May 17, 1955 H. W. GEGENHEIMER 2,708,405

PRINTING PRESS FEED AND REGISTERING MECHANISM

Filed Aug. 17, 1951

8 Sheets-Sheet 1

FIG. 1

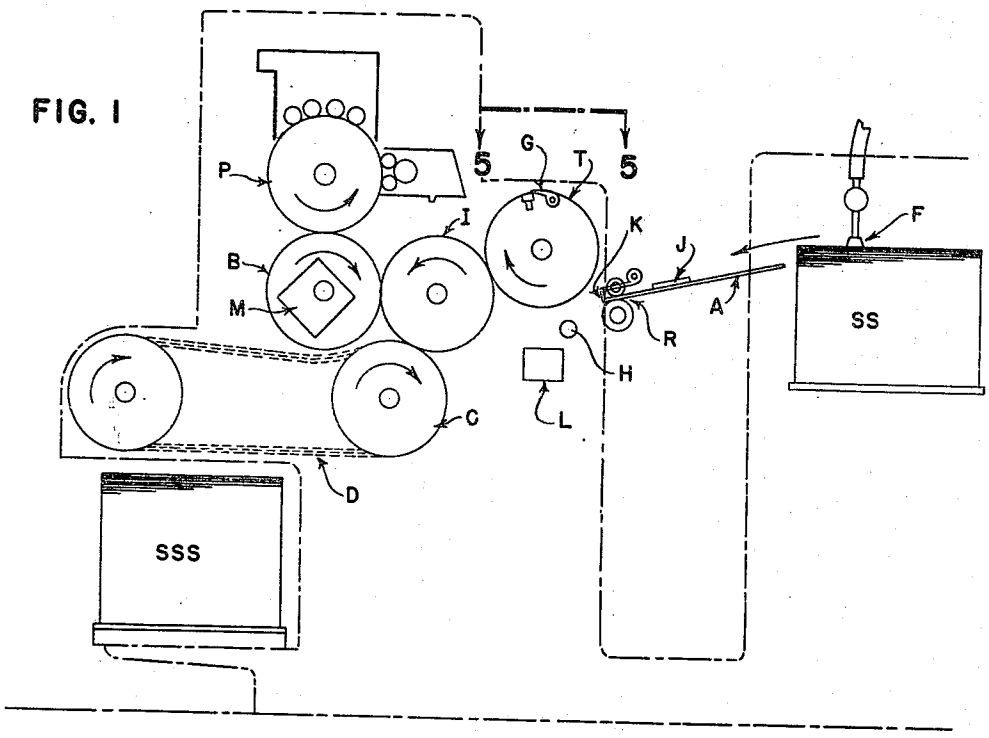


FIG. 2

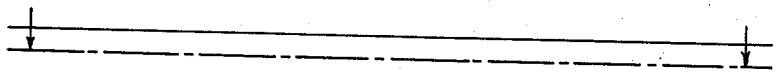
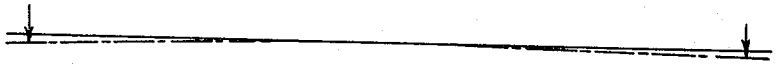


