June 14, 1938. F. S. THOMPSON 2,120,532

DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

Filed April 30, 1937 6 Sheets-Sheet 1

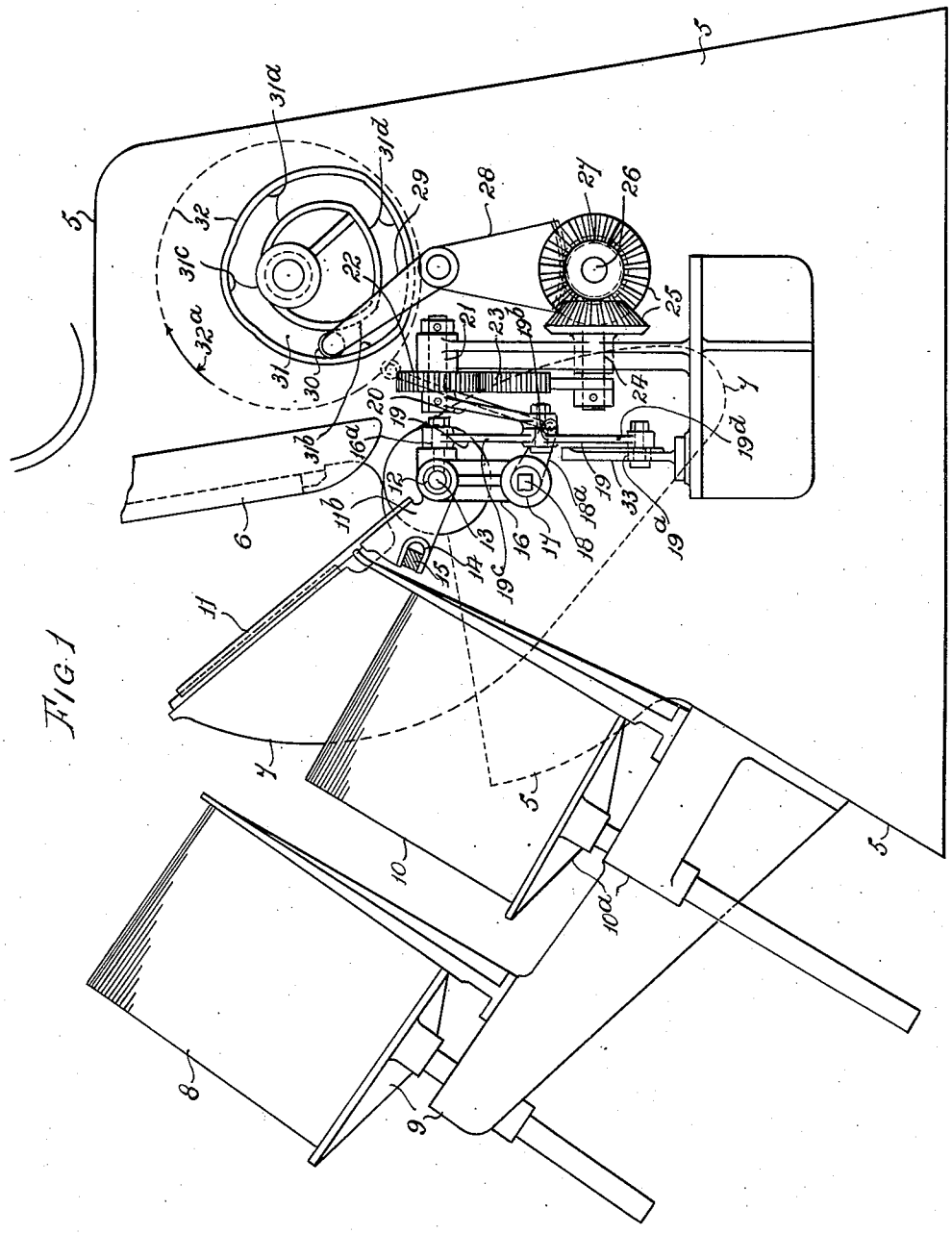


FIG. 1

