

May 15, 1945.

I. A. HUNTING

2,376,255

PRINTING PRESS

Original Filed Sept. 16, 1939 7 Sheets-Sheet 1

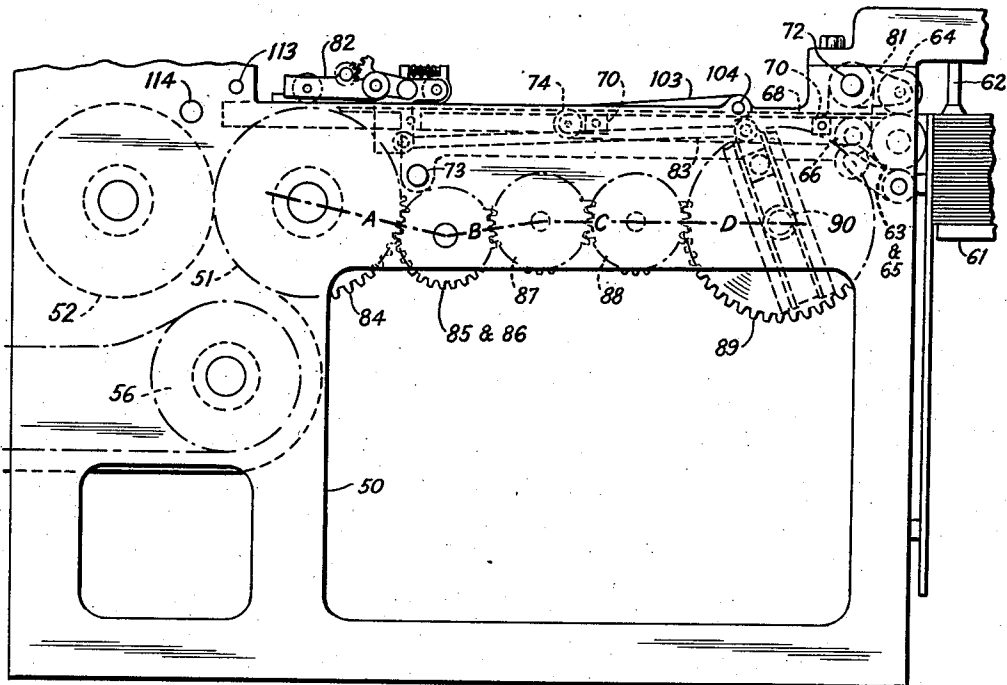


Fig. 1

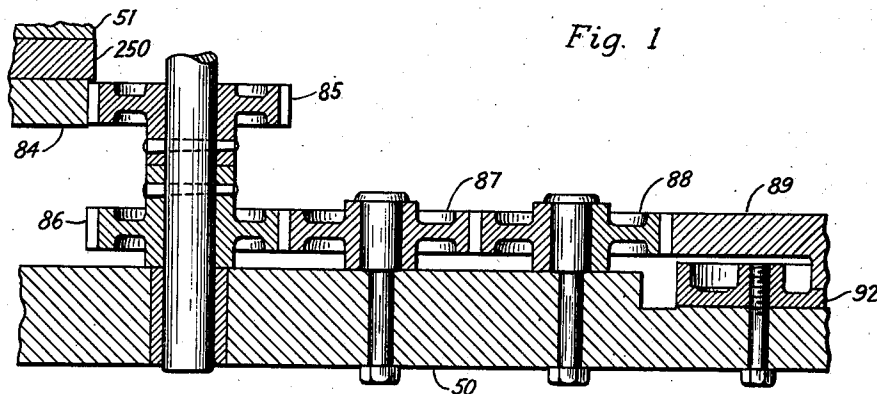


Fig. 2

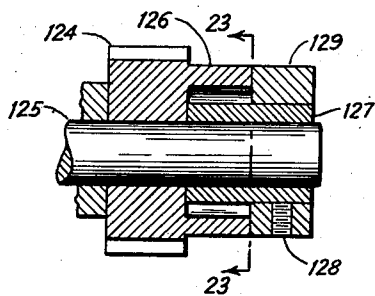


Fig. 22

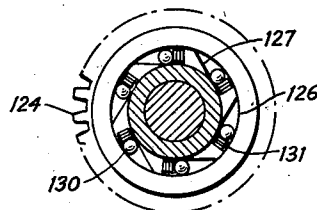


Fig. 23

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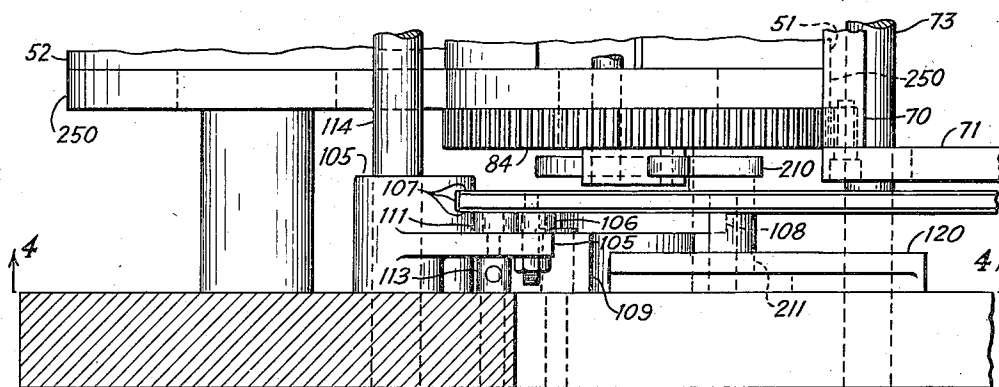


