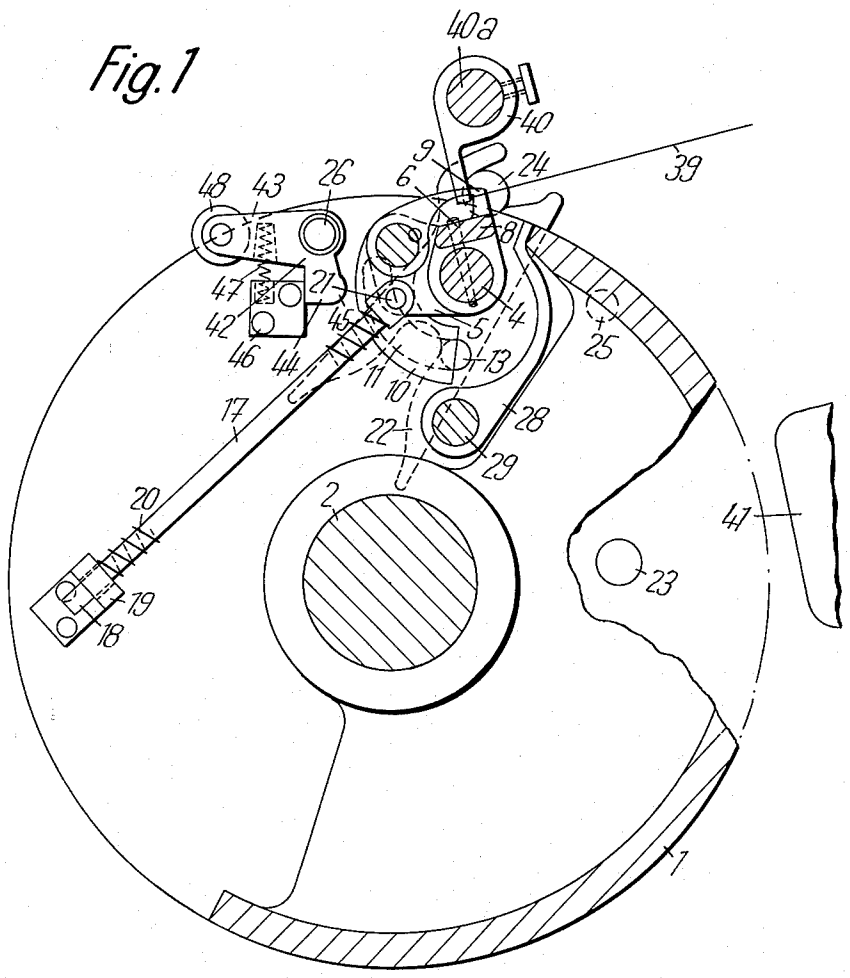
June 13, 1961 A. W. RANGER 2,988,357

SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Fig. 1



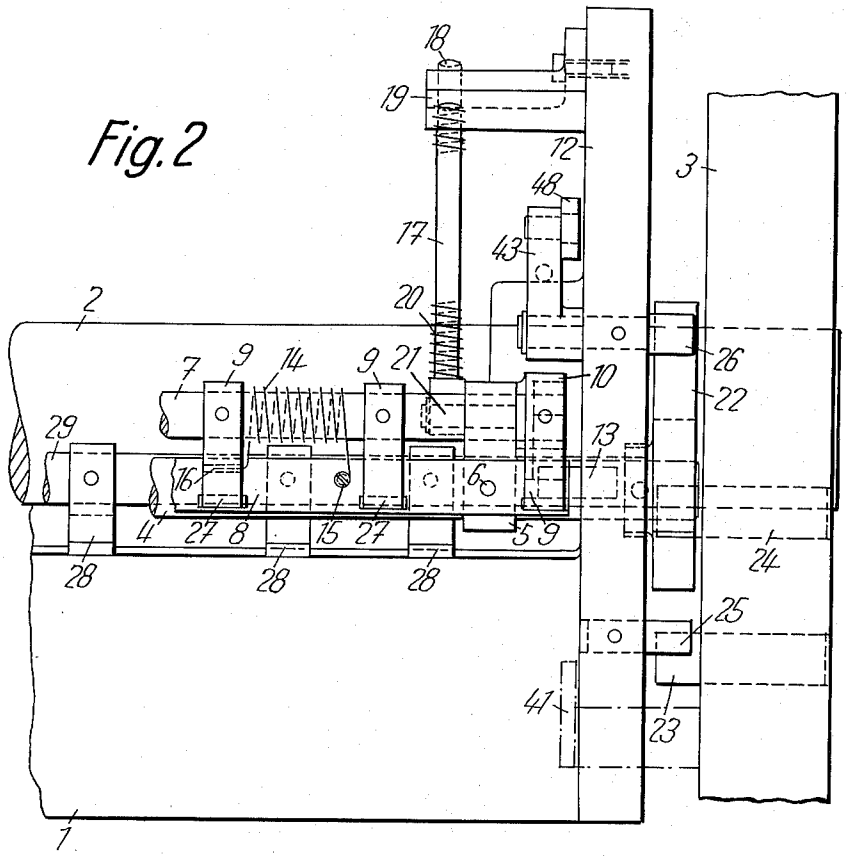
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June 13, 1961 A. W. RANGER 2,988,357

SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Fig. 2



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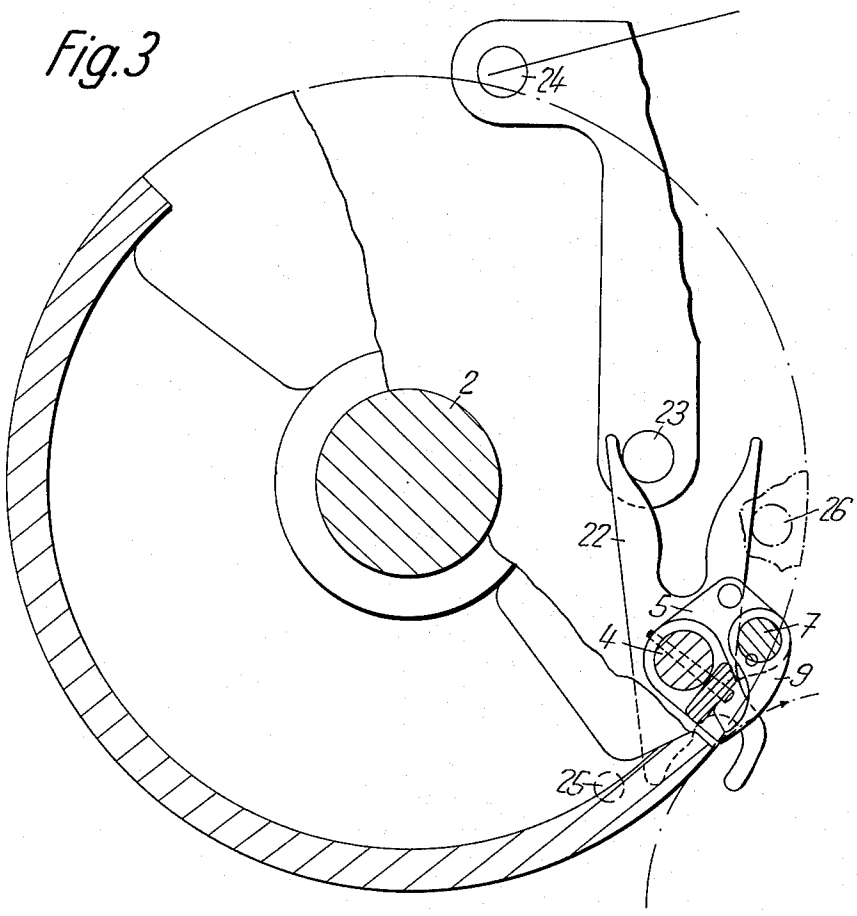
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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Fig.3