FIG. 3

FIG. 4



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PRINTING PRESS FEED AND REGISTERING MECHANISM

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8 Sheets-Sheet 2

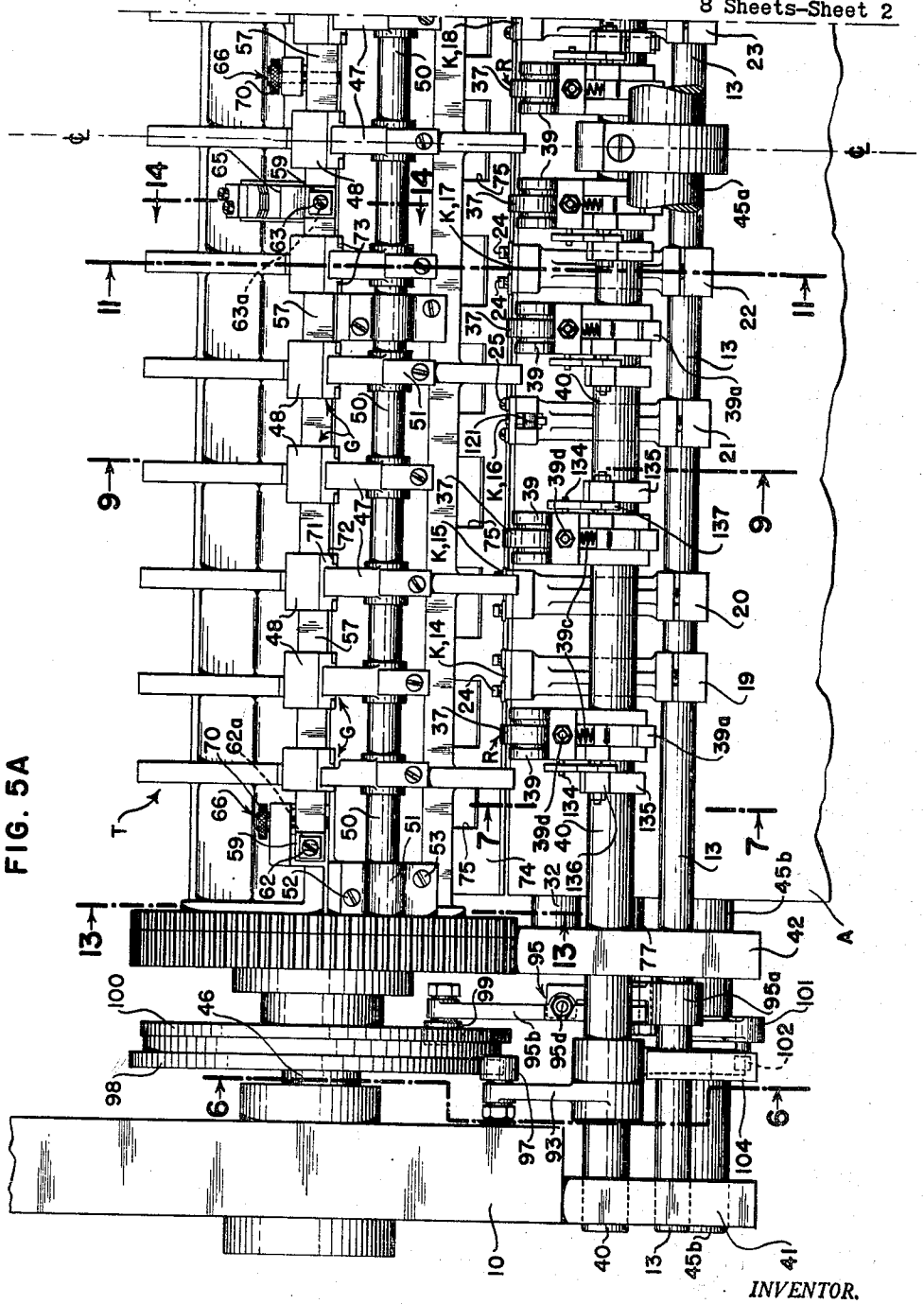

FIG. 5A

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PRINTING PRESS FEED AND REGISTERING MECHANISM

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8 Sheets-Sheet 3

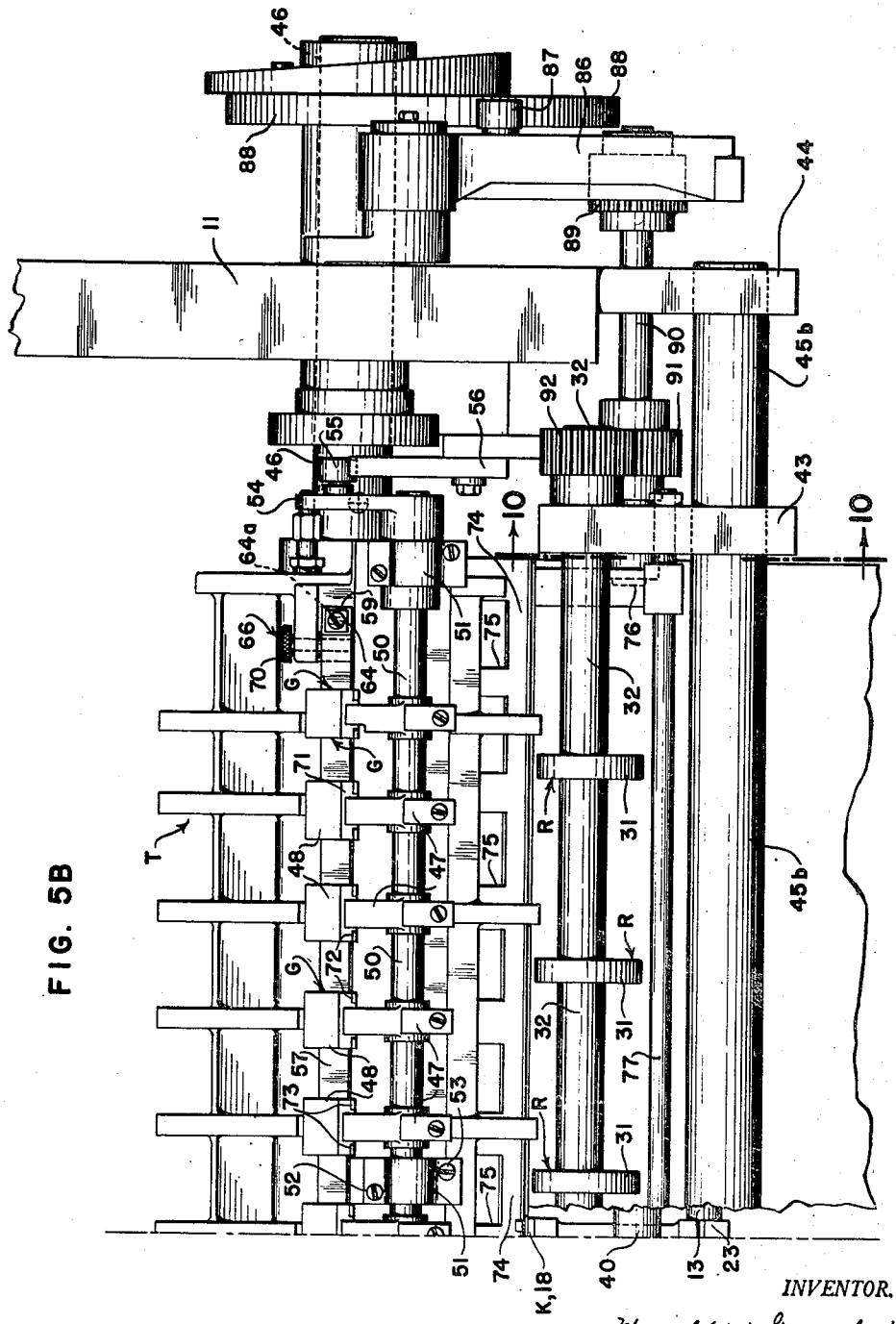

FIG. 5B

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PRINTING PRESS FEED AND REGISTERING MECHANISM

Filed Aug. 17, 1951

8 Sheets-Sheet 4

FIG. 6

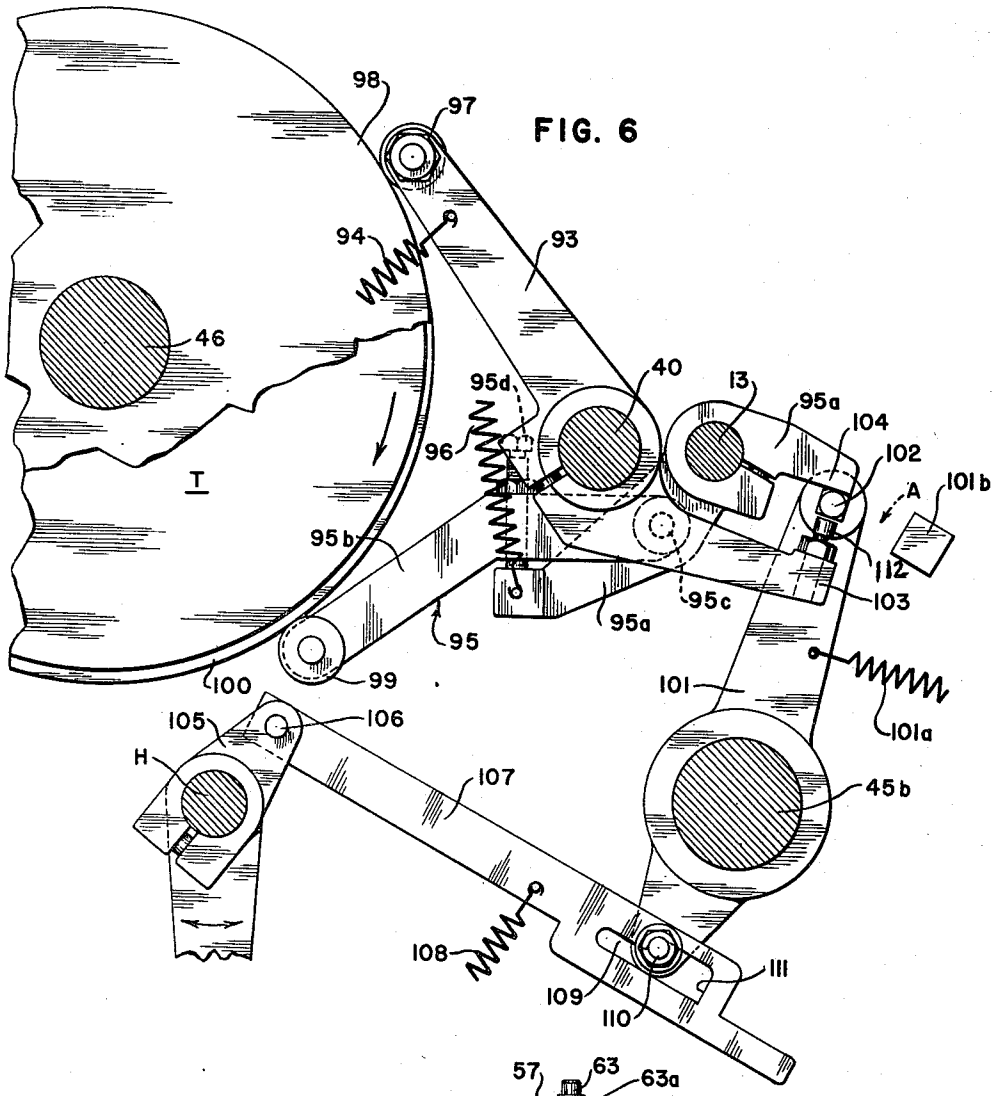


FIG. 13

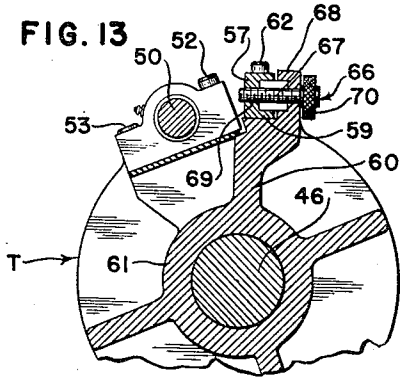
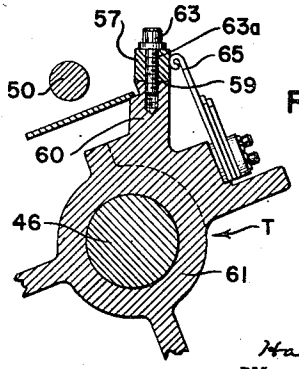


FIG. 14



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PRINTING PRESS FEED AND REGISTERING MECHANISM

Filed Aug. 17, 1951 8 Sheets-Sheet 5

FIG. 7

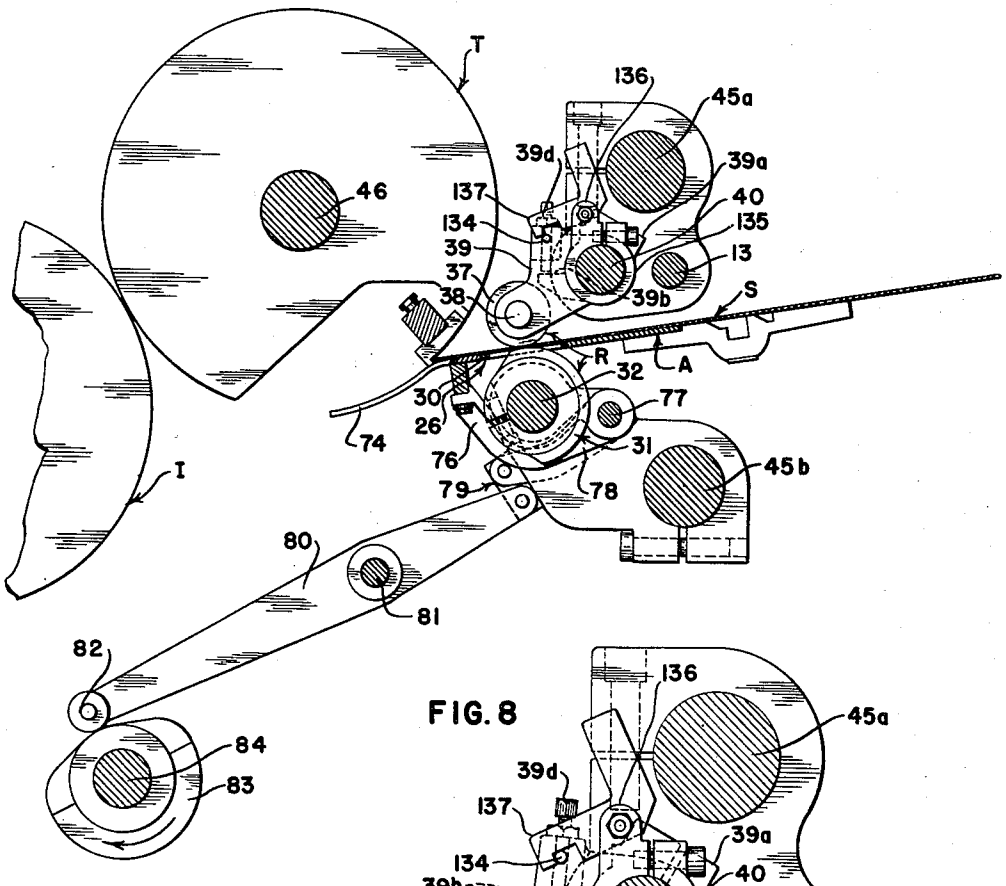
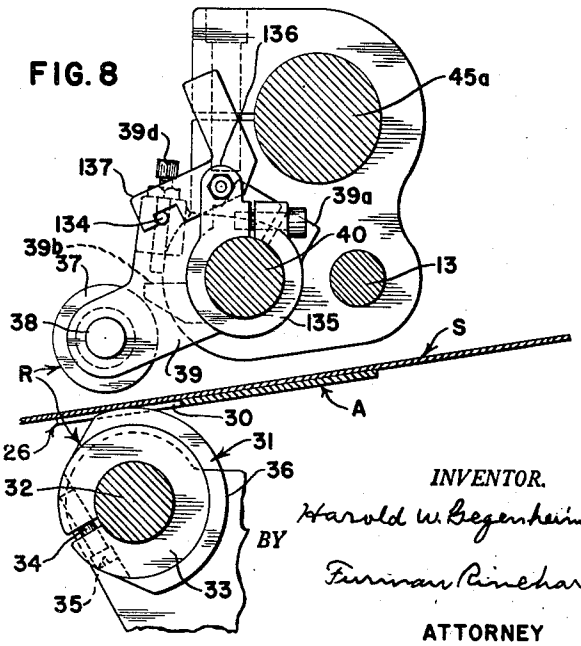