Fig. 3

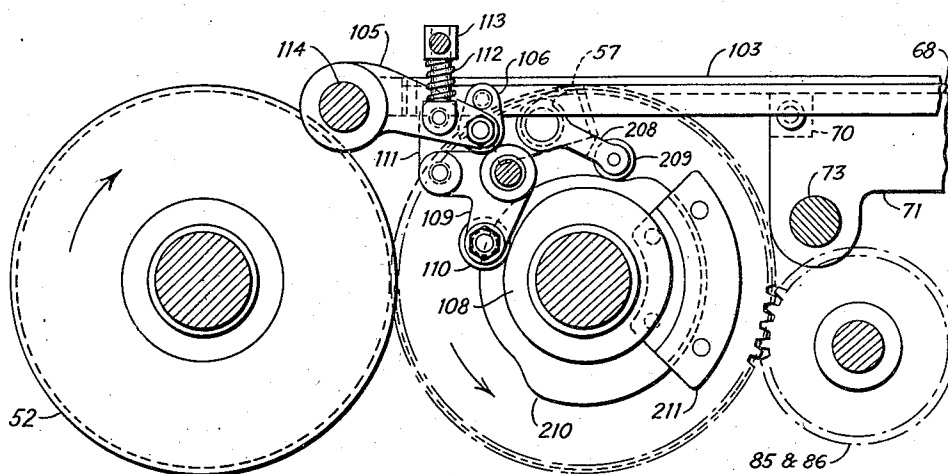


Fig. 4

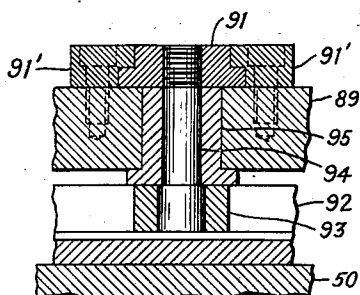


Fig. 7

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