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June 13, 1961 A. W. RANGER 2,988,357

SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Fig. 4

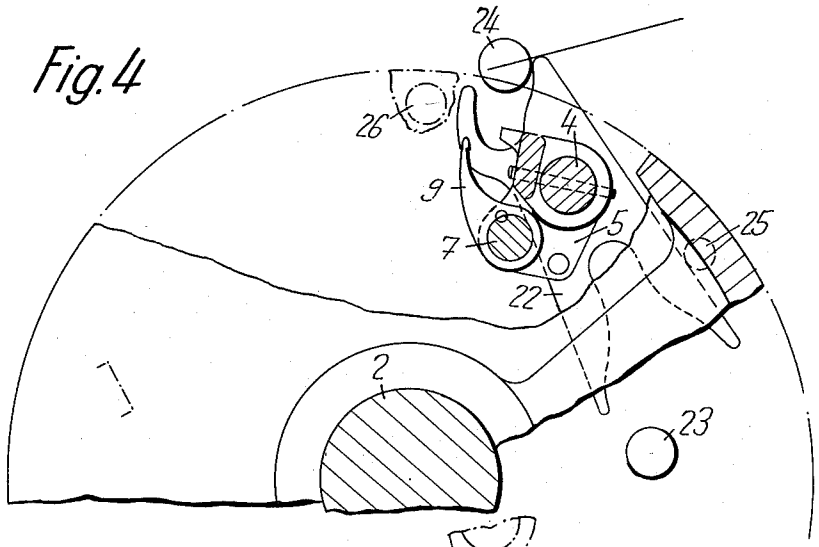
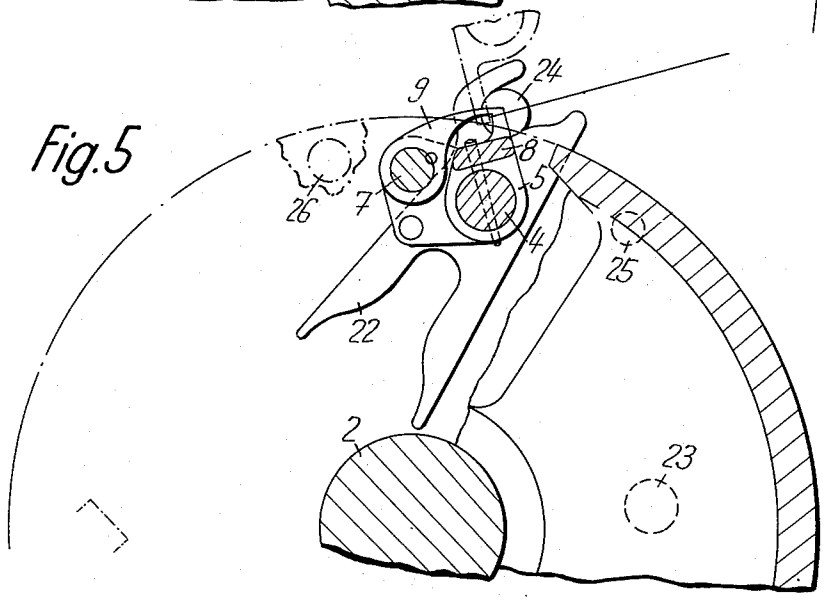


Fig. 5



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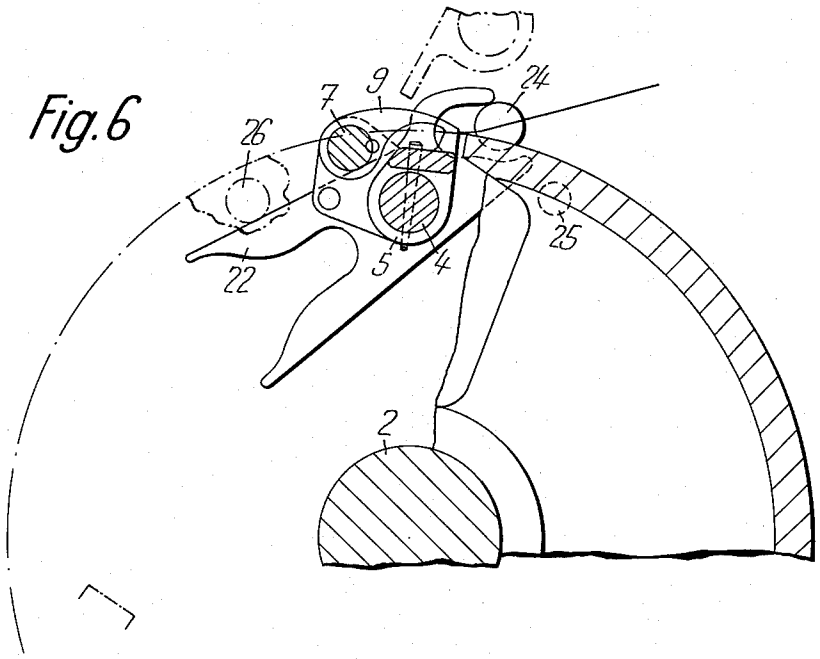
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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Fig. 6



