

June 10, 1941.

I. A. HUNTING

2,245,343

PRINTING PRESS

Filed Sept. 30, 1938

5 Sheets-Sheet 1

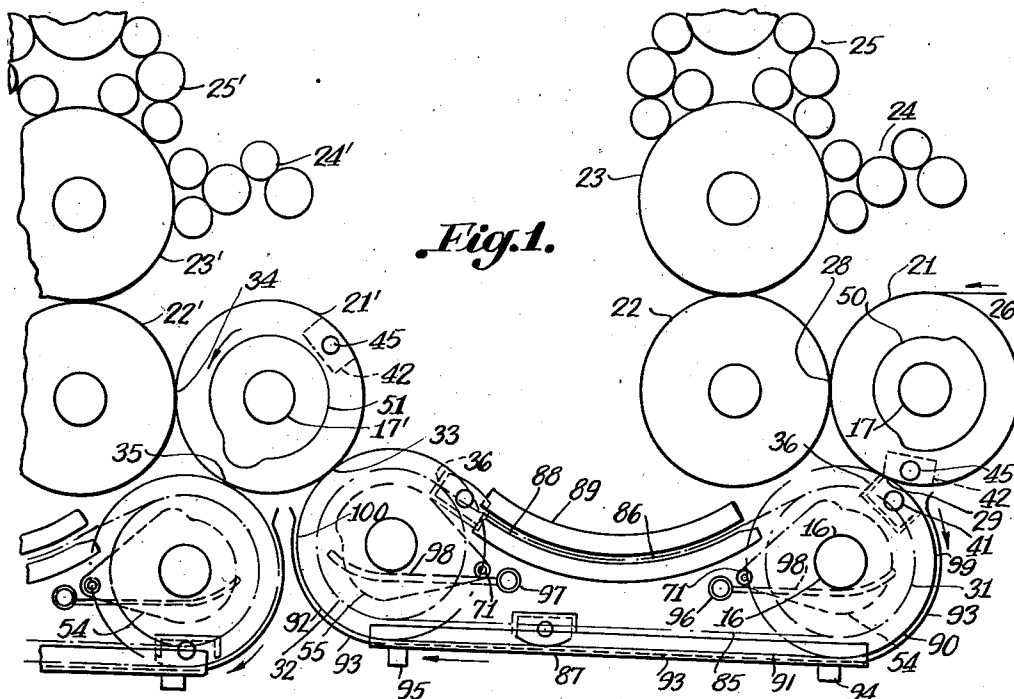


Fig. 2.

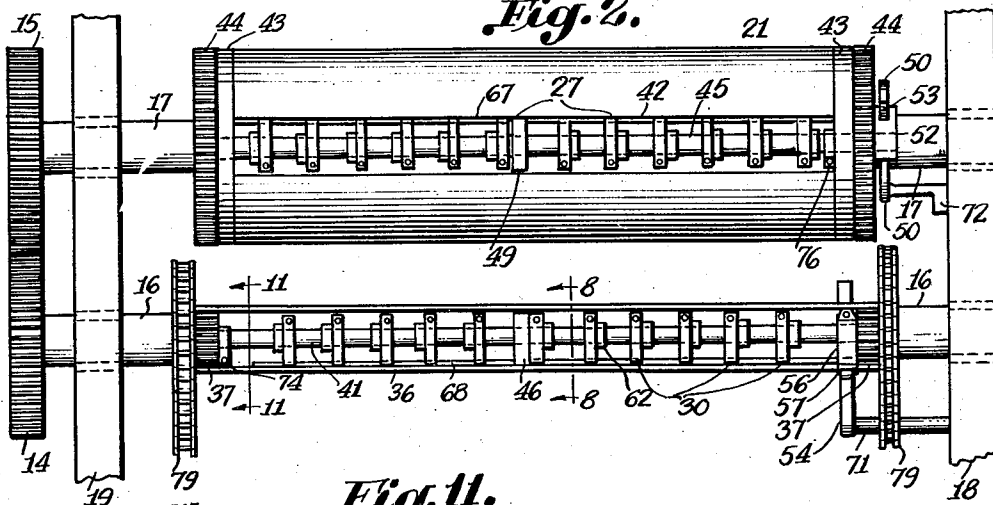
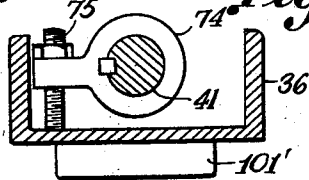


Fig. 11.



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June 10, 1941.

