof, a bearing provided in said support member and co-operating with said journal to support the table for said oscillation, said journal being dimensioned to extend through said bearing substantially to the side of the support member remote from said table, an operating member situated at said remote side of the support member and supported for movement relative to said table, an aperture provided in said journal longitudinally thereof, an intermediary member extending through said aperture and connected between said operating member and said at least one lay, said intermediary member co-operating to transmit said movement of the operating member to said at least one lay for the position thereof to be adjusted by movement of the operating member.

3. Sheet feeding apparatus according to claim 2, said operating member being supported for said movement thereof on said journal.

4. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, at least one front lay provided on the table and adjustably supported thereon for movement in the direction of sheet feed thereby to be adjustable for position, the table being supported at opposite sides thereof for oscillation about an axis extending at right angles to the direction of sheet feed and below the table, a support member situated at one of said sides of the table, a cylindrical bearing member lying concentrically with said axis and connected between the table and the support member and co-operating to support the table on said support member for said oscillation, a longitudinal aperture provided in said

bearing member, an operating member situated at a side of the support member remote from said table and supported for movement relative thereto, an intermediary member extending at the underside of the table and through said aperture and being connected between said operating member and said at least one lay, said intermediary member co-operating to transmit said movement of the operating member to said at least one lay for the position thereof to be adjusted by movement of the operating member.

5. Sheet feed apparatus comprising a table over which sheets are fed in a determined direction, at least one front lay provided on the table and adjustably supported thereon for movement in the direction of sheet feed thereby to be adjustable for position, the table being supported at opposite sides thereof for oscillation about an axis extending at right angles to the direction of sheet feed and below the table, a support member situated at one of said sides of the table, a cylindrical bearing member lying concentrically with said axis and connected between the table and support member and co-operating to support the table for said oscillation, a longitudinal aperture provided in said bearing member, an operating member situated at a side of the support member remote from said table and supported for movement relative thereto, a rod situated below the table and extending parallel to said axis of oscillation and through said aperture, the rod being supported for sliding movement in the direction of its length, the rod being connected between said operating member and said at least one lay, the operating member co-operating by movement thereof to slide the rod and the rod co-operating by such sliding to adjust the position of said at least one lay.

6. Sheet feed apparatus comprising a table over which sheets are fed in a determined direction, at least one front lay provided on the table and adjustably supported thereon for movement in the direction of sheet feed thereby to be adjustable for position, the table being supported at opposite sides thereof for oscillation about an axis extending at right angles to the direction of sheet feed, a pair of frames situated respectively at said opposite sides of the table and co-operating to support the table for said oscillation, a rod extending parallel to said axis and supported on the table for sliding motion in the direction of its length and co-operating by such sliding motion to move said at least one lay to adjust the position thereof, an operating member situated at a side of one of said frames remote from the table in the direction of said axis, and said operating member being supported for movement and co-operating by such movement to impart to said rod said sliding motion thereof.

7. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, the table being supported for oscillation about an axis extending at right angles to the direction of sheet feed, at least two front lays provided on the table and adjustably supported thereon for movement in said direction of sheet feed thereby to be adjustable for position, said lays being spaced apart in the direction of said axis, a pair of frames spaced apart in the direction of said axis, the table being situated between said frames and the frames co-operating to support the table for said oscillation, a rod extending parallel to said axis and supported on the table for sliding motion in the direction of its length, ramp means provided on said rod and positioned to engage said lays and co-operating to convert said sliding motion of the rod into said movement of the lays, an operating member situated at a side of one of said frames remote from the table in the direction of said axis, said operating member being supported for movement and being connected to said rod and co-operating by such movement to impart to said rod said sliding motion thereof.

8. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, the table being supported for oscillation about an axis extending

at right angles to the direction of sheet feed, at least two bars extending in the direction of sheet feed and supported at the underside of the table for sliding motion in the direction of their length, a front lay secured to one end of each of said bars, a rod extending parallel to said axis and supported at the underside of the table for sliding motion in the direction of its length, said bars being positioned for the other ends thereof to lie adjacent said rod, a ramp member secured to the rod at the position of each of said bars, spring means co-operating to urge the bars into engagement with said ramps and said ramp co-operating to impart to said bars said motion thereof when the rod is slid thereby to adjust the position of said lays relative to said table, a pair of frames spaced apart in the direction of said axis, the table being situated between said frames and the frames co-operating to support the table for said oscillation, an operating member situated at a side of one of said frames remote from the table in the direction of said axis, said operating member being connected to said rod and being supported for movement and cooperating by such movement to slide the rod and effect said adjustment of the lay position.

9. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, the table being supported at opposite sides thereof for oscillation about an axis at right angles to said direction of sheet feed, a support member situated at one of said sides of the table, a cylindrical bearing member lying concentrically with said axis and connected between the table and the support member to support the table on said support member for said oscillation, a longitudinal aperture provided in said bearing member, an operating member situated at a side of the support member remote from said table and supported for movement relative thereto, a rod extending parallel to said axis and supported at the underside of the table for longitudinal sliding motion, said operating member being connected through said aperture to said rod, at least two bars extending in the direction of sheet feed and supported for longitudinal movement at the under side of the table, a front lay secured to each of the bars at one end thereof, said bars each being positioned for a portion thereof to lie adjacent said rod, a ramp member secured to the rod at the position of each of said portions of the bars, spring means co-operating to urge the bars into engagement with said ramps and said ramps co-operating to impart to said bars said motion thereof when the rod is slid, and said operating member co-operating by said movement thereof to slide the rod thereby to adjust the position of said lays.

10. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, the table being supported at opposite sides thereof for oscillation about an axis lying at right angles to said direction of sheet feed and substantially at the underside of the table, a journal secured to said table at one of said sides thereof, a bearing in which said journal is seated and co-operating to support the table for said oscillation, a longitudinal aperture provided in said journal, an operating member situated at the end of the journal remote from said table and supported for movement relative to said journal, a rod extending parallel to said axis in substantial alignment with said aperture of the journal, said rod being supported at the underside of the table for longitudinal sliding motion and being connected through said aperture to said operating member, at least two bars extending in said direction of sheet feed and supported at the underside of the table for longitudinal motion, a front lay secured to each of said bars, said bars each being positioned for a portion thereof to lie adjacent said rod, a ramp member secured to the rod at the position of each of said adjacent portions of the bars, spring means co-operating to urge the bars into engagement with said ramps and said ramps co-operating to impart to said bars said motion thereof when the rod is slid, all whereby said movement of the

operating member is transmitted to said lays to adjust the position thereof.

11. Sheet feeding apparatus according to claim 10, said operating member being supported for said movement thereof on said journal.

12. Sheet feed apparatus comprising a table over which sheets are fed in a determined direction, the table being supported at opposite sides thereof for oscillating motion about an axis at right angles to the direction of sheet feed, a support member situated at one of said sides of the table, a cylindrical bearing member lying concentrically with said axis and connected between the table and the support member and co-operating to support the table for said oscillating motion, two operating members positioned at a side of the support member remote from said table and supported for movement relative thereto, two front lays connected to the table and adjustably supported thereon for movement in said direction of sheet feed thereby to be adjustable for position, two intermediary members connected to transmit the movement of the respective operating members respectively to said lays for the adjustment of the position thereof independently of each other, two longitudinal apertures provided in said bearing member, and said intermediary members being positioned to extend respectively through said apertures.

13. Sheet feeding apparatus comprising a table over which sheets are fed in a determined direction, the table being supported at opposite sides thereof for oscillation about an axis lying at right angles to said direction of sheet feed and substantially at the underside of the table, a journal secured to said table at one of said sides thereof, a bearing in which said journal is seated and co-operating to support said table for said oscillation, a longitudinal aperture provided in said journal, a screw extending parallel to said axis and threadedly connected to said journal, a rod extending parallel to said axis and supported at the underside of the table for longitudinal sliding motion, said screw being connected through said aperture to said rod, the connection between said screw and said rod operating to slide the rod when the screw is turned, at least two bars extending in said direction of sheet feed and supported at the underside of the table for longitudinal motion, a front lay secured to each of said bars, said bars each being positioned for a portion thereof to lie adjacent said rod, a ramp member secured to the rod at the position of each of said adjacent portions of the bars, spring means co-operating to urge the bars into engagement with said ramps and said ramps co-operating to impart to said bars said motion thereof when the rod is slid by said turning of said screw.

14. Sheet feeding apparatus comprising a table over

which sheets are fed in a determined direction, the table being supported at opposite sides thereof for oscillation about an axis lying at right angles to said direction of sheet feed and substantially at the underside of the table, a journal secured to said table at one of said sides thereof, a bearing in which the journal is seated and which co-operates to support the table for said oscillation, a longitudinal aperture provided in said journal, a rod extending parallel to said axis in alignment with said aperture of the journal, said rod being supported at the underside of the table for longitudinal sliding motion, at least two bars extending in the direction of sheet feed and supported at the underside of the table for longitudinal motion, a front lay secured to each of said bars, said bars being positioned for a portion thereof to lie adjacent said rod, a ramp member secured to the rod at the position of each of said adjacent portions of the bars, first spring means co-operating to urge the bars into engagement with said ramps, said ramps being dimensioned to move the bars in opposition to said first spring means when the rod is slid in the direction away from said journal and said first spring means co-operating to return the bars when the rod is slid in the opposite direction, a screw threadedly connected to said journal and situated in alignment with said aperture, said rod extending through said aperture into end to end engagement with said screw, second spring means co-operating to urge the rod in the direction towards said journal and into said engagement, said screw co-operating upon being turned in one direction to slide the rod in opposition to said second spring means and said second spring means co-operating to return the rod when the screw is reversed, said screw having a portion protruding through the end of the journal remote from the table, a head provided on the protruding portion of the screw and defining a means for manually turning the screw, and such turning operating to adjust the position of said lays.

References Cited in the file of this patent

UNITED STATES PATENTS

9,711	Richards	May 10, 1853
99,133	Barth	Jan. 25, 1870
145,890	Morris	Dec. 23, 1873
1,026,606	Robb	May 14, 1912
1,155,505	Niles	Oct. 5, 1915
1,665,305	Kelly	Apr. 10, 1928
1,695,648	Giesecke et al.	Dec. 18, 1928
2,685,446	Backhouse	Aug. 3, 1954
2,709,960	Alix et al.	June 7, 1955
2,803,460	Meltendorf	Aug. 20, 1957