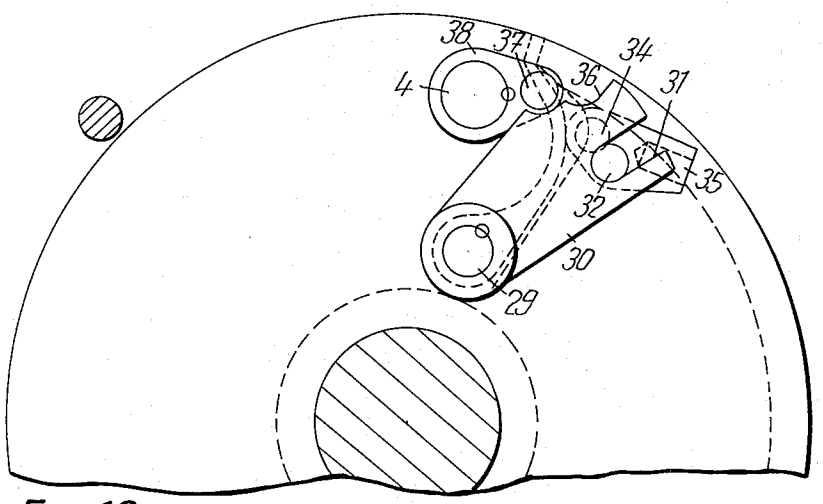


Fig. 10

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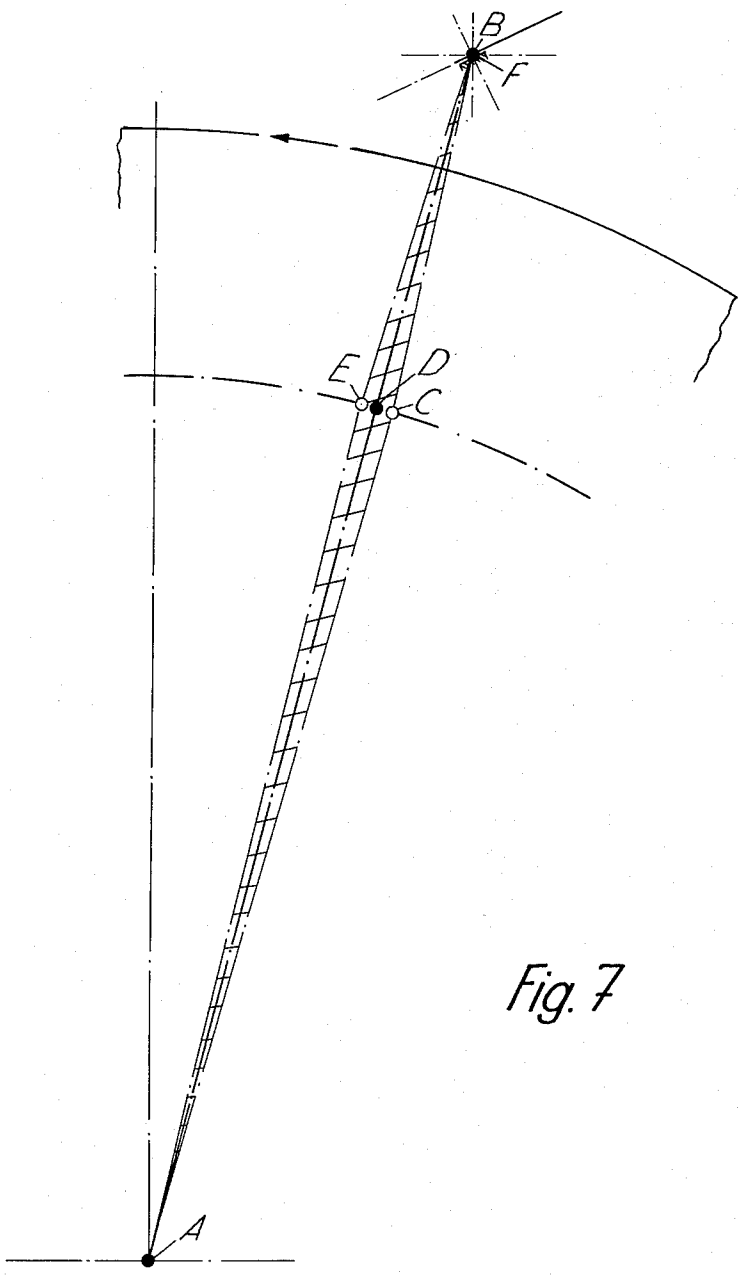


Fig. 7

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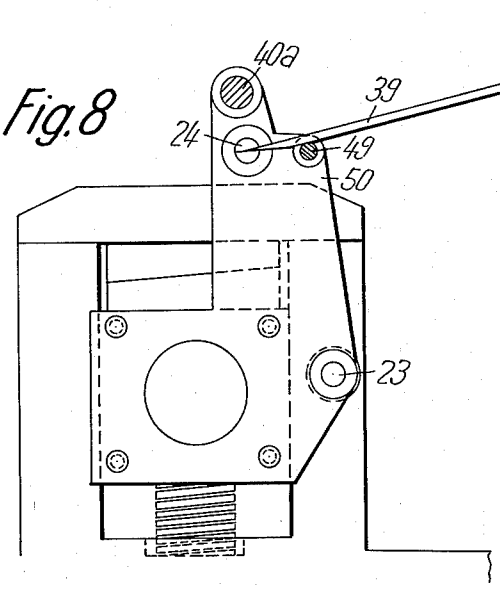
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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Fig. 8



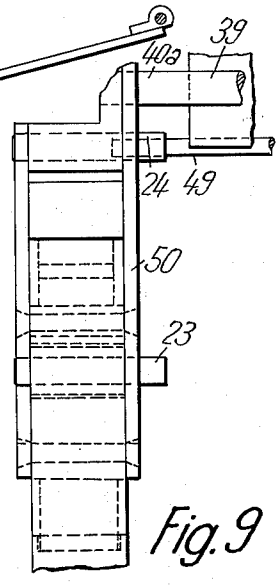
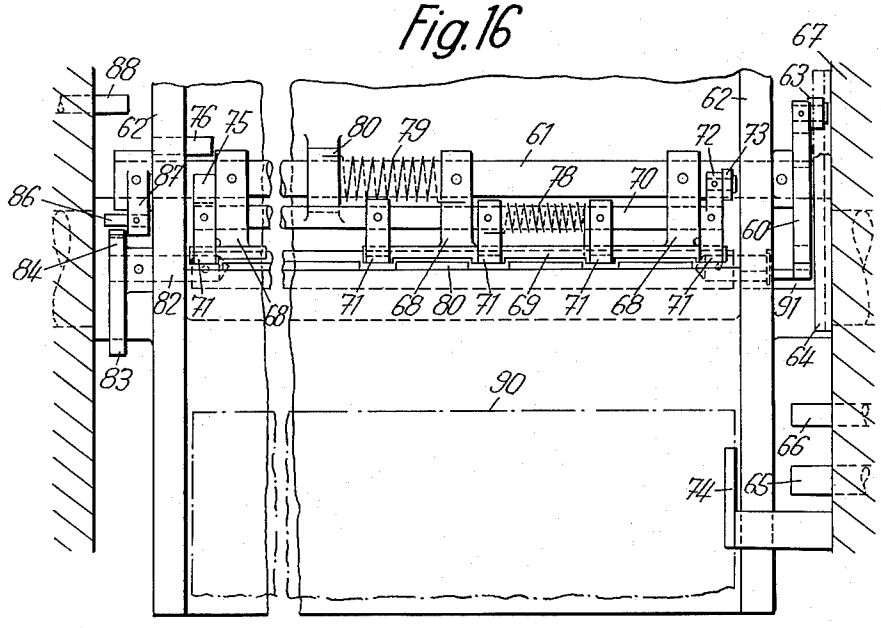


Fig. 9

Fig. 16



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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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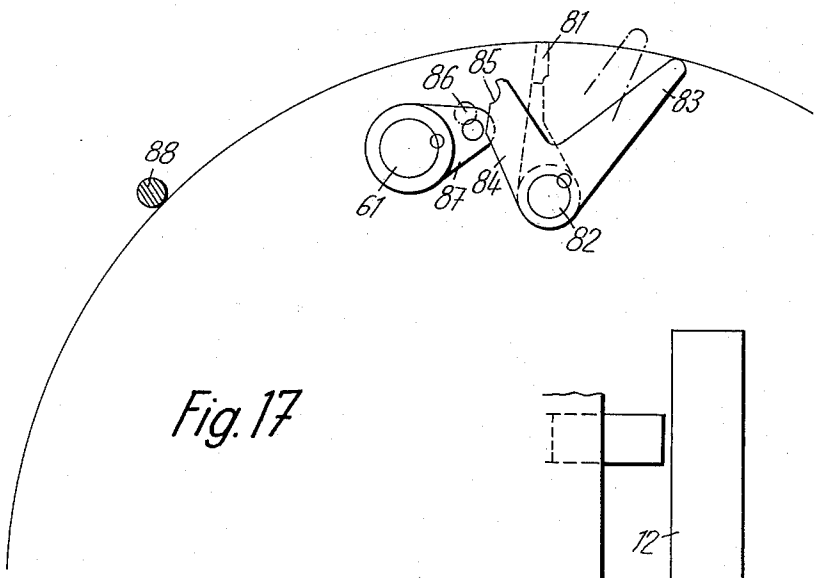