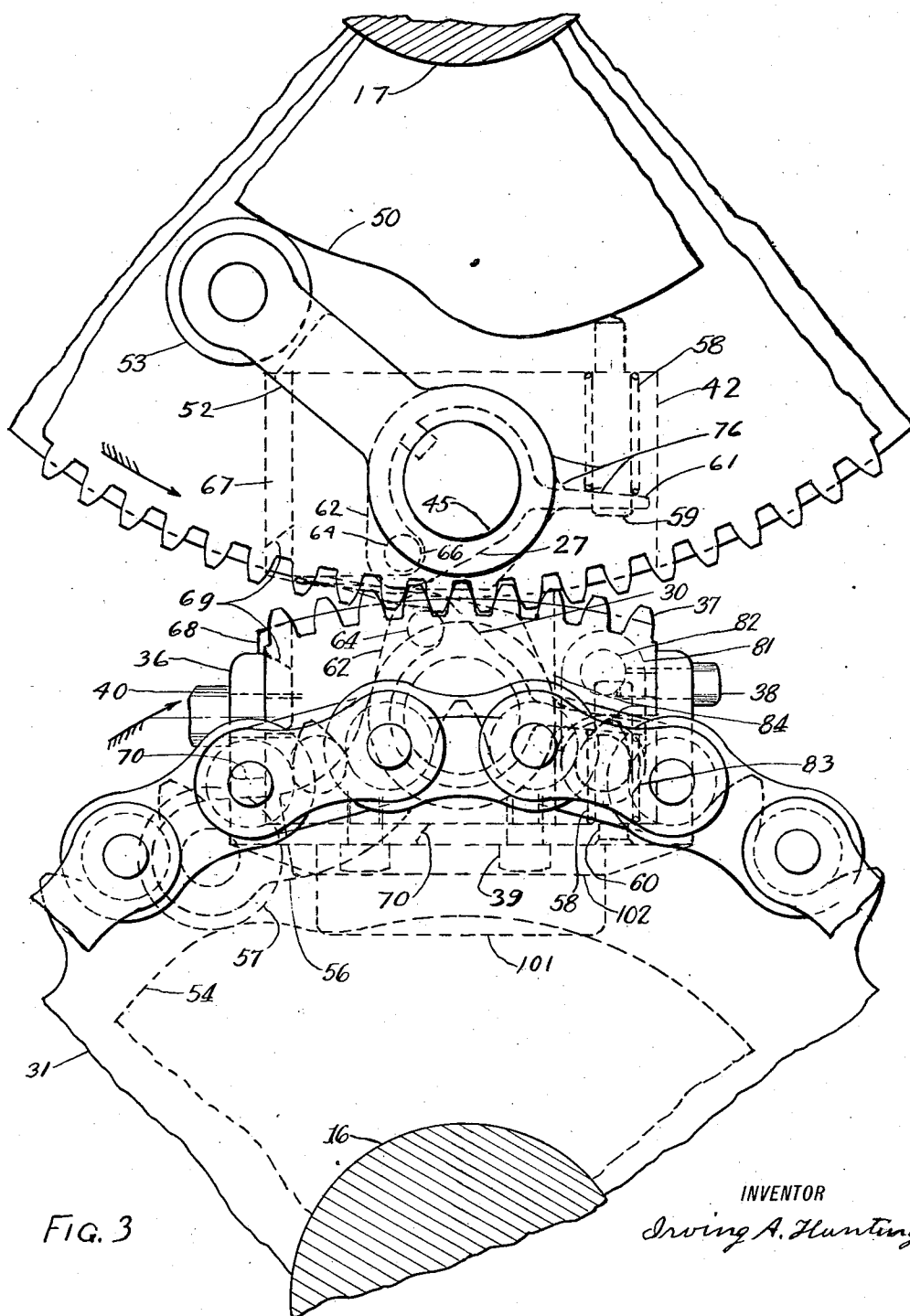
I. A. HUNTING

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5 Sheets-Sheet 2



June 10, 1941.