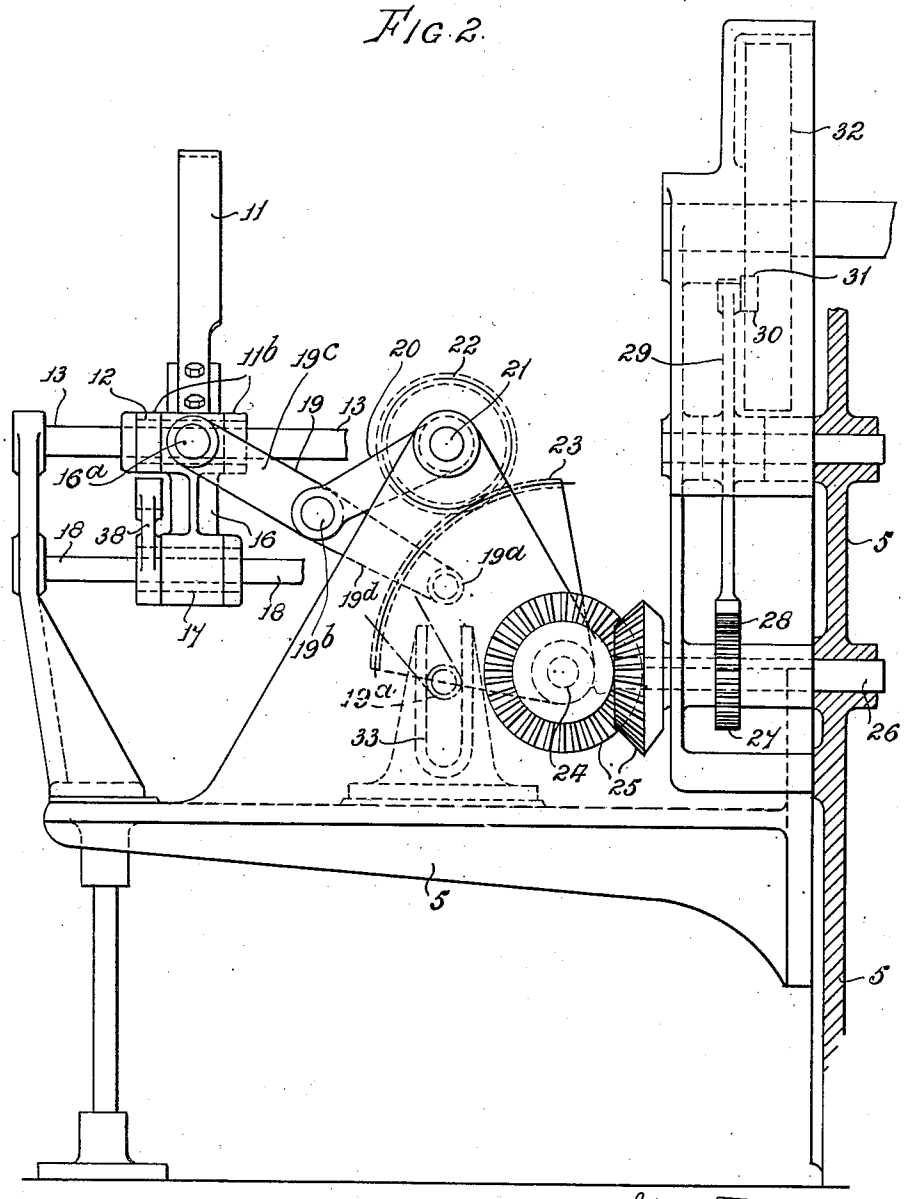
Inventor:
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DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

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FIG. 2.