Fig. 17

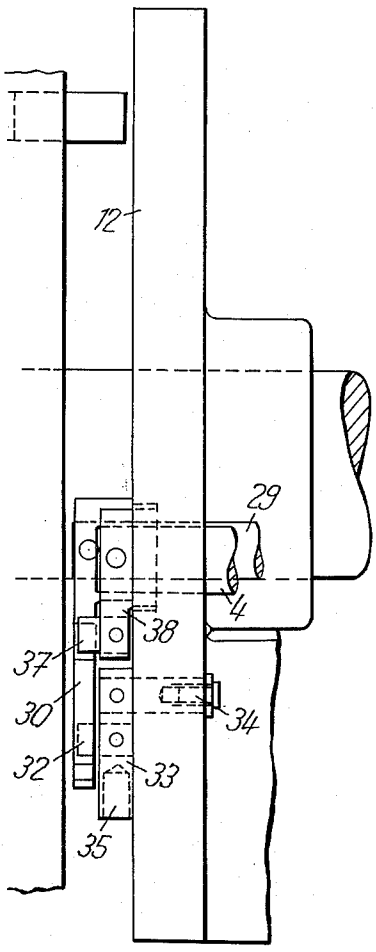


Fig. 10a

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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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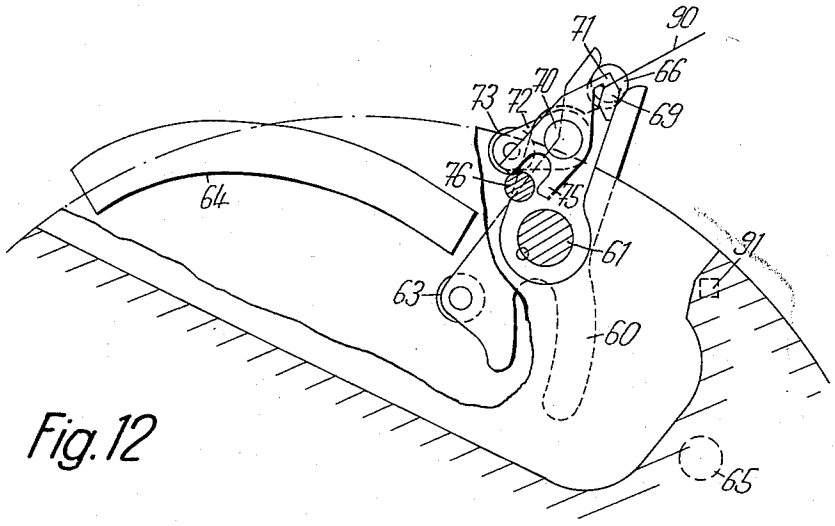
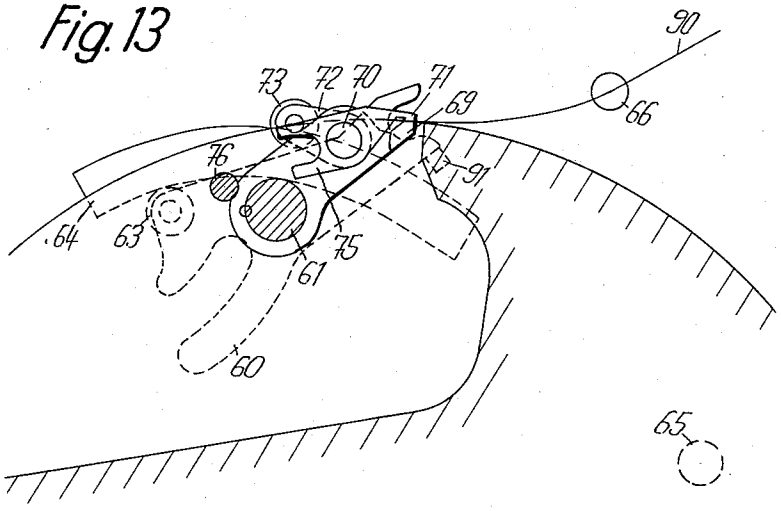


Fig. 12

Fig. 13



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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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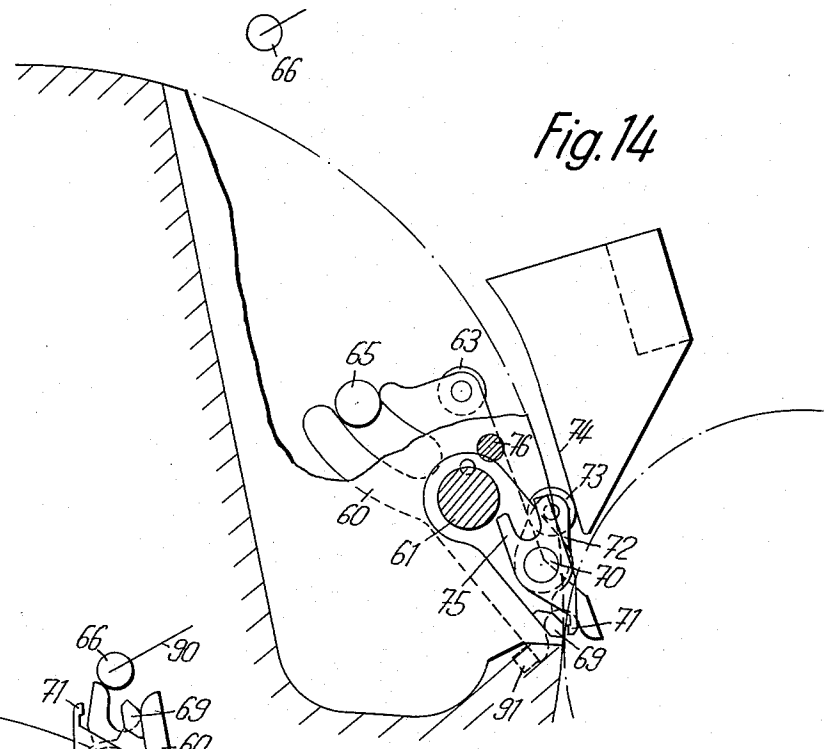