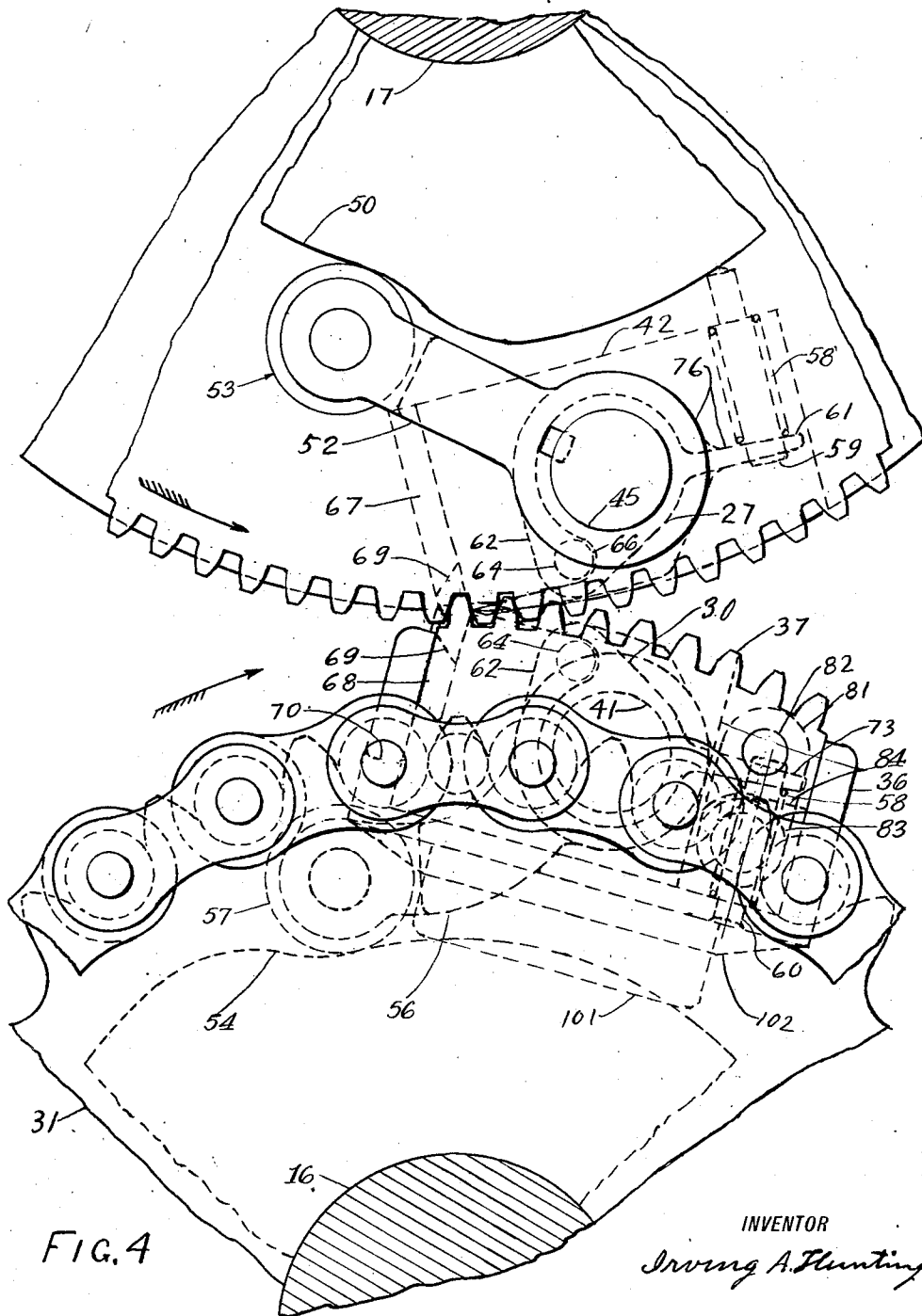
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5 Sheets-Sheet 3