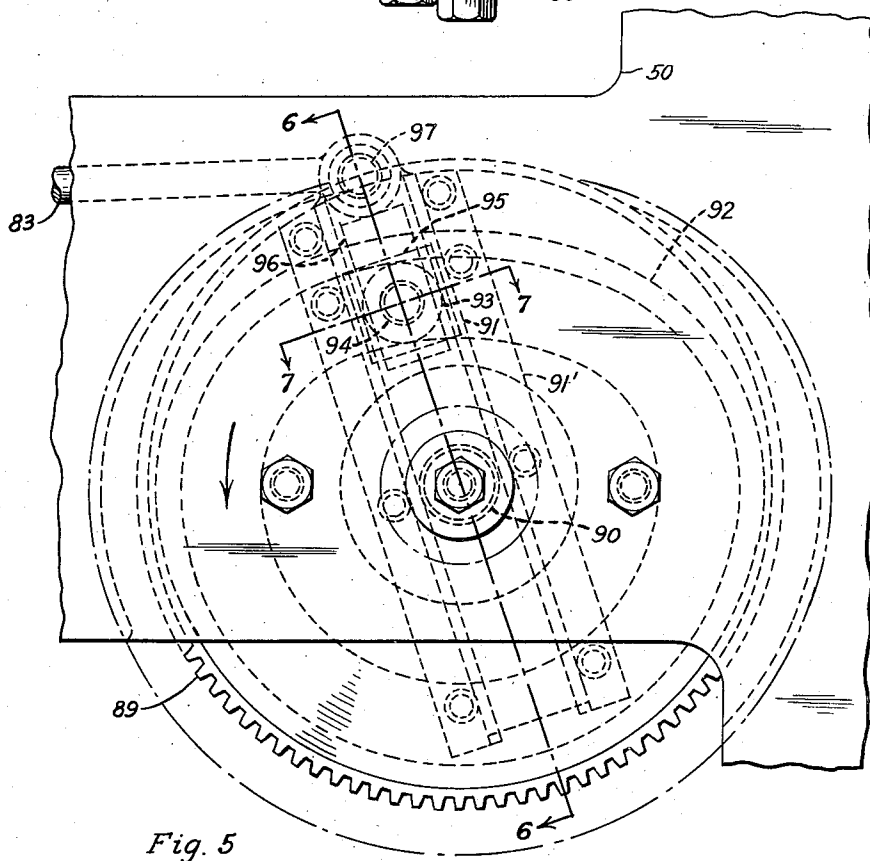
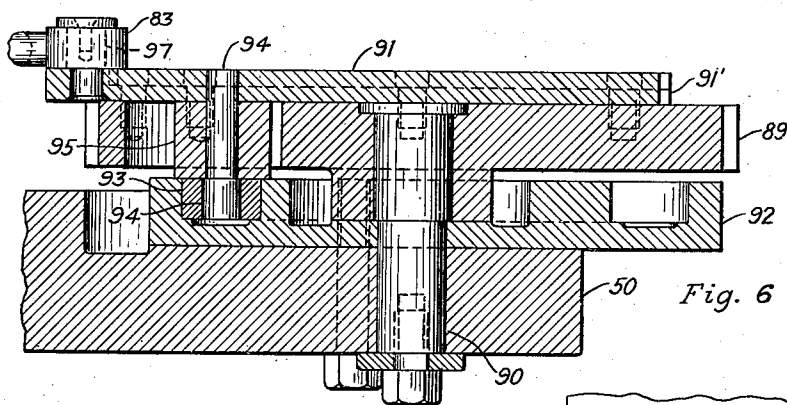
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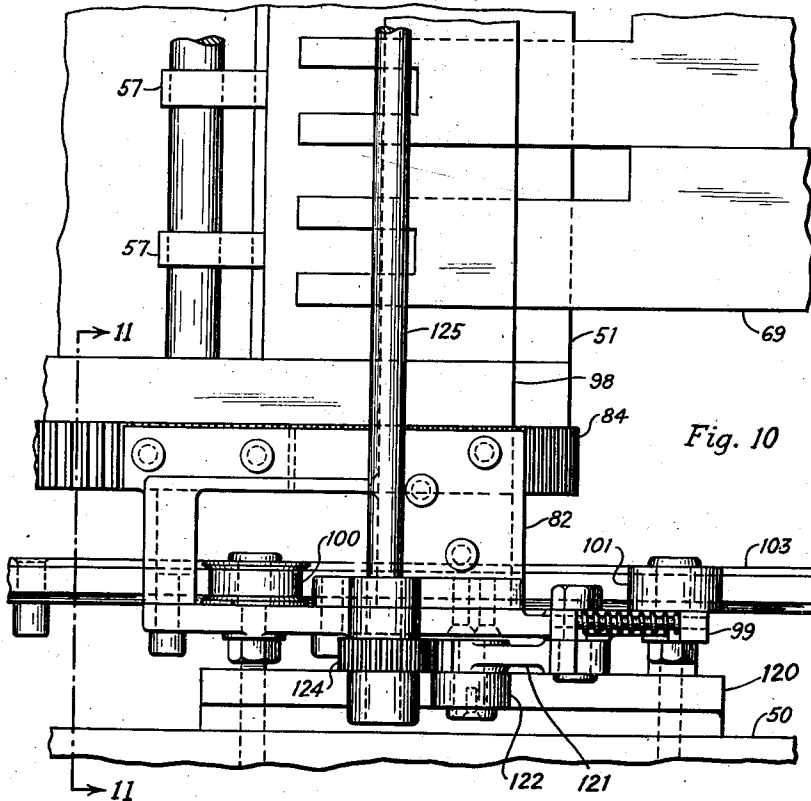