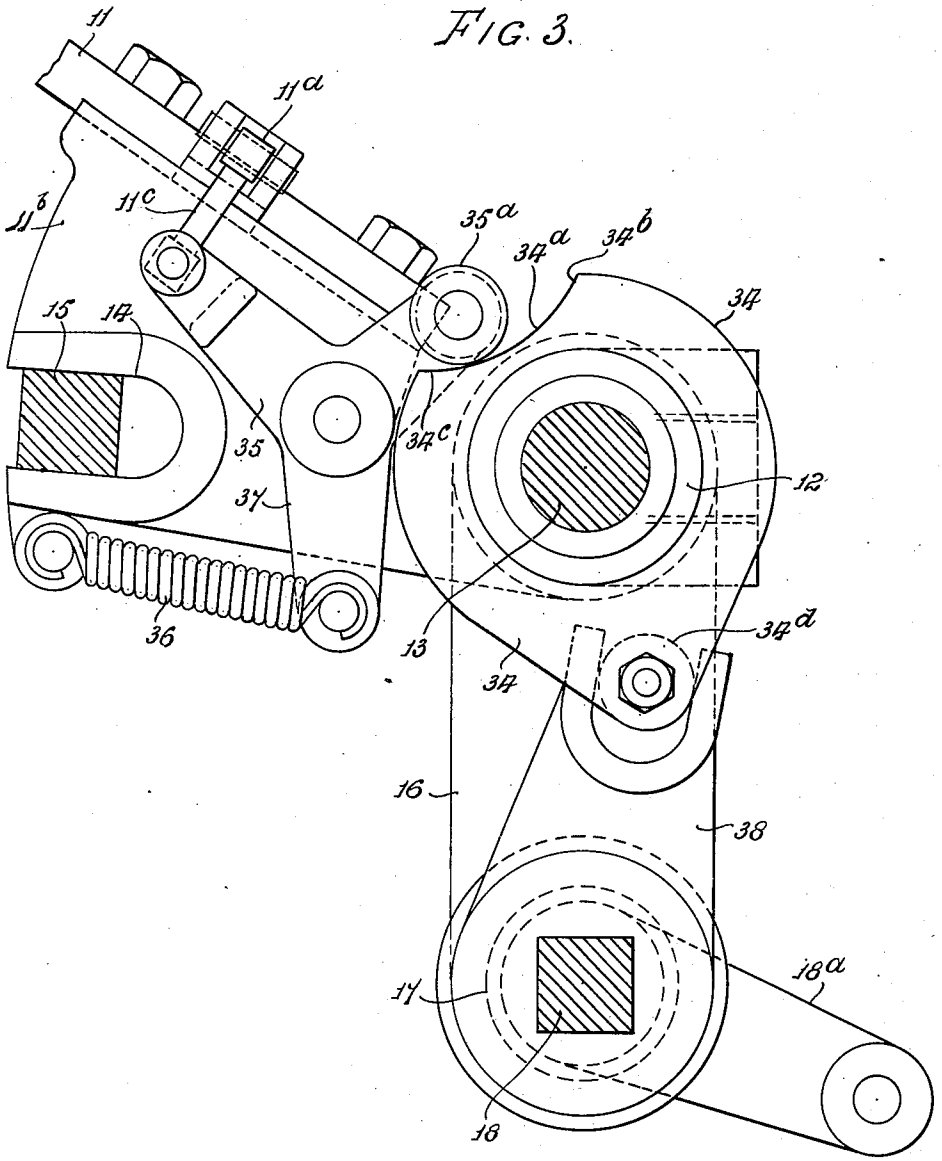

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DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

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FIG. 3.