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5 Sheets-Sheet 4

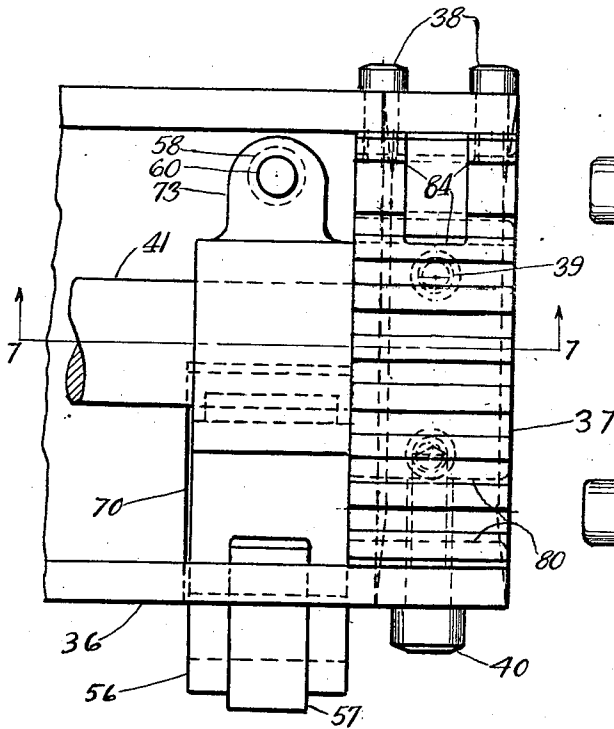


FIG. 6

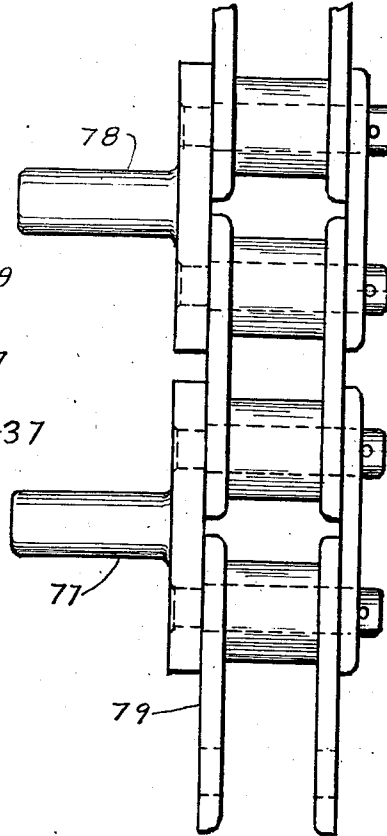


FIG. 5

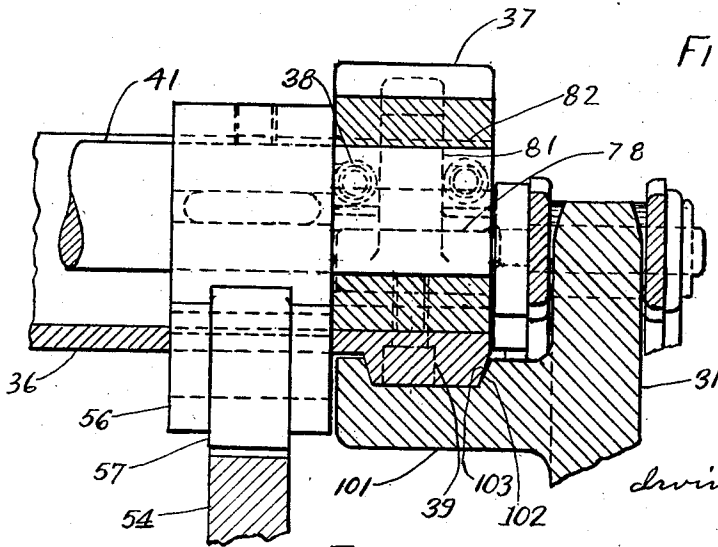


FIG. 7

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5 Sheets-Sheet 5

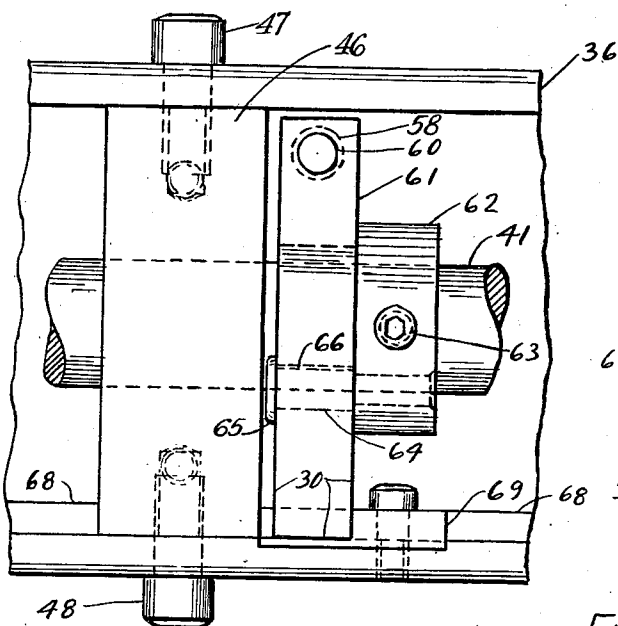


FIG. 9

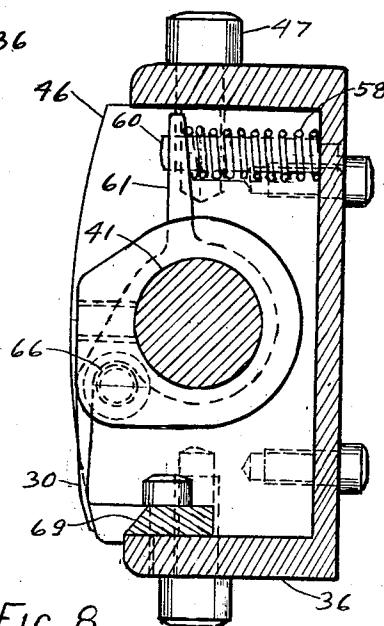


FIG. 8

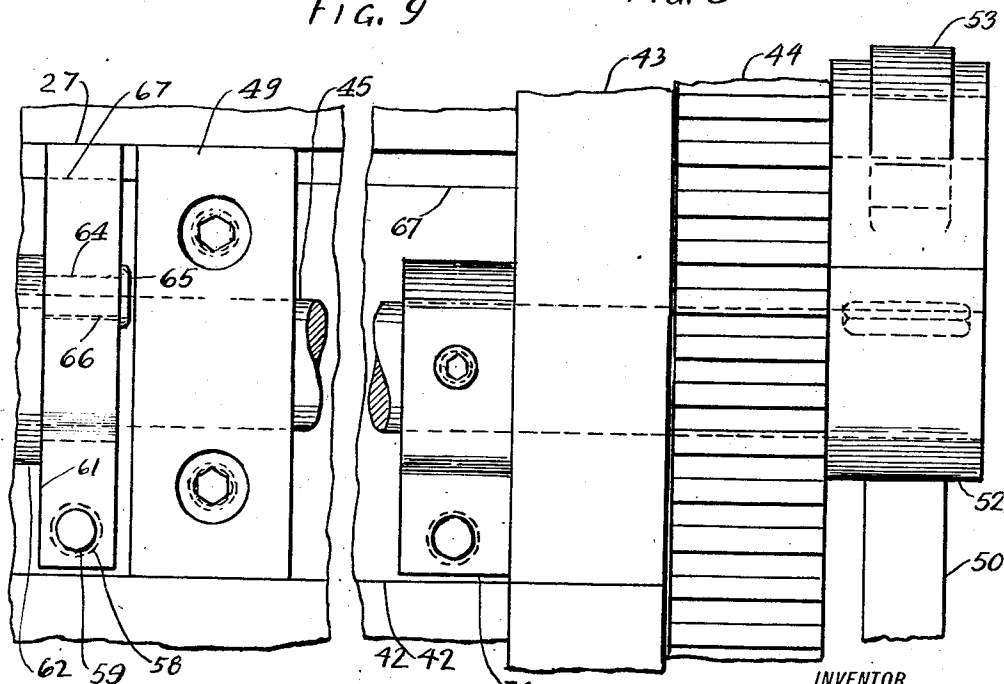


FIG. 10

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UNITED STATES PATENT OFFICE

2,245,343

PRINTING PRESS

Irving A. Hunting, South Plainfield, N. J.

Application September 30, 1938, Serial No. 232,596

21 Claims. (Cl. 101—136)

This invention relates primarily to sheet-fed printing presses in which two or more similar printing couples, or color units, are connected together to form a multicolor printing machine.

A main object of this invention is to provide an arrangement for transferring the partially printed sheets from one printing couple to the next without bringing the newly printed face of the sheet in contact with anything that can injure it.

Another object is to provide suitable space between units for convenience in operating, and yet not to transfer the sheet, or in other words to change from one holding device to another, more times than necessary.

Another object is to keep perfect register during each transfer.

A still further object of this invention is to dry the print as much as practicable after one application of ink before applying the next ink.

To obtain these and other valuable features, I use grippers in a plurality of channel-shaped bars extending across the machine, with either end carried on sprockets in such a way that the grippers in the bars take the sheet from the grippers of one impression cylinder and carry it to the grippers of the impression cylinder of the next printing unit.

Bars with grippers are in common use to take sheets, after being printed, from an impression cylinder to the delivery; but it is noticeable that sheets thus carried have not been kept in exact register on account of the chains having a certain amount of freedom. To avoid this I provide in each end of a gripper bar a gear segment, which is brought into exact meshing relation with a gear on either end of the impression cylinder before the sheet is transferred to or from the impression cylinder.

To obtain exact side register each gripper bar has on the under side at one end a wedge-shaped projection which fits into a recess in a lug on the side of the adjacent sprocket, shown here as integral with the sprocket. The above, with a plane contact at the other end of the bar, brings the two gear segments into close mesh with the gears on the cylinders before the sheet is changed from one holding device to another.

It will be seen that both in the impression cylinder and in the transfer gripper bar each gripper has its own spring for holding it in contact with the sheet. This avoids trouble in setting all the grippers in such a way as to have a uniform hold on the sheet.