FIG. 8



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PRINTING PRESS FEED AND REGISTERING MECHANISM

Filed Aug. 17, 1951

8 Sheets-Sheet 6

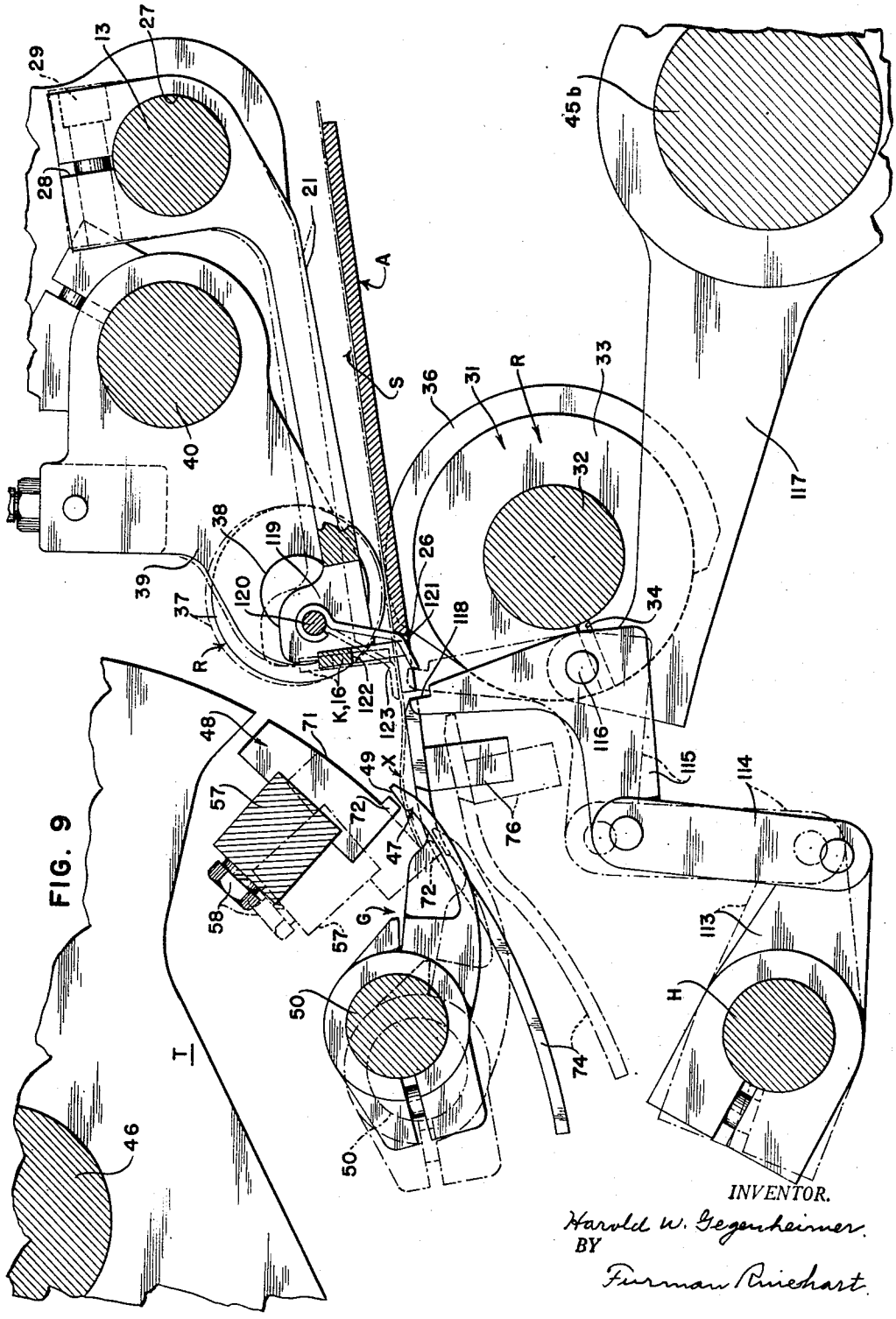

FIG. 9

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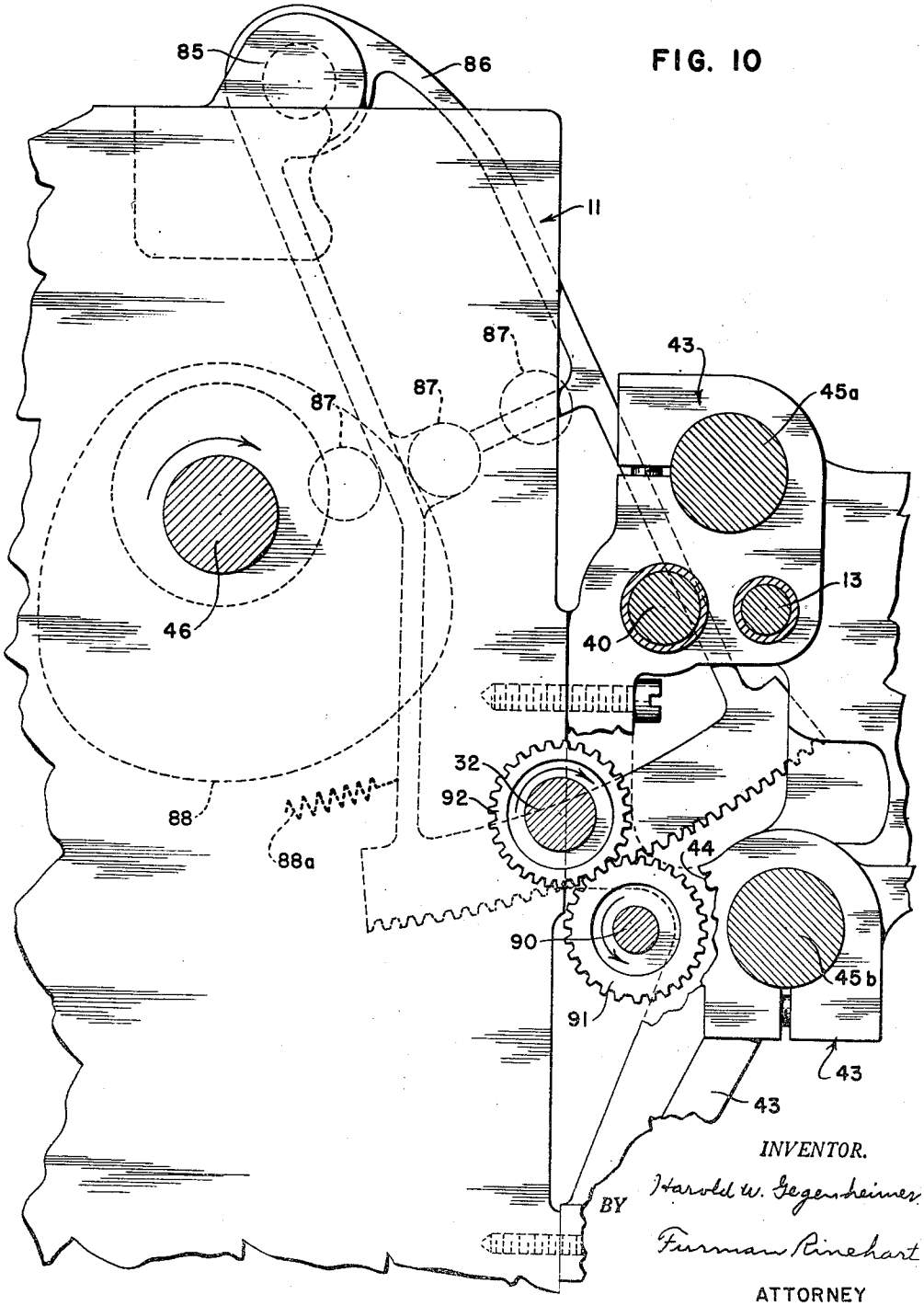
PRINTING PRESS FEED AND REGISTERING MECHANISM

Filed Aug. 17, 1951

8 Sheets-Sheet 7

FIG. 10



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PRINTING PRESS FEED AND REGISTERING MECHANISM

Filed Aug. 17, 1951 8 Sheets-Sheet 8

FIG. 11

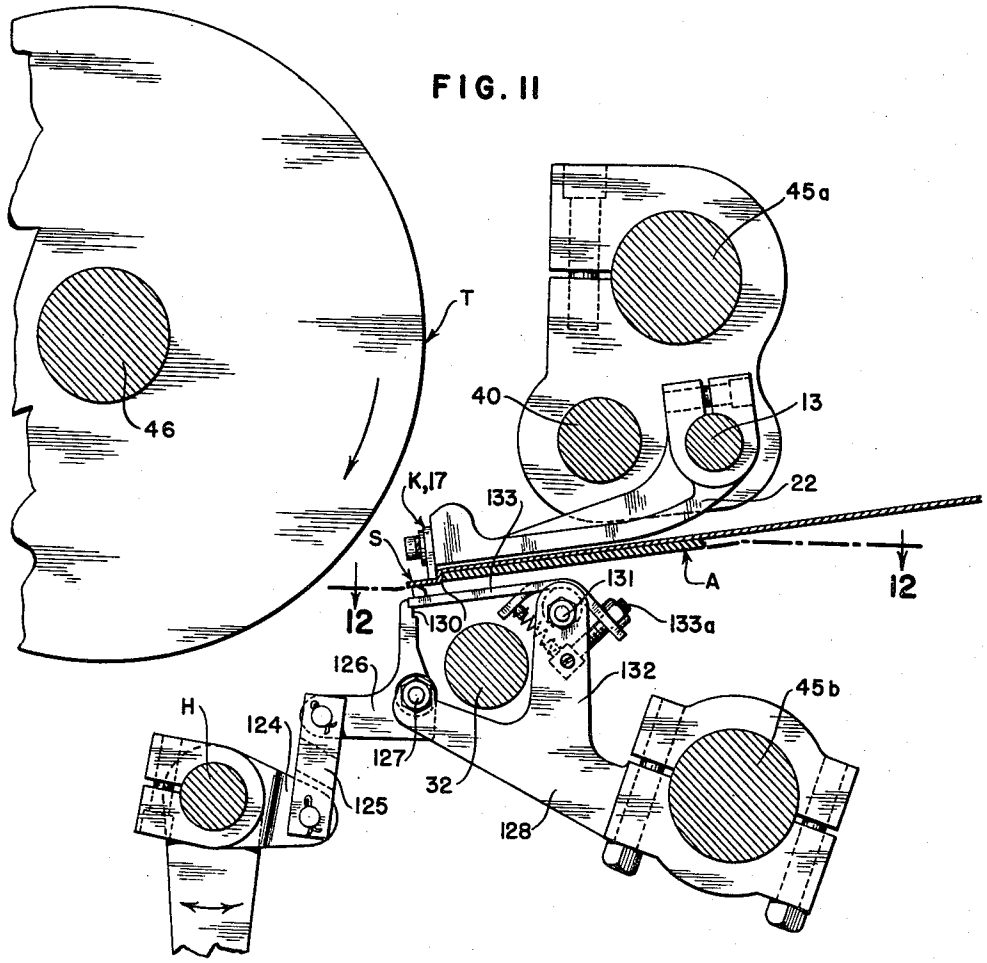
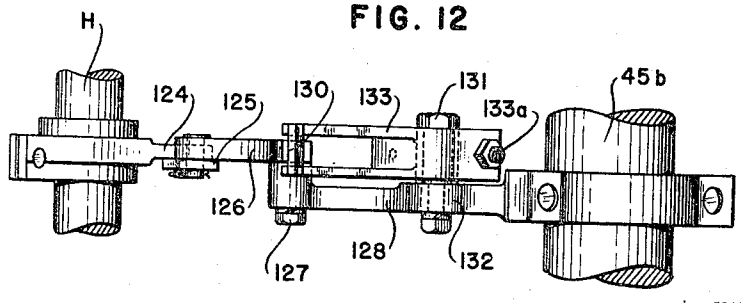


FIG. 12



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United States Patent Office 2,708,405 Patented May 17, 1955

2,708,405

PRINTING PRESS FEED AND REGISTERING MECHANISM

Harold Walter Gegenheimer, Mystic, Conn., assignor, by mesne assignments, to Miller Printing Machinery Co., Pittsburgh, Pa., a corporation of Pennsylvania

Application August 17, 1951, Serial No. 242,242

18 Claims. (Cl. 101—234)

This invention relates to sheet feed and registering apparatus for presses, and is particularly useful in connection with rotary multicolor offset lithographic presses.