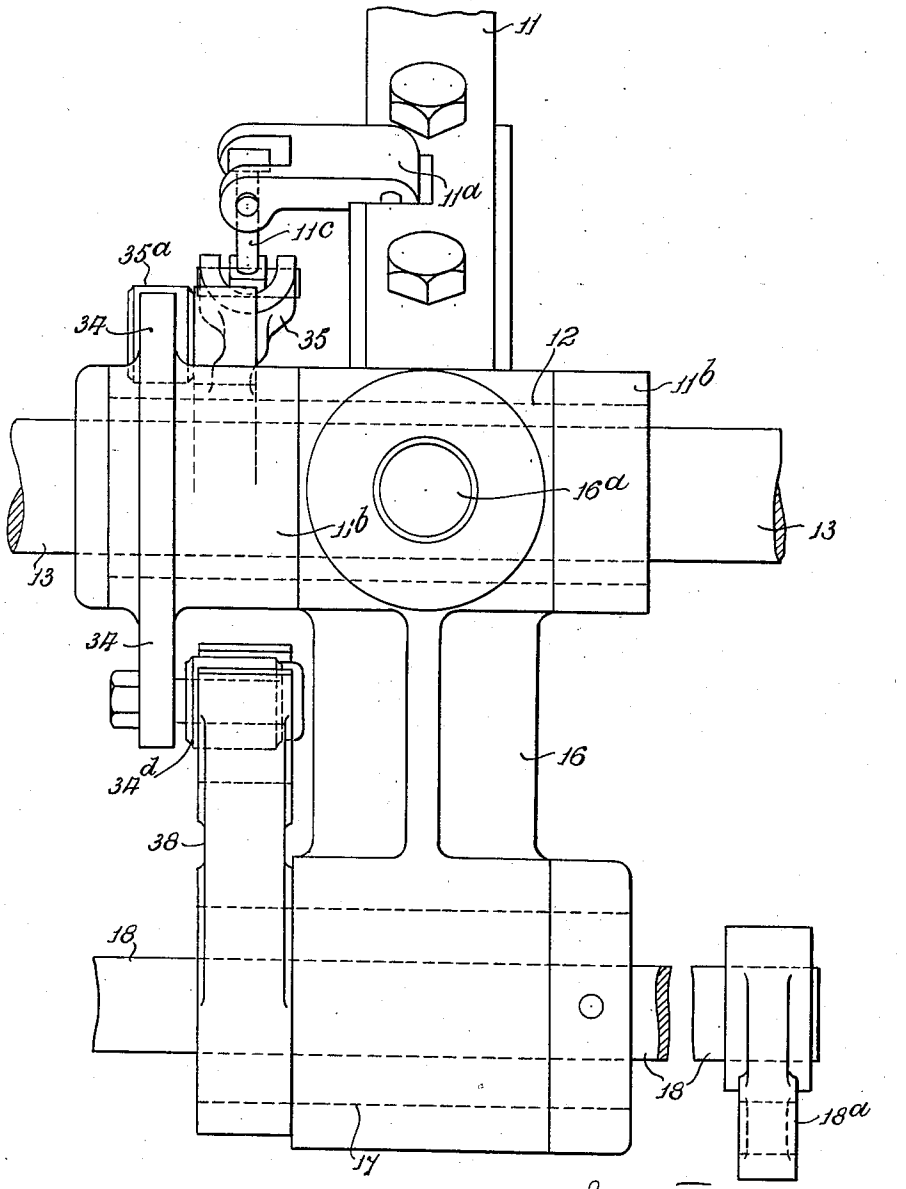

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DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

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FIG. 4



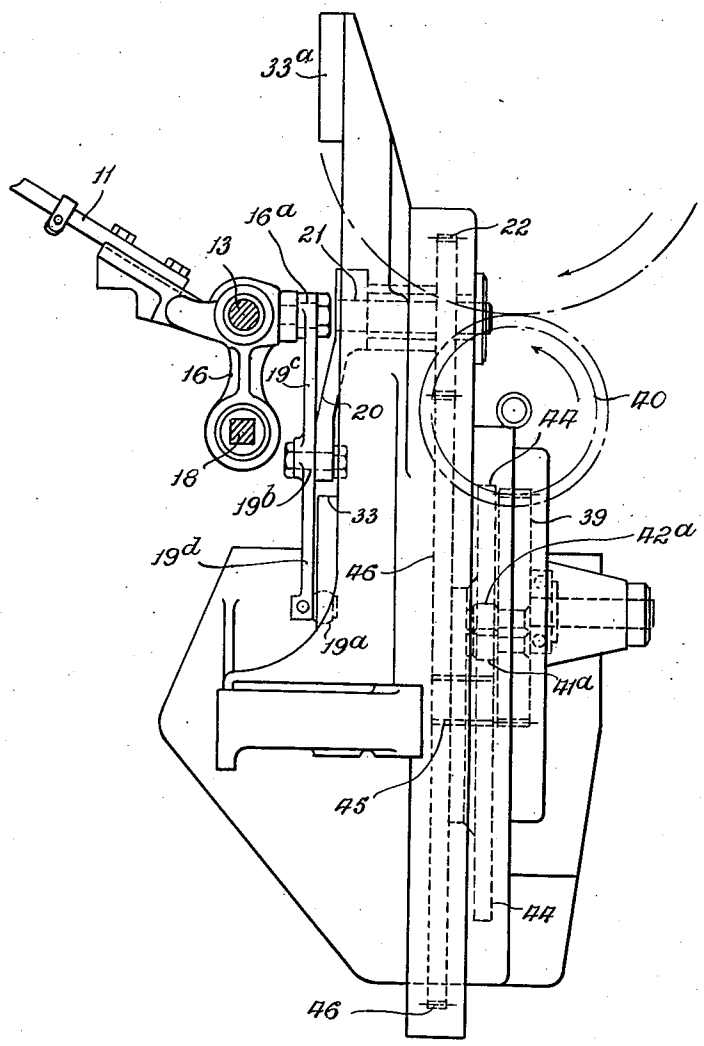

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DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

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FIG. 5.