It is general practice to hold the gripper bar

end on a single side link of the chain. I provide two pins, each being integral with a side link. These pins project into an end of the gripper bar, thus making a stronger and better support for the bar and one that is more easily assembled.

Although my invention may be applied to other forms of printing and to transferring a sheet for other operations, I have shown it as applied to a lithographic offset printing press. This application, with the details of construction, is here described and shown in the accompanying drawings in which:

Figure 1 is a diagrammatic elevation of the cylinders and the chain transfer of two units of a multicolor offset printing press.

Figure 2 is a side view of an impression cylinder and a transfer gripper bar with chains, sprockets, and shaft. The grippers in the cylinder and the bar are shown turned toward the observer.

Figure 3 is an end view of a gripper bar and of the grippers in the impression cylinder, showing the grippers in the bar open to take an approaching sheet from the grippers in the cylinder.

Figure 4 shows the same parts advanced till the bar grippers have closed on the sheet and the cylinder grippers are about to open.

Figure 5 is the top view of a portion of a chain showing the pins for supporting a bar.

Figure 6 is the top view of the front end of a gripper bar showing the gear segment and the cam roll lever.

Figure 7 is a section of a bar and sprocket on line 7—7 of Figure 6 looking in the direction of the arrows.

Figure 8 is a section of the gripper bar on line 8—8 in Figure 2 looking in the direction of the arrows, showing a gripper and a center bearer.

Figure 9 is a top view of the parts shown in Figure 8.

Figure 10 is a top view of two portions of the gripper shaft and the accompanying parts in the impression cylinder.

Figure 11 is a section of the gripper bar and shaft on line 11—11 of Figure 2 looking in the direction of the arrows, showing the gripper shaft stop.

In these drawings each reference character designates the same part wherever shown.

In Figure 1 are shown the essentials of two units of a multicolor offset press. 21 is the impression cylinder of the first unit or printing couple. The second impression cylinder is desig-

nated as 21'. The first blanket, or transfer cylinder, is 22, the plate cylinder 23, the water motion 24, and the ink motion 25. The paper is fed, without stopping, to the first impression cylinder at 26 from the sheet feeder, not shown. Here it is taken by the cylinder grippers 27 and carried past contact 28, where it receives its first print from the blanket on cylinder 22. Thence it proceeds to position 29, where it is transferred to the bar grippers 30, around sprockets 31 and 32, to position 33, where it is transferred to the grippers 27 in cylinder 21'. Thence the sheet passes to contact 34, where it receives its second print from the blanket on cylinder 22'. Thence it continues to position 35, where it is transferred to the bar grippers 30, to be carried in like manner in order to receive its third print, or if it is a two-color press, to be carried to the delivery.

This invention relates especially to the arrangement of the chain transfer from position 29 to position 33 for holding the bar, including the grippers, in exact register with the cylinder as the sheet is transferred to and from the bar. Also the grippers, both in the bar and in the cylinder, have a new and improved method of mounting and operating them.

The gripper bar 36 is channel shaped with two gear segments 37 fastened, one into either end, by the screws 38, 39, and 40 (see Figure 6) or by some other method, as by being welded in place. Each segment has a central hole in which a gripper shaft 41 is mounted, free to rock. The impression cylinder 21 has a longitudinal groove 42 and has bearers 43 and gears 44 at either end, and the bearers and one gear have holes for mounting the gripper shaft 45.

Lugs 101 and 101' on the inside of the sprockets support the gripper bars 36 to bring the gear segments into close mesh with the cylinder gears 44 before and during each transfer of the sheet. This, with a wedge-shaped projection 102 on the under side of the bar at one end, fitting into a recess 103 in the corresponding lug 101, keeps the bar in exact register in both directions as the transfer is made. This lug is shown integral with the sprocket but may be made separate and fastened on in exact position if desired.

The gripper bar 36 has a center bearing 46 for the gripper shaft 41, and it is fastened in by screws 47 and 48. The impression cylinder gripper shaft has a corresponding center bearing 49, and this and the bearing 46 in the gripper bar are turned to the radius of the cylinder bearers and roll together before and as a transfer is being made to steady the bars.

The impression cylinder gripper shaft is operated from fixed cams 50 for the first unit and from 51 for the following units through lever 52 and roll 53. The bar gripper shaft is operated from fixed cams 54 and 55 through lever 56 and roll 57.