The invention provides means for insuring properly timed and positioned presentation of sheets being fed into a rotary press; and a special feature of the invention is that it provides means whereby the press may correctly handle a sheet having a leading edge which is faulty, as for example, a straight line not normal to the sides of the sheet, or a curved line due to a bow of the blade of a shear.

Quite frequently, paper sheets cut at the mill do not have straight edges. If the mill shear blade is bent or distorted, the sheets may have convex or concave edges. When such sheets are fed through a sheet fed press, the leading edges will not contact all the front guides, in such manner that the sheet reaches the impression roll in proper registry. Also, in the operation of sheet fed presses, especially when very thin paper is printed, the paper tends to wrinkle when passing between the printing cylinders. In multicolor printing, after several colors of ink have been deposited on a sheet, there is a tendency for the sheet to become distorted and further color impressions sometimes do not register over the whole area of the sheet.

It is an object of the present invention to provide feed roll mechanism and gripper apparatus adapted to be adjusted on the press itself to compensate for an error in the leading edge of sheets whereby miscut or otherwise deformed sheets may be handled by the press as if such sheets were perfect. The apparatus is adapted to compensate for a slanting or bowed leading edge; by its use puckering and wrinkling of imperfect sheets may be avoided; and multicolor impressions in register may be applied to sheets of this character.

Another feature of the invention is the provision of means for insuring that sheets are fed to such gripper apparatus with exact timing. These means are adapted to arrest the feed of a sheet which is deposited on the usual feed board either too early or too late for properly timed delivery therefrom to the gripper apparatus; and, in cooperation with other means, now known, to effect relief of pressure between a blanket cylinder and its impression cylinder when a sheet is so arrested whereby an offset from the blanket directly onto the impression cylinder is avoided.

Although the novel features which are believed to be characteristic of the invention will be pointed out in the annexed claims, the invention itself as to its objects and advantages and the manner in which it may be carried out may be better understood by reference to the following description taken in connection with the accompanying drawings forming a part hereof, in which—

Fig. 1 is a diagrammatic view of a conventional sheet fed rotary offset press seen from the operating side, showing the positional relationship of the apparatus of the present invention to the press.

Figs. 2, 3 and 4 are diagrams illustrating three undesirable conditions of the leading edge of a sheet which may be corrected or compensated for by the apparatus. The undesirable position or shape of the leading edge of the sheet is, in each figure, indicated by a dot and dash line, the effective desirable position or shape, by a solid line. Figs. 2 and 3 illustrate adjustments usually made to square up printed material on a sheet as explained later. Fig. 4 illustrates adjustment for sheets cut with a bent or distorted shear blade or to fan out or compress sheets at their trailing portions, as described later.

Figs. 5A and 5B together constitute a plan view according to the index 5—5 of Fig. 1. These figures illustrate in part the application of the present invention to a sheet fed offset press, and show the delivery end of a usual feed board and an associated registering transfer cylinder. Here the present apparatus is seen to be mounted in part above and beneath the feed board and in part on the cylinder. Seen in plan, as indicated in Fig. 1, it will be readily understood by workers in the graphic arts that the delivery end of the feed board would obscure parts therebeneath. The cooperating members comprising the present invention, as will be later described, are mounted both above and beneath the feed board as well as upon the transfer cylinder. In Fig. 5A, the lefthand portion of the composite view, and toward the operating side of the press, the board is entered in the drawing and certain parts of members of the apparatus beneath the board are necessarily obscured. However, in Fig. 5B, the righthand portion of the board is broken away so that these parts may be seen. The longitudinal center line of the press is indicated in Fig. 5A. It will be apparent from the following description that members of the apparatus directly associated with the delivery end of the feed board are substantially other hand to each other on either side of the center line of the press.

Figs. 6 and 7 are sectional views on lines 6—6 and 7—7 of Fig. 5A.

Fig. 8 is a view showing elements of Fig. 7 in a different position.

Figs. 9, 10, 11 are views on lines 9—9, 10—10, 11—11, respectively, of Figs. 5A—5B.

Fig. 12 is a view on line 12—12 of Fig. 11.

Figs. 13 and 14 are views on lines 13—13 and 14—14, respectively, of Fig. 5A.

Fig. 1 illustrates in diagrammatic form the essential elements of a conventional sheet fed offset press and its association with the apparatus of the invention. This view is an elevation of the operating side of the press and its cooperating sheet feed and delivery mechanism.

The press comprises a feeder F, feeding from a pile of sheets SS, a feed board A, a transfer cylinder T, an impression cylinder I, a blanket cylinder B, a form or plate cylinder P, a collecting cylinder C, and a sheet delivery mechanism D delivering printed sheets to a pile SSS. Also included are the usual blanket trip mechanism M, its trip lock L, and a trip lock shaft H. The feed board is provided with the usual side guide J for lateral adjustment of sheets. As part of the apparatus of the invention the feed board is also provided with preliminary front guides, or stops K, and upper and lower feed rollers, each pair of which is designated R. In the present apparatus the transfer cylinder is provided with grippers G of special construction.

In presses of this type the main frame ordinarily comprises two opposing plates, commonly called the side frames, one thereof being referred to as the operating side frame (to the left of the press looking from the feed to the delivery end) and the other as the drive side frame. These two side frames, appearing often in the drawing and important therein for purposes of orientation, are designated 10 (the operating side frame) and 11 (the drive side frame). Both side frames are substantially

alike and provide bearings, or supports for bearings, of various transverse shafts, and are rigidly connected together and reinforced by tie rods or functionally equivalent members.

The invention relates principally to the delivery of sheets S from the feed board A to the transfer cylinder T of the press, and, accordingly, the detail views of the drawing are limited to the feed board, the transfer cylinder, and their supporting and actuating parts.

In operating the press a fed sheet is deposited, in usual manner, upon the feed board from a pile carried by the feeder. The sheet is carried downwardly upon the feed board by means of usual conveyor tapes, not shown, toward and against a transverse series of aligned preliminary front guides or stops K initially positioned within the path of the oncoming sheet. When the leading edge of the sheet strikes these stops, and is arrested, a timed side guide J, well known in the art, operates to move the sheet sidewise so that one of its lateral edges is forced against a register surface or gauge for the purpose of aiming the sheet correctly with respect to the press preparatory to the delivery of the sheet from the feed board to the transfer cylinder.

In the illustrated structure there is assumed to be eight preliminary front guides or stops K, each carried by one of a series of cantilevers mounted on and clamped to a transverse shaft **13** suitably journaled at both sides of the press. However, in the composite plan view comprising Figs. 5A and 5B, only the first five stops K, specifically **14** through **18**, and their respective cantilevers **19** through **23** are shown, since part of the righthand side of the feed board as well as part of the structure above the board is broken away in the drawing so that portions of the structure beneath the board may be seen.

All stops K and their cantilevers are substantially functional equivalents; but neither all stops nor all cantilevers are exactly alike for the reasons to be explained below; hence the visible stops and cantilevers are assigned individual reference characters. The stops K, interposed initially in the path of the oncoming sheet, are secured to the outer ends of their respective cantilevers by screws, such as **24** and **25** (Figs. 5A and 5B; Figs. 9 and 11 show two different types of cantilevers in elevation). The stops, in operative position, overlap the forward end **26** of the feed board (Fig. 9), and all stops may be simultaneously raised out of the path of a sheet by rotation of shaft **13**, which moves the several cantilevers and their stops from the solid line position of Fig. 9 to the dot and dash line position seen in that figure. All cantilevers are clamped to shaft **13** in a common manner best illustrated in Fig. 9, wherein it is seen that the base of cantilevers **21** is bored at **27** to fit the shaft **13**, and the lever is slotted at **28** outwardly from the bore, whereby a screw **29** may be utilized adjustably to fix the cantilever rigidly upon the shaft. Cantilever **21** is provided at its outer end with a pivotally mounted sheet detector **121**, more particularly described below. Preferably two such sheet detectors are provided, one on either side of the longitudinal centerline of the press. One suc detector relates to cantilever **21**, which is seen in Fig. 5A to be the second cantilever to the left from the centerline; and a like detector is provided, relating to the second cantilever to the right from the centerline. However, as the composite plan view is partly broken away to the right and the last mentioned cantilever cannot be seen, only that detector relating to cantilever **21** is shown. Wherever a sheet is indicated in the drawing it is designated S. The normal position of a sheet properly fed to the feed board and arrested by stops K is best illustrated in Fig. 9.

Herein a system of feed rollers is provided and is adapted to advance the sheet at a rate in excess of that of the peripheral speed of the transfer cylinder T, when stops K are raised. The purpose of impelling the sheet at a higher speed than that of the periphery of the cylinder T is to insure that the leading margin of the sheet is properly seated within the grippers G when the latter close to grip the sheet. The forward margin of the sheet is, in fact, buckled, as indicated at *x* in Fig. 9, when it is being inserted within the grippers. A temporary maintenance of a forward urge, causing such buckle, insures that when the grippers close no gripped portion of the leading edge of the sheet can lag and thereby effect a misdirection of the sheet or a pucker therein and the buckle provides positive seating of the leading edge of the sheet against the register surfaces of stops **72**.

The system of feed rollers comprises spaced pairs R of cooperating rollers distributed laterally across the press, one roller of each pair being mounted under the feed board and the other thereof above, the first being a driver and the second an idler. The lower feed rollers, or drivers, are all designated **31** and are distributed and rigidly clamped upon a shaft **32** which extends across the press beneath the board and is suitably journaled at both sides thereof. All rollers **31** are alike. Each comprises a centrally bored metal disk **33** having a radial slot **34** whereby the disk may be clamped to the shaft **32** by means of a screw **35** (see Figs. 8 and 9). Applied in any suitable manner to the periphery of the disk (Fig. 9) is a tire **36**, subtending less than 360°, and which may cooperate with a companion upper feed roller **37** which is freely rotatable. The forward edge **26** of the feed board is provided with spaced slots, such as **30** (see Figs. 7 and 8) whereby the rollers may cooperate.