Fig. 10

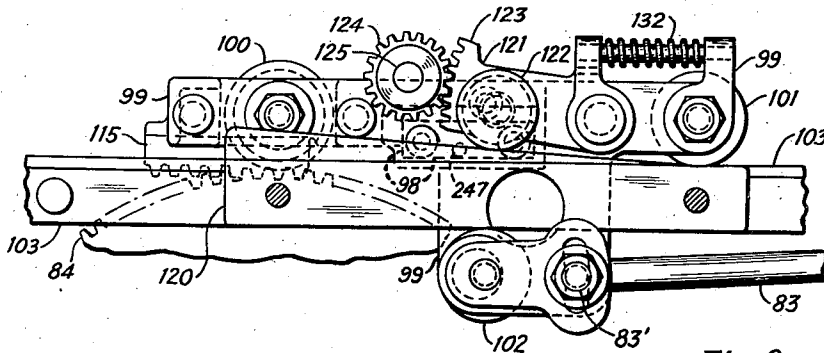


Fig. 9

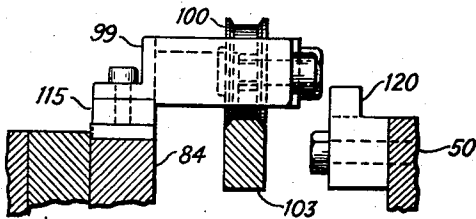


Fig. 11

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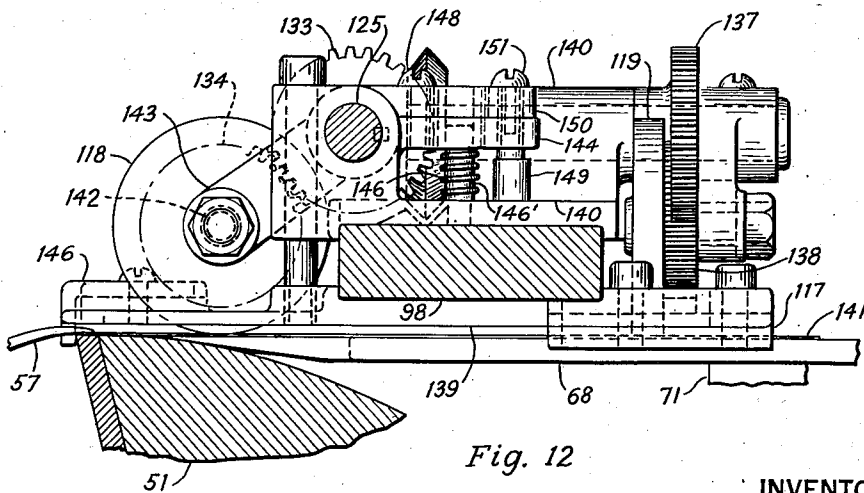
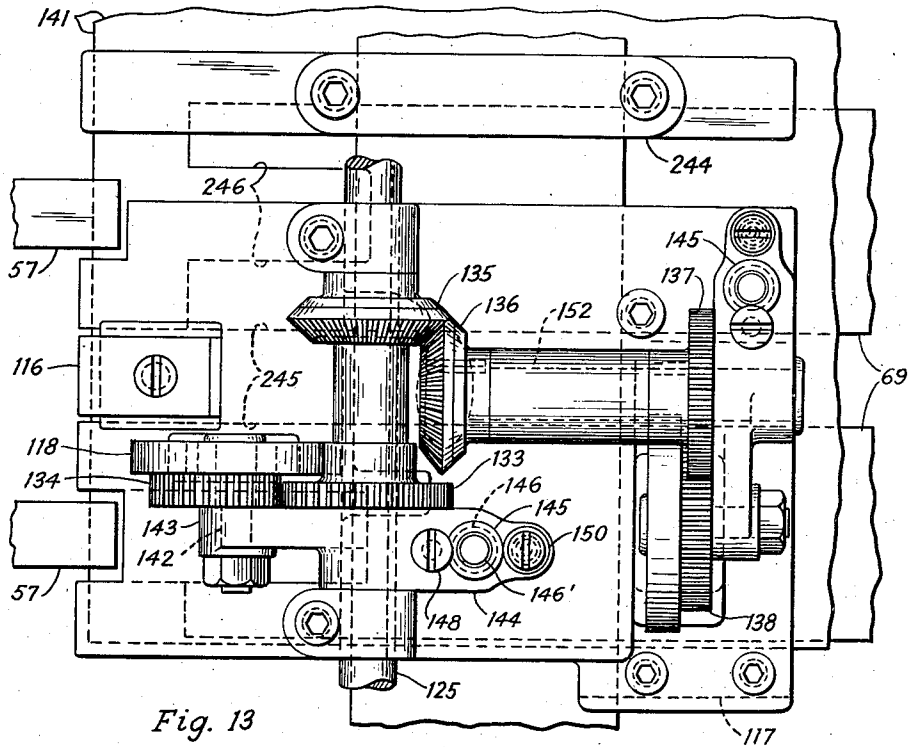
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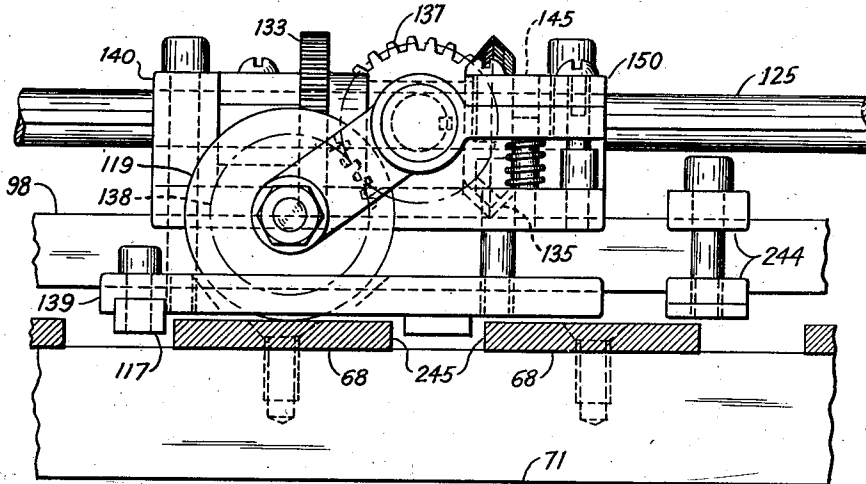