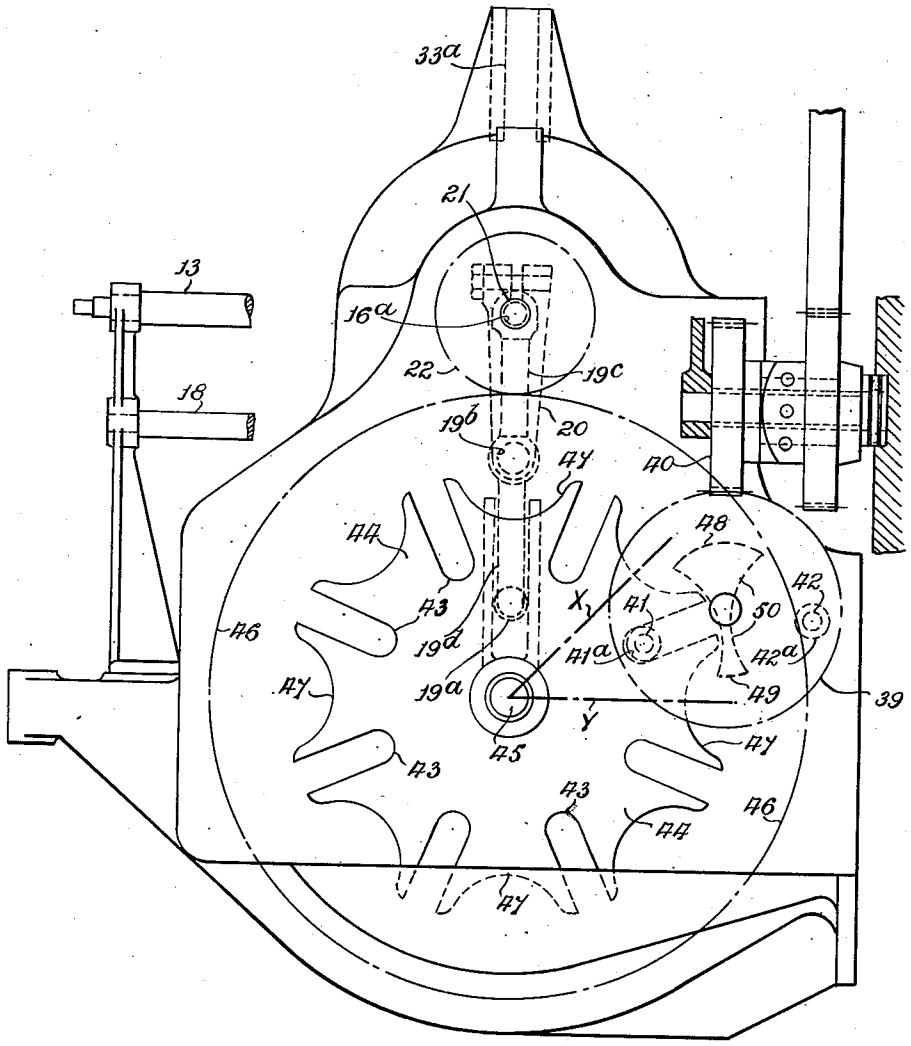

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DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

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FIG. 6




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# UNITED STATES PATENT OFFICE

2,120,532

## DELIVERY MECHANISM OF PLATEN PRINTING PRESSES

Frank Sydney Thompson, Manchester, England, assignor to T. C. Thompson & Son, Limited, Manchester, England

Application April 30, 1937, Serial No. 139,935
In Great Britain May 31, 1935

3 Claims. (Cl. 271—84)

This invention has reference to mechanism for delivering the printed sheets from platen printing presses, and to such mechanism of the kind comprising a gripper device reciprocated laterally of the movable platen by means of toggle mechanism, said gripper device alternately advancing up to the platen to seize the sheet thereon and receding from the platen to remove the sheet which it subsequently releases and delivers.

The invention has for its object to provide an improved arrangement or construction of toggle mechanism that will occupy a minimum of space, and enable a maximum reciprocatory travel of the delivery gripper device to be obtained with a minimum length of the toggle members and will function with smoothness and precision at high speeds.