Each upper or idler feed roller **37** is rotatably mounted on a stub shaft **38** carried at the outer end of a cantilever **39**, each of which is pivotally mounted on shaft **40** extending across the press above the feed board and suitably journaled at both ends. Each cantilever **39** is bifurcated at each end, the stub shaft **38** extending across and the roller **37** being mounted within the bifurcation at the outer end of the lever. A collar **39***a* is mounted and clamped on shaft **40** within the bifurcation at the opposite end (see Fig. 5A). Collar **39***a* is provided with a stop **39***b* (see Fig. 8) upon which cantilever **39** rests. The cantilever **39** is urged against stop **39***b* by a compression spring **39***c* (see Fig. 5A). A lockably adjustable gauge screw **39***d* mounted on cantilever **39** may be utilized to predetermine the operative distance between the upper and lower feed rollers. As shaft **40** is rotated clockwise, as viewed in Fig. 9, the stop **39***b* lifts cantilever **39**. When shaft **40** is rotated in the opposite direction, the cantilever follows the stop by gravity and the force of spring **39***c* and the roller **37** descends upon the upper surface of a sheet upon the feed board. It will be subsequently pointed out in further detail that each upper feed roller **37** may be individually adjusted to and locked in inoperative position.

All rollers **37** and all cantilevers **39** are respectively alike. The series of pairs R of cooperating feed rollers may, of course, comprise any suitable number. In the illustrated structure the number is assumed to be eight; and the distribution is assumed to be even with respect to the longitudinal centerline of the press. In the composite plan view, Figs. 5A and 5B, only the lefthand five idlers **37** and the righthand two drivers **31** may be seen. The relationship, in elevation, of the rollers of any pair R is best illustrated in Fig. 9.

When a sheet S is delivered down the feed board the stops K are within the path of the oncoming sheet and the idlers **37** are raised. The leading edge of the sheet passes freely beneath the several idlers **37** and comes to rest against the stops K, which serve as preliminary front guides or stops to halt the sheet so that it may be laterally adjusted. This adjustment next takes place, being performed in known manner by mechanism not shown in detail but indicated schematically as J in Fig. 1. Details of a suitable side guide registering mechanism is disclosed in the application of Harold W. Gegenheimer

for Printing Press Side Guide, bearing Serial Number 71,715, filed January 19, 1949 (now U. S. Patent No. 2,553,758). In timed relationship to the rotation of the transfer cylinder T the idlers **37** are lowered against the upper surface of the sheet so that cooperation between the rollers of each pair R is effected, and the stops K are raised to permit advance of the sheet. The sheet engaged by the feed rollers R is then impelled forward at the aforementioned higher rate of speed in order that its leading margin is buckled as its leading edge is seated against the registering surfaces of the stops **72** and within grippers G of the transfer cylinder.

Shafts **13** and **40**, which extend laterally above the feed board, and shaft **32**, which extends laterally therebeneath, are all journaled on both sides of the press. In the particular construction shown, the bearings for these shafts are not mounted directly on the side frames of the press, but upon brackets fixed to said side frames. These brackets are best seen in the composite plan view comprising Figs. 5A and 5B, and, from left to right, are designated **41**, **42**, **43**, and **44**. The brackets are reinforced by two tie rods **45***a* and **45***b*, the first extending laterally above, and the second laterally beneath, the feed board (Figs. 7 and 10). Brackets **41** and **42** are supported by the side frame **10**; brackets **43** and **44** by the side frame **11**.

Means for rocking shafts **13**, **32**, and **40** in timed relationship to other moving parts of the press are subsequently described. The shaft **46** of the transfer cylinder T is suitably journaled in the side frames **10** and **11**. (See Fig. 10 where the relationship of shaft **46** to side frame **11** is clearly illustrated.) The drive of the various moving parts of the press is dependent upon rotation of shaft **46**, to which a suitable prime mover (not shown) is connected.

The transfer cylinder T is adapted to transfer a sheet from the feed board to the impression cylinder I. Cylinder T is provided with a series of grippers G, of which thirteen are shown in the present structure. A typical gripper comprises a gripper finger **47** and its cooperating pad **48** (Fig. 9). It will be observed that the outer end of the gripper finger **47** is provided with a substantially flat faced toe **49** adapted to clamp the leading margin of a sheet against a related pad **48** when the gripper is closed.

The several gripper fingers **47** are mounted on and clamped to a gripper shaft **50**. The shaft **50** is mounted for rotation in pillow blocks **51** which are secured to the cylinder T by screws **52** and **53** (Figs. 5A, 5B, and 13). Shaft **50**, and hence gripper fingers **47**, are rocked in timed relation by means of a lever **54** secured to the end of the shaft. At the outer end of lever **54** is mounted a cam follower **55**, which, upon rotation of transfer cylinder shaft **46**, engages a stationary cam **56** fixed to the side frame **11**.

The gripper pads **48** are mounted upon a transverse gripper pad bar **57** by screws **58**; this bar serving as a register bar, as later explained. Gripper pad bar **57**, which may be flexed, is mounted on the transfer cylinder T near the periphery thereof, and rests upon platforms **59** provided on extremities of radial lugs **60** (Figs. 13 and 14) extending from the core **61** of cylinder T. The radial lugs extending out from shaft **46** as shown in Figs. 13 and 14, are commonly known as disks. Bar **57** is adjustably secured to the disks; more particularly to the platforms **59** by screws **62**, **63** and **64** which are passed through corresponding slots **62***a*, **63***a* and **64***a*, respectively, in said bar, and threaded into the lugs **60** (Fig. 13). It will be seen that bar **57** is secured to cylinder T at each end and approximately in the middle and rests upon the aligned supporting surfaces **59**. A leaf spring **65** mounted on cylinder T engages the midportion of the bar **57** and urges said portion circumferentially with respect to the cylinder T in the direction of its rotation (Fig. 14). Near each end of the bar **57** and approximately in the middle thereof, micrometer adjustors **66**,

mounted on the cylinder, are provided for precision setting of the bar on platforms **59** when screws **62**, **63** and **64** are loosened. After proper adjustment, the bar **57** is clamped securely by tightening screws **62**, **63**, **64**.

A typical micrometer adjuster (Fig. 13) comprises a screw **67** extending freely through an upwardly extending portion **68** of lug **60** and engaging a tapped bore **69** in the register bar **57**. The screw **67** is provided with an indexed head **70** to facilitate the precision adjustment of bar **57**.

It is now apparent that bar **57**, being flexible, is adapted to be moved, by the micrometer adjustors **66**, circumferentially with respect to the cylinder T. Thus the entire series of gripper pads, as a unit, may be moved a slight angular distance with respect to the periphery of the cylinder—that is, the series of gripper pads, or particular portions of the series, may be caused to lead or lag, as desired. But it is also apparent that, due to the three station arrangement of adjustors **66**, the bar **57** may be flexed or differentially adjusted on the platform **59**. That is, the three micrometer adjustors may be set in different positions whereby, for example, the bar **57**, with its series of pads **48**, may be brought out of parallelism with the axis of the cylinder T so that the series of pads are caused to lead at one end and to lag at the other, viz., placed to "cocked" position. Also the bar **57** may be bowed in either of two directions by means of the micrometer adjustors **66**. Either the ends or the middle of the pad series may be caused respectively to lead or lag, as required, to accommodate the series to positive reception of sheets having slightly curved leading edges. This adjustment may also be used to produce a fanning out or a compressing in of the trailing portion of the sheets when that is desirable. Of course the bar **57** may be both cocked and bowed.

The configuration of a typical gripper pad may perhaps be best understood by comparing Figs. 5A, 5B and 9. The face **71** is curved to accord with the periphery of the transfer cylinder T. Each pad **48** is provided with a sheet stop or detent **72** at the leading end of the face **71**. This detent in combination with the face of the pad provides a seat for the leading margin of a sheet, as it is introduced into the gripper. As will be seen in Figs. 5A and 5B, these detents **72** are slotted at **73** to permit the toe **49** of the gripper finger **47** to cooperate with the face **71** of the pad and to engage the leading margin of a sheet when seated against the register surface of detent **72**. It will be understood from the foregoing that adjustment of the bar **57** operates to vary the relative positions of the seats of the grippers as required to provide for positive seating of various classes of sheets, as illustrated diagrammatically in Figs. 2, 3 and 4.

An apron **74**, forming in effect a continuation of the feed board and adapted to conform to the curvature of transfer cylinder T, is mounted transversely in front of the board and, in part, beneath the cylinder. This apron is notched, at **75**, on its front margin to avoid interference with the various grippers (Figs. 5A and 5B).

The apron **74** is mounted on two or more cantilevers **76** (Fig. 7), there being one such cantilever at each side of the centerline of the press; and these cantilevers are mounted on and clamped to a transverse shaft **77**. Also mounted on and clamped to shaft **77** is a cantilever **78** the outer end of which is linked at **79** to one end of a lever **80**. Lever **80** is pivotally mounted at **81** on a suitable part of the main frame of the press. At the other end of the lever **80** is a follower **82** adapted to engage a cam **83** rigidly mounted on a transverse shaft **84** which is suitably journaled at both sides of the press. As will be clearly understood from Fig. 7, rotation of shaft **84** effects periodic oscillation of shaft **77** whereby the apron **74** is brought from the solid line position of Figs. 7 and 9 to the dot and dash line position of the

latter figure. To avoid confusion of lines the means for actuating the apron are not shown in Fig. 9.

The purpose of the apron **74** is to support the leading margin of a sheet as it is advanced from the feed board to the grippers of the transfer cylinder. It has been explained that the sheet S is advanced by the feed rollers **31** and **37** at a rate of speed greater than that of the peripheral speed of the transfer cylinder, whereby the sheet is buckled immediately after contact with the gripper seats, as indicated at *x* in Fig. **9**. The apron not only serves as a supporting surface for the leading margin of a sheet but also predetermines the direction of the buckle and positively guides the sheets under the gripper fingers **47**. The direction of the buckle is upward as shown and this buckling insures that the leading edge of the fed sheet is positively urged against the sheet registering surfaces of stops or detents **72** and thereby positively and properly seated in the grippers when the toes **49** engage the leading margin of the sheet. The shaft **84** which mounts cam **83** is rotated in timed rotation with the transfer cylinder shaft **46** and at the same angular speed by means of gearing not shown as such gearing is well known to those skilled in the art. After the sheet has been buckled, as mentioned, and gripped by grippers G, the apron **74** then moves downward as indicated in dot-dash lines in Fig. 9, out of the path of the sheet which is then travelling with cylinder T.

Figs. 10 and 5B illustrate the manner in which the driver feed rollers **31** of the sheet impeller mechanism are actuated. In Fig. 10 the drive side of the press is viewed from a position inwardly with respect to bracket **43**. Pivotally mounted on a bracket **85** at the top of the side frame **11** is a gear sector **86**, preferably a casting and shaped as shown. To avoid interference with other parts of the press the gear sector is mounted on the outside of side frame **11**. It will be seen that the side frame **11** is stepped down, and that toward the feed end of the press (to the right, here) the brackets **43** and **44** (the latter bracket **44** is behind **43** and therefore obscured in Fig. 10) are mounted on the stepped edge. The gear sector **86** is therefore in large part obscured and much of it is necessarily shown in dotted lines in this view.