Fig 14

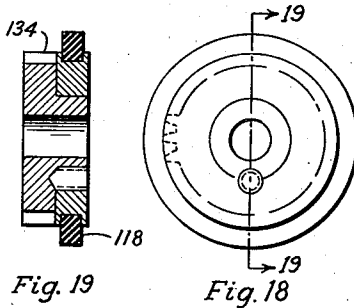


Fig. 19

Fig. 18

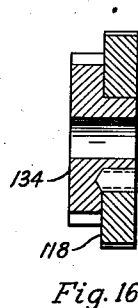


Fig. 16

Fig. 15

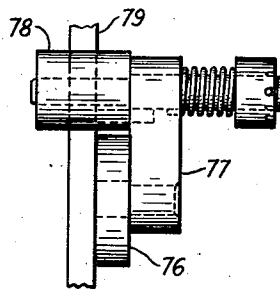


Fig. 21

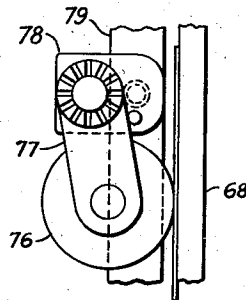


Fig. 20

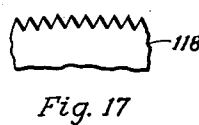


Fig. 17

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UNITED STATES PATENT OFFICE

2,376,255

PRINTING PRESS

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nois

Original application September 16, 1939, Serial
No. 295,197. Divided and this application Janu-
ary 8, 1941, Serial No. 373,522

17 Claims. (Cl. 271—58)

This application is a division of my applica-
tion, Serial No. 295,197, filed September 16, 1939,
which has matured into Patent No. 2,356,058.

This invention relates primarily to sheet-fed
printing presses but may be used for other op-
erations on flexible sheets of material.

The main object of this invention is to pro-
vide a feeding and registering mechanism that
can take sheets to a cylinder without stopping
them and can register them as they are moving
toward the cylinder.

Another object is to feed the sheets toward the
impression cylinder of an offset press in a uni-
form manner so that the absence or misplace-
ment of a sheet may be detected before it should
reach the cylinder to allow time for a better
impression tripping arrangement as shown in
my application, Serial No. 295,197.

It is common practice to stop the sheet against
standing front guides to register it, and then
take the standing sheet by the moving cylinder.

In this invention an ordinary suction feeder
may take the sheet from a supply pile and feed
it into feed rollers running at cylinder surface
speed, from which the sheet is forwarded over
a smooth table toward the impression cylinder.
As the sheets will not advance in exact register,
they are timed to come a little too late to reach
the cylinder in register, and then in the last
part of their straight travel they are pushed for-
ward a little faster till they reach register stops
attached to a reciprocating carriage running at
cylinder surface speed. This carriage also has a
side register stop, past which the sheet is fed
and then pushed over sidewise against the stop before
being taken by the cylinder.

The carriage that carries the front and side
registers is driven by a modified crank and con-
nection at either end. These drive the carriage
forward at the speed of the cylinder, while the
sheet is being registered and transferred to the
impression cylinder.

This carriage also supports friction elements,
which, with the carriage, are lowered on to the
sheet as it is being advanced at cylinder speed.
These friction elements have a supplemental mo-
tion to push the sheet over the table against the
register stops.

I have shown my invention in the accompany-
ing drawings in which:

Figure 1 is a side view of two cylinders of a
sheet-fed printing press with my feeding and
registering arrangement.

Figure 2 is an enlarged section on A—B—C—D

of Figure 1 through the gears driving the feed
carriage crank.

Figure 3 is an enlarged plan view of part of
Figure 1 at the front side and the cylinder end
with part of the frame in section.

Figure 4 is a section on line 4—4 of Figure 3
looking in the direction of the arrows.

Figure 5 is an enlarged side view showing the
arrangement for operating the feed carriage.

Figure 6 is a section on line 6—6 of Figure 5
looking in the direction of the arrows.

Figure 7 is a section on line 7—7 of Figure 5
looking in the direction of the arrows.

Figure 8 is a top view of the feed table and
associated parts.

Figure 9 is a side view of the feed carriage from
inside the frame with the carriage in position
for the cylinder to take a sheet.

Figure 10 is a top view of the front end of the
feed carriage.

Figure 11 is a section on line 11—11 of Fig-
ure 10.

Figure 12 is a side view of the front sheet
register.

Figure 13 is a top view of the front sheet
register shown in Figure 12.

Figure 14 is a rear view of the front sheet
register shown in Figures 12 and 13 with part of
the table shown in section.

Figure 15 is a side view of one form of a fric-
tion element.

Figure 16 is a section on line 16—16 of Figure
15 looking in the direction of the arrows.