Fig. 14

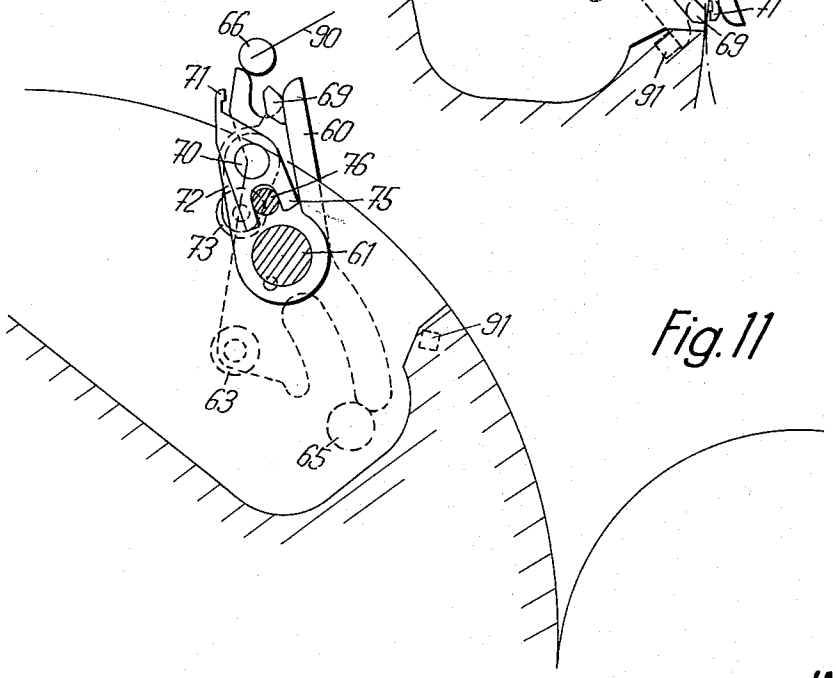


Fig. 11

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SHEET HANDLING DEVICE FOR PRINTING MACHINES

Filed Dec. 31, 1958 11 Sheets-Sheet 11

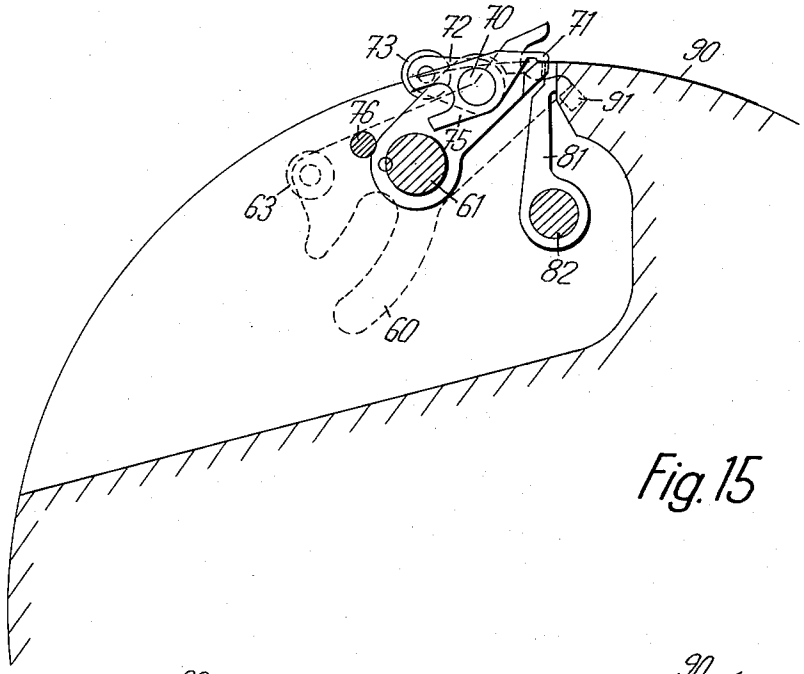


Fig. 15

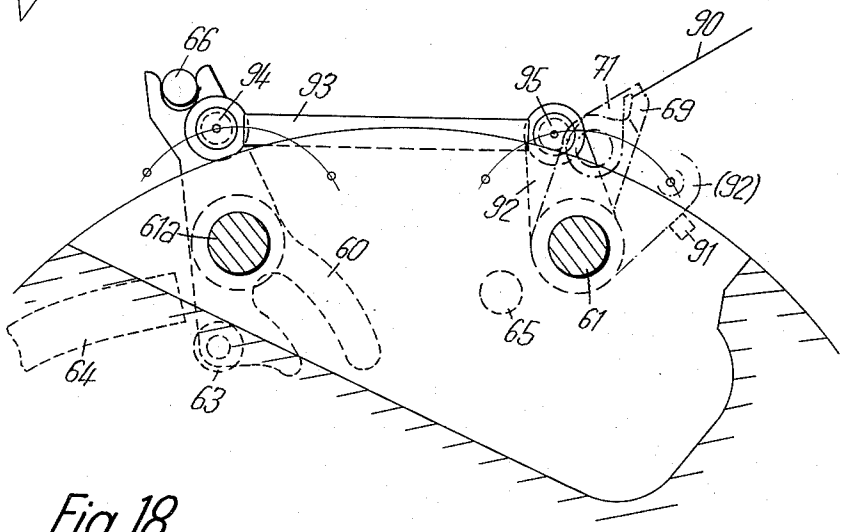


Fig. 18

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United States Patent Office

2,988,357

Patented June 13, 1961

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SHEET HANDLING DEVICE FOR PRINTING MACHINES

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Filed Dec. 31, 1958, Ser. No. 784,118
Claims priority, application Great Britain Jan. 6, 1958
7 Claims. (Cl. 271—82)

This invention relates to a gripper device, which although primarily intended for application to sheet-fed printing machines can also be applied to other sheet-fed paper or other sheet handling machines (such as die-cutting, bronzing, folding or like machines whether for paper or metal sheets). It is applicable to printing machines of the sheet-fed continuously rotating cylinder type; and it is also applicable to auxiliary feeder drums and/or to cylinders feeding sheets to continuously rotating cylinders. The invention has as its object the provision of means for ensuring the correct registration of sheets when they are seized by the cylinder grippers.

In most continuously rotating cylinder machines, of both one and two revolution types, the sheet to be printed is taken from a stationary position on a feed-board by grippers mounted within the cylinder. The grippers close on the sheet at the moment of gripping and nip it against the leading edge of the cylinder as it rotates beneath the feed-board. The actual gripping action is that of a snatch at the sheet and it will be appreciated that any material change of speed is liable to result in a variation of sheet register, which register is essential for good quality work and especially in color work. With color work it is usually necessary to run the machine at a substantially uniform speed throughout the printing of any given color and this has an adverse effect on production.

An additional disadvantage of the snatching action is that the front lays registering the sheet have to lift as the grippers seize the sheet in order to avoid fouling the front edge of the sheet as it is pulled forward at high speed onto the cylinder. Lifting of the lays leaves the sheet momentarily out of control and to maintain control drop fingers may be provided which fall onto and steady the sheet at the moment of transference. These fingers however frequently vibrate at high speeds and form an obstruction to the machine minder.

With high speed machines where accuracy of registration is considered essential recourse may be had to an auxiliary gripper system which is mounted on the machine frame and grips the stationary sheet, swinging it forward to transfer it to the cylinder grippers at cylinder speed. Such auxiliary grippers not only add appreciably to the cost of the machine but offer considerable obstruction to the machine minder when making ready.

In order to overcome the disadvantage due to the snatching action referred to, it was proposed in the specification of British Patent No. 507,522 to carry the gripper shaft and the abutment bar on arms mounted on a rocking shaft carried between the end walls of the cylinder eccentrically of the cylinder shaft and to provide a cam surface external to the cylinder sensed by a roller carried by a lever on the end of the shaft for the purpose of rocking the arms whereby the abutment bar would be stationary or very slowly moving as the grippers closed to grip a sheet, the abutment bar and grippers thereafter accelerating until they travelled at cylinder speed. With such an arrangement, at high speeds of rotation of the cylinder, strong springs had to be employed to maintain vibration-free sensing of the cam surface by the roller, resulting in rapid wear which in turn caused undesirable vibration between the grippers and abutment bar.

An object of the present invention is to ensure that the operation of the rocking shaft and gripper shaft shall be such that not only is the abutment bar substantially stationary when brought to the leading edge or lays of the feed-board and as the grippers close onto the sheet, but the abutment bar and grippers are positively controlled as they approach the sheet gripping position and remain so positively controlled until they have seized the sheet irrespective of the rotational speed of the cylinder.