The grippers 27 and 30 are mounted free on gripper shafts 45 and 41 and are normally held closed by springs 58 guided by pins 59 and 60 and pressing upward against arm 61. Collar 62 is attached to the gripper shaft by set screw 63 and carries pin 64 with head 65 to hold the gripper in its side position. Collar 62 should be so set that there is a slight clearance at 66 (see Figures 8 and 9). Cylinder and bar grippers are alternated, and thrust strips 67 and 68 are cut away at 69 to clear the other grippers when they open or close. Operating lever 56 in the bar is located inside of gear segment 37 and extends through an opening 70 in bar 36. Cam 54 is

mounted free on sprocket shaft 68 and is kept from turning by stud 71 connected to the frame 18. Cam 50 extends around shaft 17 but is fixed to frame 18 as at 72. Lever 56 has an arm 73 for receiving a spring pressure for holding roll 57 against cam 54. Arm 74 (see Figures 1 and 11) has a stop screw 75 for preventing cam roll 57 from dropping when not on cam 54 or 55. Arm 76 takes a spring pressure to hold cam roll 53 against cam 50.

Pins 77 and 78, integral with two chain side links, support the gripper bar from chain 79. Pin 77 extends into hole 80 (see Figures 5 and 6) in gear segment 37 forming the end of bar 36. Pin 78 extends through the hub 83 of link 81, which is swung in recess 84 from pin 82 extending through the gear segment 37.

The impression cylinder shaft 17 and chain sprocket shaft 16 are connected by gears 15 and 14, forming a part of a driving system, other parts of which are not shown, as they form no part of this invention. The chain 79 follows lines 85 and 86 between sprockets 31 and 32 and is guided in the usual way by bars 87, 88, and 89. The front edge of the partly printed sheet when taken by the bar grippers is carried over the path 90, 91, and 92 to position 33, where it is transferred to the second impression cylinder grippers. To keep the body of the sheet in or near this path, a guard 93 is located slightly outside of this path and held by bars 94 and 95. This guard may be of sheet metal or of a number of bars. To keep the unprinted side of the sheet against the guard, a current of air from a fan or any convenient source of pressure is brought through pipes 96 and 97 and side tubes 98 against the printed side of the sheet at 99 and 100. This air serves another very useful purpose, that of helping to dry the fresh print before another application of ink is made.

From the foregoing description it will be seen that the sheet is carried from one printing to the next with only two transfers and these in exact register in both directions; that nothing but air touches the face of the sheet between printings; that there is the best possible chance to dry the ink between printings; and that there is ample room for working between units. The design can be varied without departing from the objectives of this invention.

Having described my invention, what I claim is:

1. In a multicolor unit-type sheet-fed offset printing press, a chain-carried gripper transfer from one unit to the next, consisting of a plurality of gripper bars, each with a gear segment at either end, which segment is brought into mesh with a gear or gear segment on the impression cylinder before the sheet is transferred from the cylinder to the bar or from the bar to another impression cylinder.

2. In a multicolor unit-type sheet-fed offset printing press, a chain-carried gripper bar for transferring a sheet from one printing unit to the next, consisting of a channel-shaped bar with ends carrying a gripper shaft with grippers to take and hold a sheet against thrust strips, said ends being gear segments which come into mesh with gears or gear segments on the ends of the sheet-carrying cylinder before transferring a sheet from the cylinder to the bar.

3. A sheet transfer mechanism registered to a sheet-carrying cylinder by gear segments meshing with gears or gear segments on the cylinder before and during the transferring of a sheet

to or from the cylinder while said mechanism is being carried by constantly moving chains around an axis parallel to the axis of the cylinder.

4. A sheet taking and carrying device consisting of a shaft supported at either end, a number of grippers free to rock on the shaft for closing on and holding a sheet, a compression spring for closing each gripper against a thrust member, a collar fixed on the shaft against one side of each gripper, a stud in each collar arranged to locate longitudinally its corresponding gripper and to open the gripper against the spring action when the shaft is rocked by a cam and follower.

5. In a unit-type machine for performing two or more operations upon sheets of material, a chain-carried gripper bar for taking a sheet of material from one unit to the next, said bar being registered to a sheet-taking device in either unit by gear teeth on the bar meshing with gear teeth on the taking device, as a sheet is being transferred to or from the gripper bar.

6. In a multicolor sheet-fed printing press composed of a plurality of similar units, a plurality of chain-carried gripper bars for transporting the sheets from one unit to the next, each bar being fastened at either end to a gear segment, which segment meshes, with a gear or gear segment on the sheet-carrying cylinder, as a sheet is being transferred to or from the bar.

7. In a sheet transfer mechanism for taking sheets from the grippers of one sheet-carrying cylinder to another, a gripper shaft carried in two gear segments, one attached to either end of a cross member, said gear segments being carried by endless chains and meshing with gears or gear segments on a sheet-carrying cylinder while said mechanism is passing the cylinder to take or leave a sheet.