Figure 17 is an enlarged view of part of Fig-
ure 16.

Figure 18 is a side view of an alternate form
of a friction element.

Figure 19 is a section on line 19—19 of Figure
18 looking in the direction of the arrows.

Figure 20 is a side view of a wheel for holding
a sheet against a feed tape.

Figure 21 is a top view of Figure 20.

Figure 22 is a horizontal section of the register
driving gear and clutch.

Figure 23 is a section on line 23—23 of Figure
22 looking in the direction of the arrows.

The front frame 50, with a similar rear frame,
supports the cylinders and the sheet-feeding
and registering parts of a sheet-fed printing
press. The impression cylinder 51 takes and
supports the sheets to be printed by the printing
cylinder 52. In a direct printing press this cyl-
inder would be the plate or form cylinder. In an
offset press this would be the blanket cylinder
which receives a print from a plate cylinder and

reprints or offsets it to the paper carried by the impression. The delivery 56 takes away the printed sheets.

The sheets are taken from the pile 61 by the commonly-used sucker 62, or any other convenient method, and carried to the feed roller 63 under friction rolls 64. This roller is driven at cylinder speed by gear 65 and intermediate gear 66. The usual tapes 67 pass around this feed roller and over the feed table 68 which may be composed of flat bars of steel 69 resting on bars 70 extending between inside frames 71. These frames are carried on still shafts 72 and 73. Pulleys 74 held in brackets 75 attached to a bar 70 reach up through the table 68, receive the tapes, and return them under the table to roller 63. To keep the sheets moving at cylinder speed, small spring-pressed friction rolls 76 held by arms 77 and brackets 78 are used (see Figure 20). These may be placed where desired on rods 79. These rods are held above the table over the sheet path by brackets 80 on rod 72. This rod also carries arms 81 for holding the friction rolls 64.

Thus the sheet is kept moving at cylinder speed till it approaches the cylinder; then the sheet is moved along the table by friction elements held on a reciprocating carriage. These friction elements rest on the sheet while the carriage is moving at cylinder speed and slide the sheet over the table to bring it to the cylinder in registered position.

This carriage 82 is reciprocated by connecting rods 83, one at either end of the carriage, operated from crank pins that have crank arms of varying length to drive the carriage at the uniform cylinder speed while the friction elements have control of the sheet.

The impression cylinder 51 has gears 84 at either end, and these, through the intermediate gears 85, 86, 87, and 88, drive gears 89 at cylinder speed. These gears 89 (see Figures 5, 6, and 7) run on studs 90 and carry slides 91 in guides 91', and these slides carry crank pins 97 to operate connecting rods 83 and reciprocate the carriage by studs 83'. The position of this slide on either end determines the length of the crank arm, and it is controlled by the fixed cam 92, in which cam roll 93 runs. This roll is carried on stud 94 extending from the slide 91 through block 95, which slides in slot 96 in gear 89. This cam is so formed that when the cam roll 93 and crank pin 97 are passing the vertical center line of gear 89, the crank arm is equal to the radius of the impression cylinder, and the crank pin 97 and the carriage 82 are moving at cylinder speed. At either side of this vertical line the crank arm is lengthened just fast enough to keep the carriage moving at the uniform cylinder speed, while the friction elements are controlling the sheet. Then the crank arm is so controlled that the carriage is smoothly stopped, returned, and brought forward to cylinder speed again.

As to the register carriage 82, see Figures 9 and 10. This is composed of a pair of ends connected by a bar 98, the front end 99 being shown. Each end carries three wheels, 100, 101, and 102, the first two running on top of a track 103 and the last one running under the track to hold the carriage on the track. Wheel 100 is flanged to fit the beveled upper edges of the track 103 for guiding the carriage sidewise. These tracks are fulcrumed at the rear end on studs 104 held in the frames. The front ends of these tracks are held by a pair of levers 105 (see Figures 3 and 4) and links 106 and are guided sidewise in slots 107

in the hubs of these levers. These levers are fixed to shaft 114. The height of the tracks is controlled by cam 108 and lever 109, with roll 110, and by link 111 connected to lever 105. The roll is held to the cam by spring 112 and poppet 113 in the frame. Parts 108, 109, 110, 111, 112 and 113 are not used on the rear side.

The carriage also carries a pair of short toothed racks 115, which, while carried forward at cylinder speed, run into mesh with the gears 84 on the impression cylinder and hold the carriage in exact register with the cylinder while the sheet is being taken by the cylinder grippers. Then the cam 108 raises the tracks till the racks clear the cylinder gears. Then the carriage is reversed and returns clear of the sheet.

On the carriage bar 98 are carried a pair of registers, the front one being shown in Figures 12, 13, and 14. The rear register is the opposite hand to this and is not shown. These are each provided with front and side register stops 116 and 117 and friction elements 118 and 119 for pushing the sheet against the register stops. The register stops project downward through two of a number of openings 245 in the table 68 when the carriage is down for registering a sheet. The openings used depend on the width of the sheet to be printed. Openings 246 are to clear the cylinder grippers.