A sheet handling machine having a lay board to which sheets are delivered individually and successively, according to the present invention, comprises in combination, a rotatably driven, hollow cylinder formed with a longitudinally extending opening, a rockable first shaft extending longitudinally of the cylinder internally thereof and projecting outwardly at at least one end of the cylinder, a second shaft carried by the first shaft, grippers on said second shaft, abutment means adapted to coact with said grippers for transferring a sheet from the lay board to the cylinder and fixed relative to said first shaft to form together with said second shaft and said grippers a rockable unit, control member means mounted on the first rockable shaft externally of the cylinder, first and second fixed pins adapted to co-operate successively during rotation of the cylinder with said control member means to effect rocking movement of said rockable unit from a first position in which the abutment means are disposed within the cylinder to a second position angularly spaced from the first postion in which the abutment means project through said longitudinally extending opening in the cylinder and substantially coincide with the plane of a sheet on the lay board, means operable to effect opening of the grippers at said first position, and means operable to effect closure of the grippers at said second position, whereby at said second position of the rockable unit, the abutments means, the axis of the second pin co-operating with the control member means and the axis of the first shaft are disposed substantially in a radial plane relative to the axis of the cylinder thereby to preclude any substantial relative movement between a sheet registered and aligned on the abutment means irrespective of the rotational speed of the cylinder.

Preferably, the control member means are adapted so to coact with the second fixed pin that over a few degrees of rotation of the cylinder subsequent to said second position of the rockable unit, the abutment means at locations thereof engaged by the grippers remain substantially stationary.

In the accompanying drawings illustrating examples of the invention;

FIG. 1 is a somewhat diagrammatic side sectional elevation showing the relative positions of the various parts as the grippers have gripped a sheet;

FIG. 2 is a plan of FIG. 1;

FIGS. 3 to 6 are diagrammatic side sectional elevations of part of the cylinder showing the relative positions of the tumbler and grippers at successive points of rotation of the cylinder. The slotted lever and pin for operating the grippers have been omitted for clarity.

FIG. 3 shows the position of the cylinder just before delivery of a printed sheet, and with the tumbler about to engage the opening pin;

FIG. 4 shows the tumbler about to engage the closing pin, with the grippers open ready to grip a sheet;

FIG. 5 shows the moment of sheet gripping by the grippers, the lays are stationary and although the cylinder is moving, the grippers and abutment bar are also substantially stationary;

FIG. 6 shows the sheet being drawn from the lay board, the lays have been lifted and the abutment bar has closed onto the cylinder nose;

FIG. 7 is a diagram showing the position of the abutment in relation to the sheet edge during the period of gripping;

FIGS. 8 and 9 are respectively a diagrammatic side and front elevation of means for maintaining registration when the cylinder of a single or two revolution machine is lifted;

FIG. 10 is a detailed view in side elevation of a combined packing clamp and rocking unit opening device;

FIG. 10A is a plan view thereof;

FIGS. 11 to 14 are sectional side elevations of a modified tumbler and gripper control;

FIG. 11 shows the grippers open and approaching the lay board to grip a sheet;

FIG. 12 shows a sheet being gripped by the grippers;

FIG. 13 shows the sheet being drawn off the lay board;

FIG. 14 shows the point of delivery of a printed sheet;

FIG. 15 is a side sectional elevation showing the relative position of the parts carried by the cylinder when a sheet has been gripped.

FIG. 16 is a plan view on FIG. 13; and

FIG. 17 is a side elevational detail of a packing clamp opening device.

FIG. 18 is a side sectional elevation showing an alternative arrangement for operating the rocking gripper unit.

In the example of a printing machine shown in FIGS. 1 to 10A, a cylinder, generally designated 1 is carried by a shaft 2 mounted in bearings in the side frame 3 of the printing machine.

A rocking shaft 4 mounted in bearings in the end walls 12 of the cylinder has a number of arms 5 spaced along it (only one of which is shown) secured to it as by pins 6. The arms 5 carry a gripper shaft 7 and an abutment bar 8. A number of grippers 9 are mounted on the gripper shaft 7. The grippers may be fixed or adjustably mounted.

Secured to at one or each end of the gripper shaft 7 is a curved lever 10 having an arcuate open-ended slot 11 therein, the lever 10 being adjacent the end wall 12 of the cylinder.

The curved slotted lever 10 engages a pin 13 on the cylinder wall to effect the opening and closing of the grippers, imparting thereby a positive action to the grippers eliminating vibration and faulty closing of the grippers onto a sheet as hereinafter explained.

A helical spring 14, wound around the gripper shaft 7 is anchored at one end 15 to the abutment bar 8 and is anchored at the other end 16 under a gripper 9. The spring 14 keeps the grippers closed when they are not under the control of the slotted lever 10.

One end of the rocking shaft 4 passes through the end wall 12 of the cylinder and has secured thereto a tumbler 22.

The tumbler 22 is slotted at both ends for engagement respectively and successively with opening and closing pins 23, 24, mounted on the side frame 3 of the machine.

Although in the foregoing description the tumbler and its associated pins are described as being at one end of the cylinder, if desired a second tumbler and associated pins may be arranged at the other end of the rocking shaft, which would, of course, be extended to pass through that end wall.

Pivotally mounted on the arm 5 by a pivot pin 21 is a rod 17, the end 18 of which passes through a lug 19 secured to the end wall of the cylinder. A helical spring 20 is interposed between the lug 19 and the head on the rod receiving the pivot pin 21 and is under compression. The object of the spring 20 is to hold the tumbler 22 in either of its two extreme positions against stops 25, 26 mounted in the cylinder wall 12, after engagement with the pins 23, 24, in order to prevent undesirable oscillation of the rocking shaft 4 and tumbler 22.

As long as either of the parallel portions of the slotted ends of the tumbler 22 is in engagement with its

appropriate pin 23, 24 the rocking shaft 4 is positively controlled irrespective of the speed of the cylinder.

The abutment bar 8 is preferably machined from a solid bar. It has knurled abutment surfaces or gripping faces 27 at intervals along it and recesses (which are not shown) to provide a clearance for packing clamps 28 and to allow clearance for the delivery mechanism, not shown.

The packing clamps 28 are mounted on a packing clamp shaft 29, which is rotated by the mechanism shown in FIGS. 10 and 10A. The clamp shaft 29 projects from one end wall 12 of the cylinder and has secured thereto a lever 30 provided with a slot 31 into which fits a stud 32 secured to an arm 33 pivotally mounted on a pin 34 in the end wall of the cylinder. A hole 35 is provided in the arm 33 for a tommy bar or the like whereby leverage may be exerted on the arm 33, causing the stud 32 to bear against one wall of the slot 31 rocking the lever 30 and with it the clamp shaft 29. To lock the clamps in the open position, the lever 30 is provided with an arcuate recess 36 into which a roller 37 engages when the arm 33 has been swung in a counter clockwise direction, FIG. 10. The roller 37 is carried on a member 38 secured to the rocking shaft 4. As the rocking shaft 4 is spring loaded, it will lock the clamp shaft 29 in the open position for the clamps.

In the event of the machine minder failing to close the packing clamps 28 before starting the machine, a stud, not shown, may be provided on the side wall of the machine against which the arm 33 will engage as the cylinder rotates, rocking the arm about its pivot pin and swinging the lever 30 to rock the clamp shaft 29 thereby closing the packing clamps, and permitting the abutment unit to take up its normal position adjacent the cylinder nose.

As illustrated in FIGS. 8 and 9, lays (not shown) carried on a lay shaft 40*a*, co-operate with a lay board 39.

The lays remain at "register" position until the grippers have closed on the sheet and are thereafter moved to keep clear of the sheet as the sheet is drawn from the lay board.