According to the invention, the toggle members are opened out or extended on each side alternately of a centre about which one of the members is angularly operated, the two members of the toggle closing together during movement from one opened out position to the other. Conveniently, the toggle member which is connected with the gripper device is provided at its end which is pivoted to the angularly operated member, with an extension adapted to co-act with a guide, arranged in alignment with said centre, or two diametrically opposite such guides, in such manner that when during oscillatory, or unidirectional, angular movements of the latter toggle member through 180° about said centre to reciprocate the gripper device from one extreme position to the other, the two toggle members close together on one side of said centre during the first 90° of each said angular movement, the members are constrained to open out on the other side of said centre during the second 90° of the angular movement.

The invention is hereinafter fully described with reference to the accompanying drawings which illustrate one embodiment of it in a platen printing press. In the drawings, Fig. 1 is a part side view of the machine, Fig. 2 is a rear view (i. e. looking on the right hand side of Fig. 1) of the mechanism for actuating the delivery gripper device and Figs. 3 and 4 are elevations at right angles to each other to a larger scale than Figs. 1 and 2 showing details of the gripper-actuating mechanism not shown in such views. Fig. 5 is a similar view to Fig. 1 illustrating a modification, and Fig. 6 is an elevation at right angles thereto. On the drawings and in the following description like numerals of reference indicate like parts.

Referring first to Figs. 1 to 4 of the drawings, 5, Fig. 1, indicates the frame of the machne, 6 indicates the statonary platen and 7 indicates the movable platen which is shown in a position about one-third up from the lowered or normal position in which the sheets to be printed are fed on to it. 8 indicates the pile of sheets to be printed carried on a support 9 arranged at the front of the machine. The sheets to be printed are fed on to the platen 7 from a pile 8 by means of a feeding device of any appropriate kind. 11 indicates the delivery gripper device which is of the known kind comprising a fixed jaw and a hinged jaw normally closed against the fixed jaw by a spring. The gripper device 11 is mounted to reciprocate laterally of the movable platen 7, the gripper device being in this particular embodiment of the invention arranged on the right-hand side of the movable platen as viewed from the front and, of course, on the left-hand side as seen from the rear as in Fig. 2. The lower end 11b of the gripper device is bifurcated and is pivotally mounted knuckle-joint fashion on a bush 12 slidable on a slide bar 13 constituted by an extension of, or aligned with, the fulcrum shaft of the movable platen 7. The lower part of the gripper device is formed with a guide member 14 which co-acts with a guide bar 15 carried by and extending laterally from the movable platen 7, the co-operation of the guide member 14 and bar 15 causing the gripper device 11 to partake of the oscillation of the platen 7.

The bush 12 is mounted in the upper end of a slide 16 the lower end of which has rotatably mounted in it a sleeve 17 adapted to slide on a slide bar 18 of square cross-section and mounted in the frame of the machine vertically below the slide bar 13.

To the slide 16 is pivotally connected at 16a one end of a lever 19 which at the middle 19b of its length has pivoted to it the free end of an arm 20, of length equal to half that of the lever, fixed on a shaft 21 on which is also fixed a gear wheel 22 gearing with a toothed quadrant 23 adapted to be oscillated from the main shaft of the machine by suitable means. The arm 19c of the lever 19 and the arm 20 constitute a toggle the opening and closing of which causes the slide 16 to reciprocate on the two slide bars 13, 18 and carry with it the gripper device 11. Conveniently, and as shown, the quadrant 23 is fixed on a shaft 24 geared by means of bevels 25 with a shaft 26 carrying a toothed wheel 27 with which gears a quadrant 28 adapted to be oscillated by means of an arm 29 the free end of which carries

a bowl 30 which co-operates with a cam groove 31 in a cam disc 32 suitably driven from the main shaft of the machine.