The friction elements are shown here as wheels which are set to rest lightly on the sheets, and they are partly rotated to bring the sheets against the register stops. Then, still turning, they slip on the sheet till they are raised as the sheet is taken by the cylinder grippers.

To get this rotation there is a cam 120 (see Figures 9, 10, and 11) fixed to the frame, and a lever 121 on the carriage with a roll 122 which runs up on the cam while the friction elements are resting on a sheet to carry it against the register stops. The lever 121 has a gear segment 123 meshing with a gear 124 attached by an overrunning clutch to shaft 125, which extends across the carriage through each register.

The overrunning clutch is shown in Figures 22 and 23, where 126 is a sleeve extending from the gear 124. A ratchet 127 is attached to the shaft by set screw 128 through collar 129. Each cut in the ratchet carries a small roller 130, which is slightly crowded between the sleeve and the ratchet by spring 131. This is a flat spring, somewhat curved, so that the ends press against a ratchet tooth and the middle, against the roller. This clutch turns shaft 125 anticlockwise when roll 122 runs up on cam 120, but lets the shaft stand idle as spring 132 forces lever 121 and roll 122 to follow down the cam till stopped against pin 247 as the carriage returns. This allows the wear on the friction element to be distributed around the wheel instead of being repeated in one spot.

Figures 15 to 19 show alternate forms of the friction elements. In the first the friction surface is composed of fine sharp teeth formed on the metal surface of a wheel, while in the other the friction surface is a ring of rubber or of a similar material. If the driving mechanism were changed, the friction elements might be more like the rubber end on a lead pencil, which can illustrate the pushing of a sheet of paper over a smooth table by a friction element.

When shaft 125 is turned anti-clockwise, friction element 118 is turned clockwise by gear 133 keyed to the shaft and meshing with gear 134, which is combined with the friction element 118.

In like manner, motion is conveyed to friction element 119 through bevel gears 135 and 136 and spur gears 137 and 138. Plate 139 is clamped under bar 98 by screws from a body 140, which carries part of the mechanism. This plate allows a clearance over the table for a sheet of paper. The friction elements extend through openings in the plate to rest on the sheet of paper, a portion of which is shown as 141 registered against the front and side register stops, which are fastened to plate 139.

Friction element 118 and gear 134 run on stud 142 in lever 143, which is free on shaft 125. This lever has an extension 144 which holds a hollow screw 145 for regulating the pressure of a spring 146. This is guided by a pin 146' extending between the screw and body 140 to give the proper pressure of the friction element on the paper. This hollow screw is held from turning by tightening down screw 148. A stud 149 extends up from body 140 through 144 and carries a nut 150 to limit the swing of lever 143 when the friction element is not resting on a sheet of paper. Screw 151 can hold this nut from turning. The side register friction element 119 and associated parts are like those just described. The spindle 152 running in body 140 carries the gears 136 and 137.

It will be noted that each register is provided with a side register stop and friction element. Only one side register can be used at a time. The stop not used can be removed and the corresponding friction element lifted clear of the sheet by turning down nut 150.

Figures 13 and 14 show a guide 244 for holding the sheet from buckling between the registers. As many of them may be used as are needed.

The sheet to be printed is so fed that it can be registered against the side register stop 117 close to the edge of one of the openings 245 in the table as is shown in Figure 14. The form to be printed is located to correspond with the edge of the sheet.

The grippers 57 are shown in Figure 4 as just closed on a sheet. The gripper shaft is operated by lever 208 with roll 209 running over fixed cam 210.

Having described my invention what I claim is:

1. In a sheet-fed printing press, an impression cylinder for taking sheets to be printed, a table over which sheets may be fed to the cylinder, a feeder for starting sheets from a source and means for forwarding the sheets at essentially cylinder surface speed toward the impression cylinder, a carriage reciprocating over the table, a part of the forward motion of which is at essentially uniform cylinder surface speed, register stops attached to the carriage and extending through openings in the table during the uniform motion of the carriage, and friction elements mounted on the carriage, and having a motion supplemental to the carriage for pushing the sheets against the register stops before the cylinder takes the sheets.

2. In a sheet-fed printing press, an impression cylinder for taking sheets to be printed, a smooth fixed table over which the sheets are fed to the impression cylinder, being pushed the last part of the way by friction elements resting on the sheet as it is supported by the table, register stops moving at essentially cylinder surface speed during a part of their forward motion and, during this uniform motion, extending through openings

in the table but being raised above the table while being stopped and returned.

3. In a sheet-feeding and registering mechanism, a sheet-taking cylinder, a sheet support, a reciprocating carriage running over the sheet support, register stops fixed to the carriage, and friction elements carried by the carriage but having a supplemental motion for pushing the sheets against the stops, said friction elements resting on the sheets while they are being registered and then being raised clear of the sheet while being stopped and returned.