A cam surface 41 is secured to the side wall of the machine adjacent the delivery point for the printed sheet. The cam surface 41 acts to open the grippers 9. The stud 26 projects inwardly through the end wall of the cylinder and has pivotally mounted thereon a bell crank lever 42. One arm 43 of this lever carries at its outer end a roller 48, the other arm 44 having an abutment pad 45 near its end. A block 46 houses one end of a compression spring 47 which bears at its other end against the arm 43 to rock it clockwise as viewed in FIG. 1. The arm 44 abuts against the block 46 and limits clockwise movement.

Because the roller 48 is normally projecting beyond the periphery of the cylinder it will engage the cam surface 41 and be forced inwardly, rocking the bell crank lever 42 against the action of the spring 47. At the same time the abutment pad 45 will bear against the curved lever 10 causing the gripper shaft 7 to rock and thereby opening the grippers so that the printed sheet can be removed by the known delivery mechanism.

In the operation of the grippers in gripping a sheet for printing as shown sequentially in FIGS. 3 to 6 it will be assumed that a printed sheet is about to be delivered, FIG. 3, and that rotation of the cylinder has brought the tumbler 22 with its inner slotted end almost into engagement with the opening pin 23. Continued rotation of the cylinder swings the tumbler with the rocking shaft as shown in FIG. 4 where the outer slotted end is about to engage the closing pin 24. It will be observed that in the two positions shown in FIGS. 3 and 4 the tumbler 22 has been swung through an angle of substantially 120°. This rotation will rotate the rocking shaft 4 and arms 5 whereby the gripping assembly will be swung from the sheet delivery position to a position ready to receive and grip a sheet. It will also be seen that in FIG. 3 the tumbler is pressed against the stop 26 by the action of the spring 20, indicated by the center line. As the

tumbler is rotated under the influence of the opening pin 23, the spring 20 will be compressed and "move over center" so that as the tumbler leaves the pin 23 it will be swung against the stop 25 to position it to receive the closing pin 24. In the position shown in FIG. 4 the grippers have been opened in preparation for the gripping of the sheet.

In FIG. 5 gripping of a sheet has been effected. In this position the grippers are locked against movement and are under the complete control of the slotted lever 10 and pin 13 (see FIG. 1). When the pin 24 is at the bottom of the slot in the tumbler 22 the axes of the pin 24, rocking shaft 4 and the abutment face are all in a radial plane passing through the center line or axis of the cylinder, this line also intersecting the plane of the sheet near the lay edge.

At this moment the abutment bar 8 is substantially stationary and the co-operation of the slotted lever 10 and pin 13, as shown in FIG. 1, has completed the closing of the grippers 9, which are also stationary, that is, there is no appreciable relative longitudinal movement between the registered sheet on the lay board and the grippers and their abutments, so that correct registration is maintained.

The grippers and the tumbler are positively held in this position irrespective of the speed of the cylinder. This condition is substantially maintained during a few degrees of movement of the cylinder, as shown in FIG. 7, in which A represents the axis of the cylinder, and B the point at which the plane of the sheet intersects the center of the control pin 24. F is the center of the abutment face and remains practically stationary at point B during the movement of the rocking shaft center from C to E. The grippers close during period C to D, while the lays are lifted at a point between D and E, D being on a radial line from A to B.

On continued rotation of the cylinder the sheet is drawn smoothly from the lay board at gradually increasing speed to the cylinder nose as shown in FIG. 6.

The pins 23, 24 and the lay bar 40*a* may be so connected to the main bearings of the cylinder that they rise and fall therewith, as shown in FIGS. 8 and 9. Stirrup blocks 50 are secured to these bearings at each side of the cylinder, and these blocks carry the pins 23, 24 and the lay bar 40*a* in their appropriate positions. A cross-shaft 49 supports the lay edge of the hinged feed-board in known manner. When the cylinder is raised or "tripped" so as to clear the form, the registering elements will be maintained in their correct relative positions so that register is not affected.

FIGS. 11 to 18 show an alternative construction of the invention in which a tumbler 60, mounted on a rocking shaft 61 protruding through both end walls 62 of the cylinder, is provided with a roller 63 for engaging a cam track 64 as hereinafter described.

As in the previous example opening and closing pins, respectively 65, 66 are secured to the side frame 67 of the machine.

Secured to the rocking shaft 61 are arms 68 carrying at their outer ends an abutment bar 69. A gripper shaft 70 is carried in bearings in the arms 68 and secured to the gripper shaft 70 are a plurality of grippers 71. One of the grippers, adjacent an end wall of the cylinder is provided with an arm 72 on which is mounted a roller 73 for engaging a cam track 74, secured to the side of the machine frame. Abutment by the roller 73 on the cam track 74 rocks the gripper shaft 70 to release a printed sheet as hereinafter described.

Another gripper, at the end of the gripper shaft remote from the gripper carrying the roller 73, has secured to or integrally formed therewith a slotted lever 75 which is adapted to be engaged by a stud 76 during part of a printing cycle. The stud 76 is secured to an end wall of the cylinder.

Both the gripper shaft 70 and rocking shaft 61 are spring loaded. The gripper shaft 70 has an encircling spring 78 tensioned to rock the gripper shaft 70 to urge the grippers against the abutment bar 69, and the rocking shaft 61 has an encircling spring 79, anchored at one end to a bearing lug 80 through which the rocking shaft passes, tensioned to rock the rocking shaft to urge the arms 68, and hence the abutment bar 69 adjacent to the cylinder nose against a suitable stop 91.

As shown in FIGS. 16 and 17, unlocking means for the packing clamps 81 comprise a bell crank lever secured to the packing clamp shaft 82, one end 83 of the bell crank lever acting as a manually operated lever for rocking the packing clamp shaft, the other arm 84 of the bell crank lever having an arcuate recess 85 near its end for the reception, when the packing clamps are in the opened position, of a stud 86 on a member 87 secured to the end of the rocking shaft 61 projecting beyond the cylinder wall.

As the rocking shaft 61 is spring urged in a clockwise direction, FIG. 17, engagement of the stud 86 in the arcuate recess 85 will lock the packing clamps in the open position.

To avoid possible damage to the machine by accidental operation when the packing clamps are open, an abutment 88, secured to the side frame of the machine is positioned in the path of the arm 83 when in the "clamps open" position, and continued rotation of the cylinder once the arm 83 has struck the abutment 88 will force the arm towards the cylinder surface, unlatching the stud 86 from the arcuate recess 85 and thereby automatically closing the packing clamps, and the rocking shaft under the influence of its spring will re-asume its normal position.

The stop 91 on the cylinder end wall prevents the tumbler swinging or vibrating when the pin 65 is entering the tumbler and during a printing operation.

The sequence of events during a printing cycle closely follows that of the previous example. The action of the stud 76 in relation to the opening of the grippers at different stages of cylinder revolution being shown, it will be understood that a very similar action takes place in the example previously described with reference to the slotted lever 10 and pin 13, although their relative positions are not shown in FIGS. 3 to 6.

Referring to FIGS. 11 to 14, which show details of a printing cycle. In FIG. 11 the tumbler 60 is in contact with both opening and closing pins 65, 66, leaving pin 65 and just entering pin 66. Transference from one pin to the other is effected smoothly.

It will be appreciated that, in the previous example, the pins 23, 24 and the tumbler 22 and spring 20 may also be so positioned and proportioned that the transfer of the tumbler from one pin to the next may be effected as just described.

The grippers have been opened by the stud 76 entering fully the slot in the slotted lever 75.