The wheel 22 is adapted to be oscillated by the quadrant 23 through 180° so that the arm 20 oscillates from a position in which it is horizontal on the left-hand side of the shaft 21, as viewed in Fig. 2, to a position in which it is horizontal on the right-hand side of the shaft, and vice versa, and the toggle members 20, 19c are fully opened and closed, and vice versa, on each side of the shaft 21, alternately. In order to ensure that when the slide 16 reaches its mid-position in either direction of travel, and the toggle members 20, 19c are closed and the pivot 16a coincides with the shaft 21, the toggle member 19c shall not then move with the member 20 about the centre of the shaft 21, and that, instead, the toggle members 19c, 20 shall open on the other side of the shaft to continue the travel of the slide 16, the free end of the arm 19d of the lever 19 is provided with a bowl 19a adapted to enter and co-act with a vertical guide 33 arranged below and in vertical alignment with the shaft 21. The co-operation of the bowl 19a with the guide 33 prevents the bowl from moving angularly about the centre of the shaft 21 and so causes the lever 19 to pivot on its centre 19b and the toggle members 20, 19c to open on the side of the shaft 21 opposite to that on which they have just previously closed and in this way the toggle members during oscillation of the gear wheel 22 from one extreme position to the other, as aforesaid, first close on one side of the shaft 21 and then open on the other side of the shaft, and reciprocate the slide 16 and gripper device 11 accordingly. The described construction of toggle has the advantage of enabling a maximum reciprocation of the slide 16 and gripper device to be obtained with a minimum length of the toggle members 20, 19c. The arrangement is such that while the gripper device 11 partakes of the oscillations of the movable platen 7, in the manner before described, it advances towards the platen during the upward movement of the latter from the normal to the printing position and recedes from the platen during the return movement of the latter. The advance of the gripper device 11 occurs during co-operation of the bowl 30 with the portion 31a of the groove 31 in the cam disc 32 (which latter rotates in the direction indicated by the arrow head 32a, Fig. 1) and the recession of the gripper device takes place during co-operation of the bowl 30 with the portion 31b of the cam groove 31. During co-operation of the bowl 30 with the concentric portions 31c and 31d the gripper device "dwells" at the completion of its advance and receding movements, respectively.

In Fig. 2 the parts are shown in the position in which the gripper device 11 has advanced a little distance from the delivery position while in Fig. 1 they are shown in the position in which the gripper device is mid-way in its travel to the delivery position.

On the bush 12 on the upper slide bar 13 is mounted a cam disc 34 having a cam cavity 34a with which is adapted to co-operate a bowl 35a on one arm of a bell-crank lever 35 the other arm of which is connected with and adapted to open the hinged jaw of the gripper device 11 against the action of a spring 36 by means of which said jaw is normally kept closed. One end of the spring 36 is connected to an arm 37 fixed on the fulcrum boss of the bell-crank lever 35 and its other end is anchored on the guide member 14. The cam disc 34 carries a bowl 34d which co-operates in the bifurcated free end of an arm 38 fixed on the sleeve 17 mounted on the lower square slide bar 18 which latter has fixed on it an arm 18a adapted to be operated through suitable means from the main cam of the machine, to rock the slide bar 18 to alter the angular position of the cam disc 34 and of the cam cavity 34a therein relatively to the bowl 35a which co-operates with same.

When, during the upward movement of the platen 7 with a sheet to be printed upon it, the platen nears the printing position, the bowl 35a engages the upper part 34b of the cavity 34a in the cam 34 and operates the bell-crank lever 35 which through a lever 11c operates an arm 11a on the hinged jaw of the gripper device 11 to open said jaw against the action of the spring 36, the hinged jaw remaining open while the sheet is being registered and the application of the pressure of printing has actually commenced. The arm 18a on the lower square slide bar 18 is then actuated to rock the bar to cause the cam disc 34 to be so adjusted (clockwise as viewed in Fig. 3) relatively to the bowl 35a as to allow the hinged jaw of the gripper device 11 to be closed on the sheet by the action of the spring 36. During the subsequent return movement of the movable platen 7 the gripper device 11 moves therewith and first strips the printed sheet from the stationary platen 6 and then also reciprocates away from the platen and removes the printed sheet and the lower slide bar 18 is rocked in the opposite direction to formerly (i. e. in an anti-clockwise direction as viewed in Fig. 3) to restore the cam disc 34 to its original position. The gripping of the sheet by the gripper device 11, the printing of the sheet and the stripping of the printed sheet from the stationary platen 6, take place during the "dwell" of the gripper device at the end of its advance movement. When the movable platen 7 reaches the end of its return movement and the gripper device 11 the end of its outward reciprocation, and during the then "dwell" of the device, the bowl 35a engages the lower part 34c of the cam cavity 34a and effects the opening of the hinged jaw of the gripper 11 to release the removed sheet and deposit same on a delivery pile 10 carried by a support 10a.