4. In a sheet-feed printing press, an impression cylinder for taking sheets to be printed, a table to support sheets as they are being forwarded toward the impression cylinder, and a carriage reciprocating over the table and carrying register stops and friction elements for pushing the sheets against the register stops, said carriage running on tracks fixed at one end, and the other end automatically lowered to act on the incoming sheets and then raised to clear the sheets and the table.

5. In a sheet-feeding arrangement, a sheet-taking cylinder, a source of sheets to be fed, feed rolls running at essentially cylinder surface speed, means for taking sheets from the source to the feed rolls, a table over which the sheets pass from the feed rolls to the cylinder, a carriage reciprocating over the table, the motion of which is at essentially uniform cylinder surface speed for a part of its forward travel, register stops attached to the carriage and extending through openings in the table during the uniform forward motion of the carriage, friction elements mounted on the carriage, and having a motion supplemental to the carriage for pushing the sheets against the register stops.

6. In a sheet-feeding and registering mechanism, a sheet-taking cylinder, a feeder for starting sheets from a source of supply, means for forwarding the sheets toward the cylinder at essentially cylinder surface speed, means, including friction elements carried at cylinder speed, but having a supplemental motion for registering the sheets against moving stops before being taken by the cylinder.

7. In a sheet-fed printing press, an impression cylinder for taking sheets to be printed, a table over which sheets are fed to the impression cylinder, register stops moving at essentially cylinder surface speed during a part of their forward motion, and friction elements, which, while resting on a moving sheet supported by the table, push it against the register stops before it is taken by the cylinder.

8. In a running feed for feeding sheets of material to a running cylinder, a table over which the sheets are fed at essentially cylinder surface speed, moving register stops, and moving friction elements that have a supplemental motion to push the sheets against the register stops before the sheets are taken by the cylinder.

9. In a sheet-fed printing press, an impression cylinder, a feeding mechanism for taking a sheet from a source to the impression cylinder without stopping it, and means, including friction elements carried at cylinder surface speed, but having a supplemental motion for registering the sheet to moving stops before it reaches the impression cylinder.

10. In a sheet-fed printing press, a feeder for feeding sheets, feed rollers, and tapes for forwarding the sheets at essentially cylinder surface speed, a reciprocating carriage with sheet register

stops and friction elements with a supplemental motion for pushing the sheets forward and against the stops, and an impression cylinder for taking the sheets in registered position.

11. In a sheet-feeding and registering mechanism, a sheet-taking cylinder, a reciprocating carriage, registering stops fixed to the carriage, means for pushing a moving sheet against the stops, and toothed racks fixed to the carriage, which racks mesh with gear teeth on the cylinder to hold the carriage in exact register with the cylinder while a sheet is being taken by the cylinder.

12. In a device for registering a sheet while it is approaching a sheet-taking cylinder, a reciprocating carriage moving over a sheet support, sheet registering stops on the carriage, and friction elements carried by the carriage but having a supplemental motion for pushing the sheet over the sheet support and against the stops.

13. In a sheet-fed printing press, an impression cylinder for taking sheets to be printed, a smooth fixed table over which sheets are fed to the cylinder, means for forwarding the sheets at essentially cylinder surface speed toward the impression cylinder, a carriage reciprocating over the table, a part of the forward motion of which is at essentially cylinder surface speed, front and side register stops attached to the carriage and extending through openings in the table during the uniform motion of the carriage, friction elements for pushing the sheets forward against the front register stops and a friction element for pushing the sheets sidewise against the side register stop.

14. In a sheet-fed printing press, an impression cylinder for taking sheets to be printed, a smooth

fixed table over which the sheets are fed to the impression cylinder, a carriage reciprocating over the table, a part of the forward motion of which is at essentially cylinder surface speed, front and side register stops attached to the carriage, friction elements mounted on the carriage for pushing the sheets forward against the front register stops, and a friction element for pushing sheets sidewise against the side register stop during the uniform motion of the carriage.

15. In a sheet-feeding and registering mechanism, a sheet-taking cylinder, a smooth fixed table over which to feed sheets to the cylinder, a carriage reciprocating over the table, a part of the forward motion of which is at essentially cylinder surface speed, front and side register stops attached to the carriage, friction elements for pushing the sheets forward against the front register stops, and a friction element for pushing the sheets sidewise against the side register stop.

16. In a sheet-feeding and registering mechanism, a table over which the sheets are fed, and a carriage reciprocating over the table for carrying the registering parts, the carriage being driven by cranks and connections, the arm length of the cranks being so modified that the carriage is given a uniform motion during a part of its forward travel.

17. In a sheet-feeding and registering mechanism, a smooth fixed table for supporting a moving sheet, friction elements carried on a reciprocating carriage and bearing on the sheet for a short time to move the sheet, as supported by the fixed table, forward and against moving register stops.

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