Pivotally mounted on the outside of the gear sector **86** is a cam follower **87**, which engages an eccentric providing a cam **88** mounted on shaft **46** of transfer cylinder T. (See Figs. 10 and 5B.) The gear sector **86** is normally urged in clockwise direction by a spring **88***a* one end of which is secured to the gear sector and the other to the frame. As the transfer cylinder T is rotated the cam **88** accordingly effects oscillation of gear sector **86**. The latter engages a pinion **89** (seen only in Fig. 5B) mounted on a stub shaft **90** which extends transversely between, and is journaled in, brackets **43** and **44**. Also mounted on stub shaft **90**, between the brackets, is a gear **91**, which meshes with a gear **92** mounted on shaft **32**; this being the shaft on which the lower feed rollers **31** are mounted. It will be realized by comparison of Figs. 5B and 10 that pinion **89** is necessarily obscured by gear **91** since both are of the same size and on the same shaft, which, in Fig. 10, is viewed axially.

As shaft **46** of the transfer cylinder rotates, the shaft **32** of the drive rollers **31** is accordingly caused to rotate, first in one direction through a predetermined angular distance and then to return in response to the oscillation of gear sector **86**. The oscillation of the drivers **31** is, as before stated, timed with respect to the rotation of the transfer cylinder T. Counterclockwise rotation of the rollers **31**, as viewed in Fig. 9, operates to impel a sheet toward the cylinder T. When such counterclockwise movement takes place the idlers **37** are in the solid line position indicated in Fig. 9, and the idlers are in contact with the top surface of the sheet and their weight and springs **39***c* serve to clamp the leading margin of the sheet firmly against the tires **36** of the drivers **31**. When the counterclockwise movement is arrested, the idlers **37** are raised by rotation of shaft **40** before the reverse, or clockwise, movement of the drivers is initiated, and such clockwise movement of the drivers, while they are possibly still engaging the lower surface of the sheet, merely cause a negligible tendency to sweep the sheet backward. However, at such time the sheet will have been gripped by grippers G on cylinder T and the cylinder is then pulling the sheet off the feed board at press speed.

Mounted on and clamped to shaft **40** at the operating side of the press is a lever **93** (see Fig. 6). A spring **94** urges the lever **93** to rotate shaft **40** in a counterclockwise direction. Mounted on and clamped to shaft **13**, also at the operating side of the press is a lever **95**. Lever **95** comprises two parts **95***a* and **95***b* adjustably joined together. Part **95***a* is directly mounted on shaft **13**. Part **95***b* is pivotally mounted on part **95***a* at **95***c*, and an adjustably lockable screw **95***d* mounted in part **95***b* rests on part **95***a*. A spring **96** urges the lever **95** to rotate shaft **13** in a clockwise direction. At one end of lever **93** is a cam follower **97** which normally engages a cam **98** mounted on shaft **46** of the transfer cylinder T. At one end of lever **95** is a cam follower **99** which normally engages another cam **100** also mounted on shaft **46**. As the transfer cylinder T rotates the cams **98** and **100** normally cause oscillation of levers **93** and **95**, respectively, whereby the related shafts **40** and **13** are slightly rotated in the directions set forth above. Counterclockwise rotation of shaft **40** operates to lower the idler feed rollers **37** onto a sheet upon the feed board. Clockwise rotation of shaft **13** operates to raise the front guides or stops K out of the path of the sheet.

Pivotally mounted on the lower tie rod **45***b*, also at the operating side of the press, is a lever **101** which is urged in clockwise direction by spring **101***a* toward stop **101***b* secured to the frame. At the upper end of this lever is a square gauge block or stop **102**. It is seen in Fig. 6 that end **103** of lever **93** and end **104** of lever **95** (more particularly part **95***a*) are normally disposed on either side of stop **102**, and that unless the stop is withdrawn from this position neither lever can move, and accordingly their respective cam followers **97** and **99** cannot follow their related cams **98** and **100**.

Mounted on the trip lock shaft H, at the operating side of the press, is a cantilever **105** pivotally connected at **106** to an arm **107**. A spring **108** urges arm **107** to rotate clockwise on the pivotal connection at **106**. Arm **107** is provided with a stepped slot **109**, as shown.

Carried on the lower end of lever **101** is a follower **110** which rides within slot **109**. At a particular period during a revolution of the transfer cylinder T the trip lock shaft H begins to rotate in a counterclockwise direction, and normally continues to rotate a certain amount and then to reverse itself. During counterclockwise rotation of shaft H the cantilever **105** draws arm **107** toward the left as viewed in Fig. 6. Presently the edge **111** of slot **109** strikes follower **110** of lever **101**, and as rotation of shaft H continues, the arm effects clockwise rotation of lever **101**, whereby the stop **102** is withdrawn from between end **103** of lever **93** and end **104** of lever arm **95***a*. With the stop **102** withdrawn both levers are free to operate in normal manner. It will be seen in Fig. 6 that end **103** of lever **93** is provided with an adjustable check stop **112** which engages stop **102**.

The apparatus of the invention includes means for preventing delivery from the feed board of a sheet underfed or overfed for a particular revolution of the cylinders of the printing unit.

Mounted on trip lock shaft H is a cantilever **113** (see Fig. 9) connected by a link **114** to a bellcrank **115** pivotally mounted at **116** on another cantilever **117** extending from and clamped on the lower tie rod **45***b*. The upper arm of bellcrank **115** is provided with a tappet **118**. The cantilever **21** with which the detector means is associated is slotted at **119** at its outer end. Mounted on the end of the cantilever within the slot at **119** is a pin **120**.

Swingingly hanging on pin **120** within the slot at **119** is the sheet detector pendulum **121** which is free to swing from the solid line position of Fig. 9 to the dot and dash line position therein. The stop **16** (one of series K) at the end of cantilever **21** is slotted at **122** to permit the swinging movement of pendulum **121**. Before the arrival of a sheet, pendulum **121** hangs as shown in the solid line position of Fig. 9 and rests against the base of a slot **123** provided in the margin of the feed board. It is seen that in this position the pendulum is within the path of an oncoming sheet. When the leading edge of a sheet strikes the pendulum **121**, the latter is swung outwardly and upwardly by the momentum of the sheet. The sheet continues, and presently the leading edge strikes the stops K, and the sheet is brought to a halt.

Thereupon operation of side guide J effects lateral registration of the sheet. Then transfer cylinder T will have turned nearly to the angular position at which timed delivery of the sheet from the feed board to the grippers of the cylinder is to begin. Substantially at this time the trip lock shaft H begins to oscillate; and as it does so, the tappet **118** is carried clockwise, as viewed in Fig. 9. If a sheet has arrived in proper timing the pendulum **121** will be out of the path of the tappet and cannot interfere with the movement of the latter.

However, if a sheet is not present at the guides K at the proper time for the commencement of delivery thereof from the board to the transfer cylinder grippers, the pendulum **121** will be in the solid line position of Fig. 9 and therefore in the path of the tappet **118**. After a slight rotation of the trip lock shaft H the tappet **118** will strike the pendulum **121** whereupon the rotation of the trip lock shaft H is arrested. By well known mechanism (not shown in detail) the blanket cylinder B is thereupon almost immediately tripped so as to disengage it from both the plate cylinder P and the impression cylinder I, to avoid an imprint directly onto the surface of the impression cylinder. Under these conditions the delayed sheet is plainly incapable of being received by the grippers of the transfer cylinder, and its delivery, if and when it arrives at the end of the board, must be absolutely blocked. This is accomplished by preventing the stop K from rising and the upper feed rollers **37** from descending during the instant revolution of the cylinders of the printing unit, and the operation is as follows:

Shaft H will have rotated so slightly that arm **107** (see Fig. 6) will have been drawn only a slight amount. Accordingly the lever **101** is not moved, and the gauge block or stop **102** remains between the end **103** of lever **93** and the end **104** of arm **95***a* of lever **95**. The levers **93** and **95**, including arm **95***a*, cannot move. Since lever **93** is rigidly mounted on shaft **40**, this shaft cannot rotate to lower the upper feed rollers **37** into operative position; and, since lever **95** is rigidly mounted on shaft **13**, this shaft cannot rotate to raise the front guides or stops K. When the delayed sheet arrives at the stops it is simply held on the feed board; and in the meantime the blanket cylinder B remains tripped and the press idles until the condition is corrected.

Mounted on the trip lock shaft H is a cantilever **124** (see Fig. 11) connected by a link **125** with a bellcrank **126** pivotally mounted at **127** on a Y-shaped cantilever **128** extending from and clamped on the lower tie rod **45***b*. The upper arm of the bell crank **126** is provided with a tappet **130**. Pivotally mounted at **131** on an upwardly extending leg **132** of Y-shaped cantilever **128** is a spring-loaded detent **133** which ordinarily is urged upwardly against an adjustable stop screw **133***a* and out of the path of the oscillating tappet **130**. When the leading edge of a sheet is overfed, that is, when it prematurely passes beneath the then raised stops K, these stops, in their normal descent, strike the upper surface of the sheet and depress it. The depression of the sheet in turn depresses the detent arm **133** and hence moves it into the path of travel of the oscillating tappet **130**, as illustrated in Fig. 11.

This arrests further movement of the trip lock shaft H. Thereupon the lever **105** (see Fig. 6), which is connected to the trip lock shaft H, does not travel sufficiently to move the arm **107** into position wherein the edge **111** of slot **109** engages the follower **110**. Therefore lever **101** is not rotated and the gauge block or stop **102** remains in the way of end **103** of lever **93** and end **104** of lever **95**. Consequently further movement of shafts **40** and **13** cannot take place, and hence the stops K will not again rise and the stops K and the upper feed rollers **37** are arrested in their movement. Meantime the trip lock is actuated through the trip lock shaft H. This causes the blanket B to be tripped out of engagement with the impression cylinder I and the press to idle until the situation is manually corrected.

In day to day operation of presses of this type the upper feed rollers sometimes have a tendency to mark the sheet, especially on printed matter after one or more colors have already been printed on the sheet. Mechanism is provided whereby such unwanted tendency can be eliminated or at least minimized. This can be done by using only those feed rollers which contact the sheet on unprinted areas. It will be noted that each of the upper feed rollers can be individually raised and temporarily locked in inoperative position. Mounted on each cantilever **39** is a pin **134**. Mounted on and clamped to shaft **40** adjacent each cantilever **39** is a collar **135** having a lug **136** on which is pivotally mounted a hook **137**. When it is desired that a particular upper feed roller **37** is to be raised to inoperative position, as shown in Fig. 8, its cantilever **39** may be manually raised against the force of compression spring **39***c* and the pin **134** secured within hook **137**.