In the modification illustrated in Figs. 5 and 6, a gear wheel 39 driven uni-directionally at a uniform speed, one revolution per cycle of the machine, from the main shaft of the machine through screw gearing 40, has projecting from one side of it two pins 41, 42 fitted with rollers 41a, 42a respectively. These rollers 41a, 42a are adapted to co-act with radial slots 43 formed in a disc 44 mounted on a shaft 45 on which is also mounted a gear wheel 46 which gears with the gear wheel 22 on the shaft 21 on which the toggle member 20 is fixed. The slotted disc 44 is shown formed with eight equal-angularly spaced slots 43 and the ratio of the gear wheels 46 and 22 is four to one so that each step of rotation of the slotted disc results in half a revolution of the shaft 21 and toggle member 20. The bowls 41a, 42a engage the slotted disc 44, alternately, when a slot 43 is in the position indicated by the line X in Fig. 6 which slot is then entered by the particular bowl the latter then rotating the disc and gear wheel 46 through one-eighth of a revolution, i. e. until the slot reaches the position indicated to the line Y whereupon the bowl leaves the slot.

Below, and in vertical alignment with, the

shaft 21 there is provided a stationary guide 33 with which the bowl 19a on the free end of the extension 19d of the toggle member 19c co-acts during advance of the slide 16 and gripper device 11 (which for clearness are omitted from Fig. 6) towards the movable platen, in the manner before described.

Diametrically opposite the guide 33 there is provided above the shaft 21 a second guide 33a with which the bowl 19a engages in like manner during movement of the slide 16 and gripper device 11 in the opposite direction i. e. away from the movable platen to the delivery position.

The pins 41, 42 are so relatively spaced on the wheel 39 that the intervals between their successive engagement with the slotted wheel 44 are of unequal duration and so as to provide a longer period of rest of the wheel 44, and hence a longer "dwell" of the gripper device, when the gripper device is in its advanced position next to the movable platen 7 to seize the sheet than when it is in its retracted position remote from the platen 7 in which it deposits the removed sheet.

Between the slots 43 of the slotted disc 44 the latter is formed with concaved surfaces 47 with which complementary convexed surfaces 48, 49 of a stop 50 associated with the pins 41, 42 are adapted to co-act and lock the disc during its periods of rests, the angular length of said convexed surfaces 48, 49 being proportional to the spacing of the pins.

It will be manifest that the spacing of the pins 41, 42, the number of such pins and of the slots 43 in the disc 44, and the ratio of the gearing between the disc 44 and the shaft 21 may be varied to suit particular circumstances or requirements

I claim:—

1. In a delivery mechanism for a platen printing press of the type described, the combination comprising a fixed guide, a gripper device slidably mounted on the fixed guide and means for reciprocating the gripper device including a toggle comprising a member rotatably mounted about a fixed axis positioned intermediate the ends of said fixed guide, another member pivotally connected to the gripper device and to said first mentioned toggle member, said second mentioned toggle member having an extension thereon extending beyond the point of connection with the first mentioned toggle member, and a second fixed guide positioned intermediate the extreme positions of movement of the gripper device and cooperating with the extension of said second mentioned toggle member, whereby the toggle is extended on each side of the fixed axis of oscillation of said first mentioned toggle member.

2. In a delivery mechanism for a platen printing press of the type described, the combination comprising a fixed guide, a gripper device slidably mounted on the fixed guide and means for reciprocating the gripper device including a toggle comprising a member rotatably mounted about a fixed axis positioned intermediate the ends of the fixed guide, means for effecting angular movement of the member about the fixed axis through 180 degrees, another toggle member pivotally connected to the gripper device and to said first mentioned toggle member, said second mentioned toggle member having an extension thereon extending beyond the point of connection with the first mentioned toggle member, and a second fixed guide positioned to cooperate with the extension of the second mentioned toggle member, whereby the toggle is fully extended on each side of the fixed axis of oscillation of said first mentioned toggle member upon angular movement of the toggle member through 180 degrees.

3. In a delivery mechanism for a platen printing press of the type described, the combination comprising a fixed guide, a gripper device slidably mounted on the guide and means for reciprocating the gripper device including a toggle comprising a member rotatably mounted about a fixed axis positioned intermediate the ends of the fixed guide, another toggle member pivotally connected to the gripper device and to said first mentioned toggle member, said second mentioned toggle member having an extension thereon extending beyond the point of connection with the first mentioned toggle member, a pair of fixed guides adapted to cooperate with the extension of said second mentioned toggle member and positioned in alignment with and on diametrically opposite sides of the center of the fixed axis of the said first mentioned toggle member, and means for rotating said first mentioned toggle member about its fixed axis in steps of 180 degrees.

FRANK SYDNEY THOMPSON.