The tumbler and its associated mechanism will be carried round with the cylinder for a few more degrees until the slotted outer end of the tumbler fully engages the closing pin 66, as shown in FIG. 12. At the point shown in FIG. 12 relative motion is taking place between the tumbler and the cylinder, rocking the rocking shaft 61 in a direction opposite to that of the cylinder, thereby ensuring that the grippers and abutment bar are substantially stationary during the time the grippers close on the sheet. A sheet 90 is shown in FIG. 12 just after gripping by the grippers. The stud 76 is still controlling the slotted lever 75 preventing thereby any vibration of the grippers as they close onto the sheet.

Continued rotation of the cylinder will cause the tumbler 60 to continue to rotate under the influence of the closing pin 66, the rocking movement swinging the tumbler round until the roller 63 engages the cam track 64. At the point where the cam track is left by the roller, the rocking shaft 61 has rotated the gripper as-

semblage, namely grippers and abutment bar, so that they nestle adjacent the cylinder nose. As shown in FIG. 13, the sheet 90 is being drawn from the lay board or transfer machine smoothly by the grippers which are now held closed by the spring 78.

Between the positions shown in FIGS. 12 and 13, the grippers will commence to move from their stationary position and will accelerate until they are nestled adjacent the cylinder nose when they will be moving with the cylinder at cylinder speed.

During the printing period the tumbler will abut against the stop 91.

In FIG. 14 the sheet delivery position is shown. The tumbler is steadied by the opening pin 65 and the gripper shaft 70 is rocked by the roller 73 riding under the cam track 74 opening the grippers so that the printed sheet can be removed from the cylinder.

The slotted lever 75 is not in engagement with the stud 76 and the gripper shaft 70 is free to rock under the cam action of the cam track 74.

It will be appreciated that as the printed sheet is peeled from the cylinder while the latter rotates, so the tumbler is swung about the rocking shaft 61 by the opening pin 65, into the position shown in FIG. 11 in preparation for another sheet gripping operation.

Instead of the roller 63 on the tumbler 60 engaging the cam track 64, the tumbler may be provided with a cam track for engaging a roller mounted on the side frame of the machine.

As shown in FIG. 18, the gripper unit shaft 61 may be rocked by means of a secondary shaft 61*a* on the end of which is mounted the tumbler 60 carrying the roller 63. Levers 92 on the shaft 61 are connected by links 93 and pins 94, 95 to the upper limb of the tumbler 60. The opening and closing pins 65, 66 are suitably positioned to effect co-operation with the upper and lower slots of the tumbler 60 as previously described, and resultant rocking of the secondary shaft 61*a* will produce like rocking of the gripper unit to effect gripping and transport of the sheet. The roller 63 and cam 64 will complete the rocking movement of the gripper unit as already described.

In the appended claims the expression "sheet handling machine" is used as meaning a machine for handling sheets of paper or other material which are fed to it and includes any printing or other sheet handling machine (such as die-cutting, bronzing, folding, or like machines whether for paper or metal sheets), which include a cylinder which may be a printing cylinder or a transfer cylinder provided with a gripper device for gripping the paper.

What I claim is:

1. A sheet handling machine having a lay board to which sheets are delivered individually and successively, comprising in combination, a rotatably driven, hollow cylinder formed with a longitudinally extending opening, a rockable first shaft extending longitudinally of the cylinder internally thereof and projecting outwardly at at least one end of the cylinder, a second shaft carried by the first shaft, grippers on said second shaft, abutment means adapted to coact with said grippers for transferring a sheet from the lay board to the cylinder and fixed relative to said first shaft to form together with said second shaft and said grippers a rockable unit, control member means mounted on the first rockable shaft externally of the cylinder, first and second fixed pins adapted to co-operate successively during rotation of the cylinder with said control member means to effect rocking movement of said rockable unit from a first position in which the abutment means are disposed within the cylinder to a second position angularly spaced from the first position in which the abutment means project through said longitudinally extending opening in the cylinder and substantially coincide with the plane of a sheet on the lay board, means operable to effect opening of the grippers at said first position, and means operable to effect closure of the grippers at said second position, whereby at said second position of the rockable unit, the abutment means, the axis of the second pin co-operating with the control member means and the axis of the first shaft are disposed substantially in a radial plane relative to the axis of the cylinder thereby to preclude any substantial relative movement between a sheet registered and aligned on the abutment means irrespective of the rotational speed of the cylinder.

2. A sheet handling machine according to claim 1, in which the control member means are adapted so to coact with the second fixed pin that over a few degrees of rotation of the cylinder subsequent to said second position of the rockable unit, the abutment means at locations thereof engaged by the grippers remain substantially stationary.

3. A sheet handling machine according to claim 1, in whch the axis of the second pin is disposed in a radial plane of the cylinder approximately corresponding to a radial plane of the cylinder in which the leading edge of an individual sheet is disposed when in registered position on the lay board.

4. A sheet handling machine according to claim 1, in which the means operable to effect closure of the grippers at said second position of the rockable unit comprise a lever member mounted near an end of said second shaft and formed with a curved slot and a complementary pin mounted on an end of the cylinder and adapted to engage within said slot so that, during rocking of the rockable unit to the second position thereof, co-operation between said slot of the lever member and said complementary pin effects closure of the grippers.

5. A sheet handling machine having a lay board to which sheets are delivered individually and successively, comprising in combination, a rotatably driven, hollow cylinder formed with a longitudinally extending opening, a rockable first shaft extending longitudinally of the cylinder internally thereof and projecting outwardly at at least one end of the cylinder, a second shaft carried on the first shaft, grippers on said second shaft, abutment means adapted to coact with said grippers for transferring a sheet from the lay board to the cylinder and fixed relative to said first shaft to form together with said second shaft and said grippers a rockable unit, control member means comprising a lever arm formed with slots extending inwardly from respective opposite ends thereof and rotatably mounted on said first shaft externally of the cylinder, first and second fixed pins mutually spaced angularly relative to the axis of the cylinder and adapted to co-operate successively, during rotation of the cylinder, with respective slots of said lever arm to effect rocking movement of said rockable unit from a first position in which the abutment means are disposed within the cylinder to a second position in which the abutment means project through said longitudinally extending opening in the cylinder and substantially coincide with the plane of a sheet on the lay board, and means operable to effect opening of the grippers at said first position of the rockable unit, there being further provided a lever member mounted near an end of said second shaft and formed with a curved slot and complementary pin mounted on an end of the cylinder and adapted to engage within said slot so that, during rocking of the rockable unit to the second position thereof, co-operation between said slot of the lever member and said complementary pin effects closure of the grippers, the arrangement being such that, at said second position of the rockable unit, the abutment means, the axis of the second pin co-operating with the control members means and the axis of the first shaft are disposed substantially in a radia plane relative to the axis of the cylinder thereby to preclude any substantial relative movement between a sheet registered and aligned on

the abutment means irrespective of the rotational speed of the cylinder.

6. A sheet handling machine according to claim 5, in which the means operable to effect opening of the grippers at said first position of the rockable unit comprise a cam surface provided externally of the cylinder, a bell crank lever pivotally mounted on the cylinder, a cam follower mounted on one end of the bell crank lever and spring means biasing the cam follower in a sense away from the axis of the cylinder, whereby during engagement of said follower with said cam surface, the bell crank lever is rocked and the end thereof remote from said follower engages said lever member mounted on the second shaft

to effect rotation of the second shaft in a sense so as to open the grippers.

7. A sheet handling machine according to claim 5, further including packing clamps, a clamp shaft mounting the clamps and means to close the clamps when the cylinder starts angular rotation.

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