The operation of the press is as follows:

Sheets are fed one after another from a pile at the feeder onto the feed board, the sheets thereupon being carried in timed relation toward the press by moving tapes. This mechanism is well known in the art. By suitable intergearing all moving parts of the press and appliances thereon, such as the feeder, the present apparatus, and the delivery mechanism, are timed with rotation of the printing cylinders and the transfer cylinder.

In a normal press run of a single sheet, the sheet is deposited by the feeder onto the feed board whereupon it is carried by tapes to the end of the board. At this point the preliminary front guides or stops, in lowered position and within the path of the oncoming sheet, are engaged by the leading edge of the sheet. The sheet is momentarily arrested.

While so arrested the sheet is moved against a lateral guide so that it is properly aligned for its travel through the press.

Then the preliminary front guides or stops are raised out of the path of the sheet and the upper feed rollers of the impeller system are lowered onto the upper surface of the sheet. The weight of the upper feed rollers and their supporting cantilevers aided by their compression springs serve to clamp the sheet against the driver feed rollers beneath the sheet. The driver feed rollers are immediately rotated through a part turn whereby the sheet is impelled forward toward the transfer cylinder, and at greater speed than the peripheral speed of that cylinder.

The leading margin of the sheet is rapidly advanced out upon the apron and the leading edge of the sheet is guided into the seats of the grippers of the transfer cylinder. Since the sheet is impelled at a speed greater than the peripheral speed of the transfer cylinder, as soon as the leading edge of the sheet strikes any of the gripper seats the leading edge is arrested and the leading margin of the sheet is necessarily buckled. The presence of the apron beneath the sheet prevents buckling in a downward direction whereby the margin of the sheet is buckled in the only available direction, which is upwardly against the faces of the pads of the grippers. Accordingly the leading edge of the sheet within every gripper is positively seated under pressure.

In the presence of the buckle the grippers of the transfer cylinder close upon the sheet. Immediately the upper feed rollers of the impeller system are raised out of contact with the sheet and the driver feed rollers stop rotating in the feed direction and begin to reverse their partial turn and the apron descends to inoperative position. Thereupon forward motion of the sheet depends upon rotation of the transfer cylinder alone; the buckle flattens automatically, and the remaining portion of the sheet is pulled off the feed board at regular press speed, and is carried to the impression cylinder in proper registration and proceeds through the press in conventional manner.

If a sheet is underfed or overfed, its delivery to the transfer cylinder is prevented, and the blanket is tripped off impression to prevent an imprint being made on the bare impression cylinder.

In the event that it is necessary or desirable to square up printed material on the sheets, the flexible register bar on the transfer cylinder may be suitably adjusted by cocking it or by bowing it or by both bowing and cocking. Usually it is inconvenient to mount a printing plate on the plate cylinder in perfect position. If the plate is slightly out of square, a combination of adjustments of the register bar of transfer cylinder as diagrammatically illustrated in Figs. 2 and 3 will quickly correct to the desired registry and this adjustment is simpler to obtain proper registry than to move the plate on the plate cylinder. In the event that it is desirable to fan out the trailing ends of the sheets or to compress them, or in the event that the sheets have an undesirable curved leading edge, adjustment of the register bar on the transfer cylinder to obtain proper registry is accomplished by bowing the bar, as for example, to correct for a condition as diagrammatically illustrated in Fig. 4.

It will be seen from the foregoing description that the invention provides feeding and registering mechanism in combination with other operating elements of sheet fed printing presses which overcome a number of difficulties which have heretofore been experienced. It provides mechanism for proper registry; any desirable shift of the position of the printed matter on a sheet can be accomplished quickly and accurately; sheets, whose leading or guide edges are not straight, can be registered with the same accuracy as perfect sheets, and sheets which have become distorted due to successive applications of ink can be further printed in proper registry by suitable adjustment of the mechanism which can be quickly accomplished.

The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, and it will be understood that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. Mechanism in a rotary sheet fed press having a feed board from which sheets to be printed are fed which comprises, a rotatable cylinder to transfer a fed sheet from said board to be printed on said press, preliminary guide stops mounted in advance of said cylinder for temporarily arresting the movement of said sheet prior to delivery of said sheet to said cylinder, sheet impelling rollers mounted for periodic rotation for impelling said sheet forward to said cylinder, a flexible register bar mounted on the periphery of said cylinder and extending generally parallel to the axis of said cylinder, gripper surfaces on said bar providing seats for the leading margin of said sheet when impelled forward by said rollers, adjustors engaging said register bar for adjusting the position of said bar relative to said cylinder, a gripper shaft mounted on said cylinder for periodic oscillation, gripper fingers mounted on said gripper shaft and operative on rotation of said cylinder to grip the leading margin of said sheet on said seats when said sheet is delivered thereto from said feed board and to release said sheet for delivery from said cylinder.

2. A rotary sheet fed press which comprises a feed board, an impression roll, a plate roll, a blanket roll, a transfer cylinder to transfer a fed sheet from said board to said impression cylinder, preliminary guide stops at the end of said feed board mounted for periodic vertical movement in and out of the path of travel of a sheet fed to said board for temporarily arresting the movemeent of and preliminarily registering the leading edge of said sheet, sheet impelling rollers mounted for periodic oscillating rotation for impelling said sheet forward to said transfer cylinder upon movement of said stops out of the path of travel of said sheet, a flexible register bar mounted on the periphery of said transfer cylinder and extending generally parallel to the axis of said cylinder for finally registering the leading edge of said sheet for delivery of the sheet in proper registery to said impression cylinder, gripper pads mounted along said bar providing seats for the leading margin of said sheet when impelled forward by said rollers, adjustors engaging said bar at both ends and intermediate said ends for selectively cocking or bowing said bar, a gripper shaft mounted on said transfer cylinder for periodic oscillation, and gripper fingers mounted on said gripper shaft and operative on rotation of said transfer cylinder to grip the leading margin of said sheet on said seats when said sheet is delivered thereto and to release said sheet for delivery from said transfer cylinder to said impression cylinder.

3. A rotary sheet fed press which comprises a feed board, an impression roll, a plate roll, a blanket roll, a transfer cylinder to transfer a fed sheet from said board to said impression cylinder, preliminary guide stops for temporarily arresting the movement of and preliminarily registering said sheet, sheet impelling rollers mounted for periodic rotation for impelling said sheet forward to said transfer cylinder at a speed greater than the peripheral speed of said transfer cylinder, a flexible register bar mounted on the periphery of said transfer cylinder and extending generally parallel to the axis of said cylinder, gripper pads mounted along said bar providing seats for the leading margin of said sheet when impelled forward by said rollers, adjustors engaging said bar for selectively cocking or bowing said bar, a gripper shaft mounted on said transfer cylinder for periodic oscillation, gripper fingers mounted on said gripper shaft operative on rotation of said transfer cylinder to grip the leading margin of said sheet on said seats when said sheet is delivered thereto and to release said sheet for delivery from said transfer cylinder to said impression cylinder, and a guide apron mounted for periodic vertical movement at the end of said feed board operative to produce an upward buckle in the leading margin of said sheet when its leading edge advances toward and engages said seats on said register bar.

4. A rotary sheet fed press which comprises a feed board, an impression roll, a plate roll, a blanket roll having a trip lock mechanism, a transfer cylinder to transfer a fed sheet from said board to said impression cylinder, preliminary guide stops at the end of said feed board mounted for periodic vertical movement in and out of the path of travel of a sheet fed to said board for temporarily arresting the movement of and preliminarily registering said sheet, sheet impelling rollers mounted for periodic rotation for impelling said sheet forward to said transfer cylinder upon movement of said stops out of the path of travel of said sheet, a flexible register bar mounted on the periphery of said transfer cylinder and extending generally paralell to the axis of said cylinder, gripper surfaces on said bar providing seats for the leading margin of said sheet when impelled forward by said rollers, adjustors engaging said bar for selectively cocking or bowing said bar, a gripper shaft mounted on said transfer cylinder for periodic oscillation, gripper fingers mounted on said gripper shaft operative on rota-

tion of said transfer cylinder to grip the leading margin of said sheet on said seats when said sheet is delivered thereto and to release said sheet for delivery from said transfer cylinder to said impression cylinder, and detector mechanism mounted in advance of said transfer cylinder operative to detect the existence of an underfed or an overfed sheet and upon such occurrence to actuate said trip lock mechanism.

5. Mechanism for feeding and registering sheets in a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, which mechanism comprises a rotatable transfer cylinder; a series of pairs of sheet impellers mounted at the delivery end of said feed board, each pair comprising an upper and a lower roll, a series of vertically movable stops at the delivery end of said feed board mounted for movement into and out of the path of travel of a sheet delivered on said board and operative to preliminarily register said sheets, means operative to raise said stops in timed relation out of the path of travel of said sheets, after they have been so registered, means operative to drive said impellers and in response thereto to deliver the leading margin of a delivered sheet to said transfer cylinder, said transfer cylinder having means thereon including an adjustable gripper bar extending generally parallel to the axis thereof carrying a plurality of gripper pads along its length and a plurality of companion gripper fingers operative in timed relation to grip said leading margin of a sheet delivered thereto between said fingers and pads and to deliver said sheet properly registered to said impression cylinder.

6. Mechanism in sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, which mechanism comprises a rotatable transfer cylinder; a series of pairs of sheet impellers mounted at the delivery end of said feed board, each pair comprising a freely rotatable upper and a driven lower roll, a series of vertically movable stops at the delivery end of said feed board mounted for movement into and out of the path of travel of a sheet delivered on said board and operative to preliminarily register said sheets, means operative to raise said stops in timed relation out of the path of travel of said sheets, after they have been so registered, a shaft mounting said lower rolls and mounted to rotate said lower rolls first in clockwise direction and then in counter-clockwise direction, said lower rolls driving said sheet forward only in response to rotation of said lower rolls in one direction to deliver the leading margin of a sheet to said transfer cylinder, said transfer cylinder having means thereon including an adjustable gripper and register bar extending generally parallel to the axis thereof carrying a plurality of gripper pads along its length and a plurality of companion gripper fingers operative in timed relation to grip said leading margin of a sheet delivered thereto between said fingers and pads and to deliver said sheet properly registered to said impression cylinder.