8. In a multicolor printing machine composed of a plurality of similar printing units, each having an impression cylinder with sheet-carrying grippers, a mechanism for transferring a sheet from the impression cylinder of one printing unit to the impression cylinder of the next, the sheet, while being transferred having its back supported by a fixed guard, and, near either end of its travel, being pressed against said guard by having air blown against its face.

9. In a unit-type multicolor printing press, a mechanism for taking a sheet from grippers in one impression cylinder to grippers in the next said mechanism consisting of a chain carried gripper bar, the back of the sheet being supported by a fixed guard, and being pressed against said guard near either end of its travel by blowing air against the face of the sheet.

10. In a unit-type multicolor printing press, a sheet transfer from one unit to the next carried by endless chains passing around sprockets at either end of the travel of the sheet, a fixed guard for supporting the unprinted side of the sheet, and means for directing currents of air against the printed side of the sheet to hold it against the guard as it passes down from the first unit and up to the second unit.

11. In a unit-type multicolor printing press, a sheet transfer from one unit to the next carried by endless chains passing around sprockets at either end of the travel of the sheet, a fixed guard to support the unprinted side of the sheet which is being transferred, and means for directing currents of air against the printed side of the sheet for holding the body of the sheet near

the path of the leading edge of the sheet as it passes down from one unit and up to the next unit.

12. A sheet transfer mechanism for taking sheets from a sheet carrying cylinder, including a gripper shaft fulcrumed in two gear segments, which segments are being carried by chains passing around sprockets on a shaft geared to the cylinder while the gear segments are brought into and out of mesh with gear teeth on the cylinder.

13. In a sheet transfer mechanism for taking sheets from one sheet carrying cylinder to another, a gripper shaft fulcrumed in two gear segments one attached to either end of a cross member, said segments being carried by chains which bring them into and out of mesh with gear teeth on the cylinders as they pass.

14. A chain carried sheet transfer mechanism registered longitudinally to a chain sprocket as the chain is passing around the sprocket, and, while it is thus registered, being registered circumferentially to a sheet carrying cylinder by a gear segment on the mechanism coming into mesh with gear teeth on the cylinder, and while so registered, transferring a sheet to or from the cylinder.

15. In a sheet transfer mechanism, a sheet taking gripper bar carried by chains and registered longitudinally to a chain sprocket as it is being carried by the chains around the sprocket shaft and meanwhile being registered circumferentially to a sheet carrying cylinder by gear segments on the mechanism coming into mesh with gear teeth on the cylinder.

16. A sheet-carrying device in a cylinder having a cam-rocket shaft mounted at the ends to rock in a groove in the cylinder and carrying grippers for taking and holding a sheet, each gripper being free to rock on the shaft but being urged into closed, or sheet-holding, position by a spring, a member by each gripper fixed to the shaft and arranged to open the gripper when the shaft is rocked in one direction and to allow the gripper to be closed on the sheet when the shaft is rocked in the other direction.

17. A sheet transfer mechanism having a cross member with ends carrying a cam-rocked shaft on which are mounted grippers for taking and carrying the sheet, each gripper being free to rock on the shaft but being urged into closed, or sheet-holding, position by a spring, a member fixed to the shaft by each gripper and arranged to open the gripper when the shaft is rocked in one direction and to allow the gripper to be closed on the sheet when the shaft is rocked in the other direction.

18. In a sheet-carrying mechanism, a cam-rocked shaft on which are mounted grippers for carrying the sheet, each gripper being free to rock on the shaft but being urged into closed, or sheet-carrying, position by a spring, a member fixed to the shaft by each gripper and arranged to open the gripper when the shaft is rocked in one direction and to allow the gripper to be closed on the sheet when the shaft is rocked in the other direction.

19. In a multiple unit machine for printing on, or otherwise operating on, flexible sheets, a sheet transfer from one unit to the next carried by endless chains passing around sprockets, a fixed guard for supporting one side of the sheets while being transferred, and means for directing currents of air against the other side of the sheet to prevent it from falling away from the guard.

20. In a sheet transfer for taking sheets from a sheet-carrying cylinder, said transfer being carried by endless chains passing around sprockets, a fixed guard for supporting one side of the sheets while being transferred and means for directing currents of air against the other side of the sheet to prevent it from falling away from the guard.

21. A chain-carried transfer mechanism for

taking flexible sheets from one sheet-carrying member to another sheet-carrying member, consisting of a chain-carried gripper bar having gear teeth on each end, which teeth come into mesh with gear teeth on each end of a sheet-carrying member while a sheet is being transferred from one to the other.

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