7. Sheet feeding and registering mechanism in a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, said mechanism comprising a rotatable transfer cylinder; a series of pairs of sheet impellers mounted at the delivery end of said feed board, each pair comprising an upper and a lower roll; a series of vertically movable stops at the delivery end of said feed board mounted for movement into and out of the path of travel of a sheet delivered on said board and operative to preliminarily register the leading edge of a sheet fed onto said feed board; means operative to raise said stops in timed relation out of the path of travel of said sheets after a sheet has been so registered; means operative to drive said impellers and in response thereto to deliver the leading margin of said sheet to said transfer cylinder; a flexible gripper bar mounted at the periphery of said transfer cylinder and extending generally parallel to the axis of said transfer cylinder, a gripper-finger shaft mounted for rocking movement on said transfer cylinder; a plurality of gripper pads mounted on said bar, a plurality of companion gripper fingers mounted on said gripper-finger shaft, means to rock said gripper-finger shaft in timed relation causing said gripper fingers to grip the leading margin of a sheet delivered to said pads and causing said gripper fingers to release said sheet for delivery of said sheet to said impression cylinder, and a plurality of independently operative adjustors connected to said bar for adjustment of said bar selectively to cocked or bowed positions.

8. In a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder and blanket roll trip mechanism operative in response to action of a trip lock shaft to move said blanket cylinder out of operative engagement with said impression cylinder; the combination of a rotatable transfer cylinder for receiving sheets from said feed board and delivering them to said impression cylinder, said cylinder including gripper fingers and pads for gripping the leading margin of sheets delivered thereto; sheet guide stops movable into and out of the normal path of travel of said sheets and mounted at the delivery end of said feed board in advance of said transfer cylinder; sheet impellers mounted in advance of said stops operative to advance the leading margin of said sheets in timed relation to said transfer cylinder at a speed greater than the peripheral speed of said transfer cylinder and to release a sheet when it is gripped by said gripping fingers; detector mechanism connected with said trip lock shaft and mounted to cooperate with said stops and impellers, said detector mechanism being operative to detect the existence of a sheet out of registry and when such condition occurs, to actuate said detector mechanism to prevent said stops from moving out of the path of travel of said sheets and to actuate said trip lock shaft to effect operation of said blanket roll trip mechanism.

9. In a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, the combination of a rotatable transfer cylinder for receiving sheets from said feed board and delivering them to said impression cylinder, said cylinder including gripper fingers and pads for gripping the leading margin of sheets delivered thereto, sheet guide stops movable into and out of the normal path of travel of said sheets and mounted at the delivery end of said feed board in advance of said transfer cylinder, a plurality of pairs of sheet impellers mounted in advance of said stops operative to advance the leading margin of said sheets in timed relation to said transfer cylinder at a speed greater than the peripheral speed of said transfer cylinder and to release a sheet when it is gripped by said gripping fingers, each of said pairs of impellers comprising an upper and a lower roll, and means mounting said upper rolls for vertical movement to inoperative position and means cooperating with said upper rolls for releasably locking said upper rolls individually in inoperative position.

10. In a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, the combination of a rotatable transfer cylinder for receiving sheets from said feed board and delivering them to said impression cylinder, said cylinder including gripper fingers and pads for gripping the leading margin of said sheets delivered thereto, preliminary sheet guide stops movable into and out of the normal path of travel of said sheets and mounted at the delivery end of said feed board in advance of said transfer cylinder, sheet impellers mounted in advance of said stops operative to advance the leading margin of

said sheets in timed relation to said transfer cylinder at a speed greater than the peripheral speed of said transfer cylinder and to release a sheet when it is gripped by said gripping fingers, and a vertically movable apron mounted beyond said stops and beneath said transfer cylinder providing guide means causing a buckle in the leading margin of a sheet when the leading edge thereof strikes said pads.

11. In a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, the combination of a rotatable transfer cylinder for receiving sheets from said feed board and delivering them to said impression cylinder, said cylinder including gripper fingers and pads for gripping the leading margin of sheets delivered thereto, sheet guide stops movable into and out of the normal path of travel of said sheets and mounted at the delivery end of said feed board in advance of said transfer cylinder, sheet impellers mounted in advance of said stops operative to advance the leading margin of said sheets in timed relation to said transfer cylinder at a speed greater than the peripheral speed of said transfer cylinder and to release a sheet when it is gripped by said gripping fingers, and a vertically movable apron mounted beyond said stops and beneath said transfer cylinder providing guide means causing a buckle in the leading margin of a sheet when the leading edge thereof strikes said pads, said sheet impellers comprising a series of pairs of rollers, each pair comprising an upper freely rotatable idler roller and a lower driven roller.

12. In a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating with and engageable with said impression cylinder, the combination of a rotatable transfer cylinder for receiving sheets from said feed board and delivering them to said impression cylinder, said cylinder including gripper fingers and pads for gripping the leading margin of sheets delivered thereto, sheet guide stops movable into and out of the normal path of travel of said sheets and mounted at the delivery end of said feed board in advance of said transfer cylinder, and sheet impellers mounted in advance of said stops operative to advance the leading margin of said sheets in timed relation to said transfer cylinder at a speed greater than the peripheral speed of said transfer cylinder and to release a sheet after it is gripped by said gripping fingers, said sheet impellers comprising a series of pairs of rolls, each of said pairs having an oscillating driven roll and a cooperating freely rotatable roll.

13. Mechanism in a sheet fed press having a feed board; a transfer cylinder cooperating therewith; an impression cylinder and an engaging blanket cylinder receiving sheets from said transfer cylinder; said mechanism comprising an impeller for feeding sheets from said board at greater speed than the peripheral speed of said transfer cylinder; a series of grippers and a series of pads therefor mounted at the periphery of said transfer cylinder, both of said series being normally parallel to each other and to the axis of said transfer cylinder; a pressure sensitive device for detecting an underfed sheet on said feed board and controlling said tripping means, said device controlling said tripping means for disengaging said impression cylinder and blanket on the occurrence of such underfed sheet; a flexible bar mounted on said transfer cylinder and carrying said series of pads; and micrometer adjustors connected to said bar operative to adjust said bar selectively to cocked or bowed positions.

14. Mechanism in a sheet fed press having a feed board; a transfer cylinder cooperating therewith; an impression cylinder and an engaging blanket receiving sheets from said transfer cylinder; said mechanism comprising an impeller for feeding sheets from said board at greater speed than the peripheral speed of said transfer cylinder; a series of grippers and a series of pads therefor mounted at the periphery of said transfer cylinder, both of said series being normally parallel to each other and to the axis of said transfer cylinder; a pressure sensitive device for detecting the presence of an overfed sheet on said board and controlling said tripping means, said device controlling said tripping means for disengaging said impression cylinder and blanket on the occurrence of an overfed sheet; a flexible bar mounted on said transfer cylinder and carrying said series of pads; and micrometer adjustors connected to said bar operative to adjust said bar selectively to cocked or bowed positions.

15. Mechanism for a sheet fed press having a feed board; a transfer cylinder cooperating therewith; an impression cylinder for receiving sheets from said transfer cylinder; an engaging blanket cylinder; said mechanism comprising an impeller for feeding sheets from said board at greater speed than the peripheral speed of said transfer cylinder; a series of grippers and a series of cooperating pads therefor mounted on the periphery of said transfer cylinder, both of said series being normally parallel to each other and to the axis of said transfer cylinder; a series of cantilevers mounted at the end of said feed board, guide stops mounted on said cantilevers, means operating said cantilevers thereby to lower said stops into the path of travel of a sheet fed down said board and to raise said stops out of said path of travel, a sheet detector finger lying normally in said path of travel and movable by a moving sheet out of said path and mounted on one of said cantilevers, an oscillating tappet mounted to oscillate a full stroke when said finger is raised and to be arrested by said finger when said finger remains unmoved due to an absence of such sheet, and means operative to arrest the movement of said cantilevers when the oscillation of said tappet is arrested, a pressure sensitive device for detecting the presence of a sheet on said board, said device controlling said means for disengaging said impression cylinder and blanket in the absence of a sheet at a particular time; and a flexible bar mounted on said transfer cylinder and carrying said series of pads, said bar being adjustable transversely with respect to its axis whereby said pads may be selectively advanced and retracted circumferentially with respect to said periphery.

16. A transfer cylinder in a sheet fed press having a feed board, an impression cylinder and a blanket cylinder; said transfer cylinder comprising a driven rotatable shaft, a plurality of disks fixedly mounted on said shaft providing a plurality of aligned register bar supporting surfaces, a flexible register bar adjustably mounted on said supporting surfaces and normally lying parallel with the axis of said shaft, a plurality of aligned gripper pads on said bar having detents providing register surfaces for engaging the leading edge of a sheet delivered from said feed board to said transfer cylinder, adjusting devices mounted on said disks and engaging said bar and operative selectively to cock and bow said register bar thereby to correspondingly align said register surfaces, a gripper shaft mounted for oscillating rotation on said transfer cylinder, and a plurality of gripper fingers mounted on said shaft and operative to grip the leading portion of said sheet when its leading edge strikes and engages said register surfaces.

17. Mechanism for feeding and registering sheets in a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating and engageable with the impression cylinder, oscillatable means including means for tripping the blanket cylinder on and off of the impression cylinder and a rotatable transfer cylinder, comprising a sheet detector normally disposed in the path of sheets advancing along the feed board toward the transfer cylinder and when so disposed having a portion lying in the path of a portion of the oscillatable means to limit movement of the oscillatable means in one direction of oscillation and as a consequence of such limitation of movement trip the blanket cylinder off of

the impression cylinder, the sheet detector being movable by a sheet to a position out of the path of said portion of the oscillating means so that when a sheet has been delivered along the feed board toward the transfer cylinder past the sheet detector said portion of the oscillating means and consequently the oscillating means as a whole is movable without interruption through its entire amplitude of oscillation and the blanket cylinder is maintained on the impression cylinder.

18. Mechanism for feeding and registering sheets in a sheet fed printing press having a feed board, an impression cylinder, a blanket cylinder cooperating and engageable with the impression cylinder, oscillatable means including means for tripping the blanket cylinder on and off of the impression cylinder and a rotatable transfer cylinder, comprising a sheet detector normally disposed in the path of sheets advancing along the feed board toward the transfer cylinder and when so disposed having a portion lying against the feed board in the path of a portion of the oscillatable means to limit movement of the oscillatable means in one direction of oscillation and as a consequence of such limitation of movement trip the blanket cylinder off of the impression cylinder, the sheet detector being swingable by a sheet to a position generally above the level of the feed board and out of the path of said portion of the oscillating means so that when a sheet has been delivered along the feed board toward the transfer cylinder past the sheet detector said portion of the oscillating means and consequently the oscillating means as a whole is movable without interruption through its entire amplitude of oscillation and the blanket cylinder is maintained on the impression cylinder.

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