

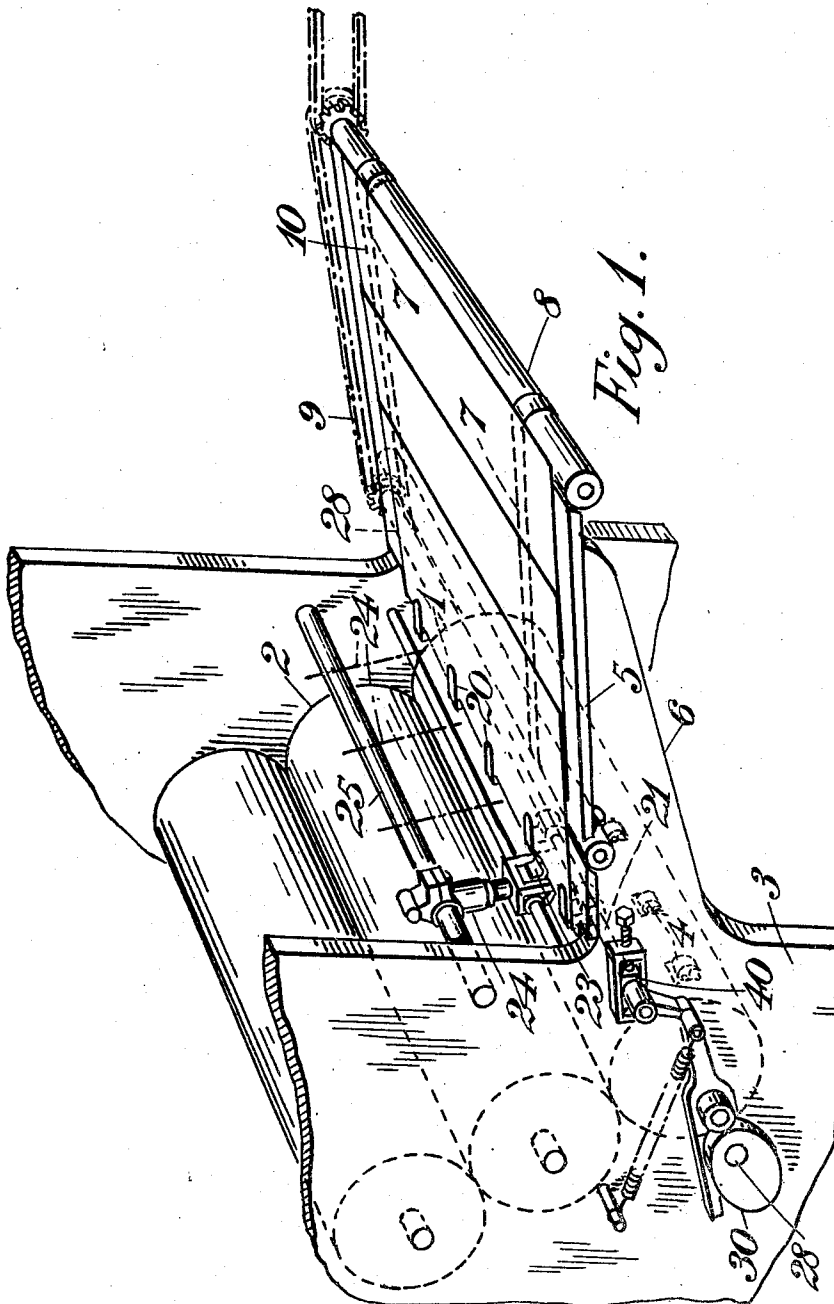
July 29, 1952

H. T. BACKHOUSE
SHEET REGISTERING MEANS FOR PRINTING
MACHINES AND THE LIKE

2,605,103

Filed Nov. 26, 1948

3 Sheets-Sheet 1



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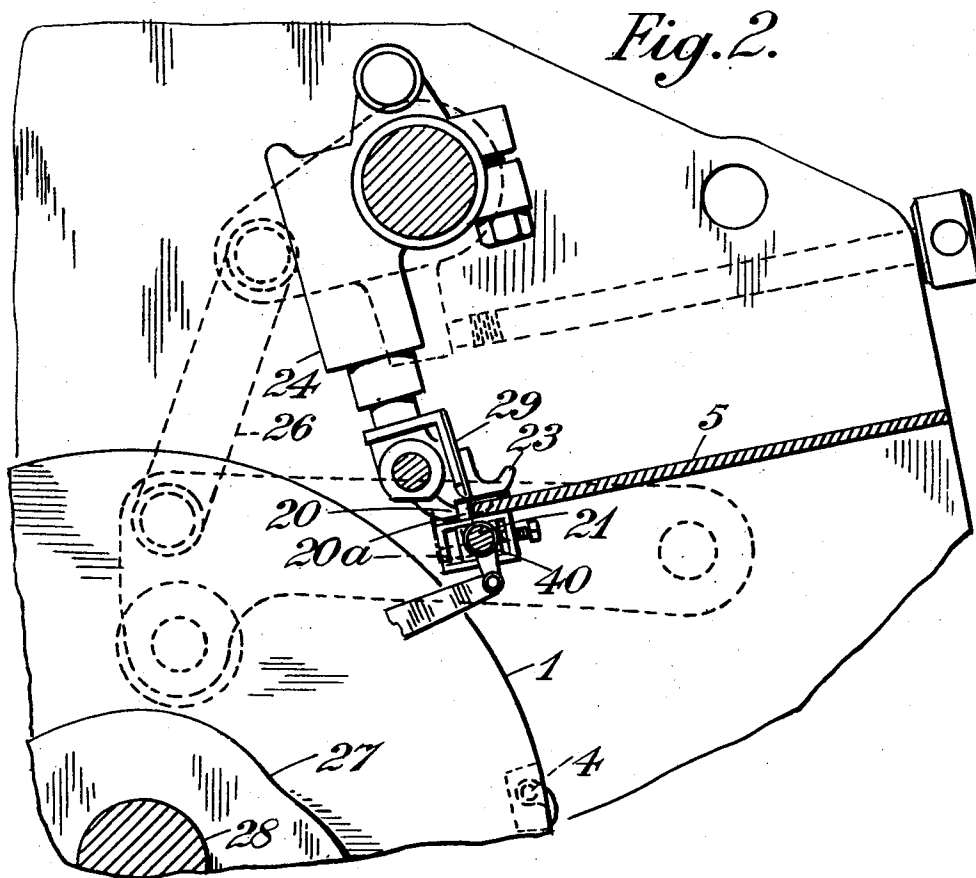
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3 Sheets-Sheet 2



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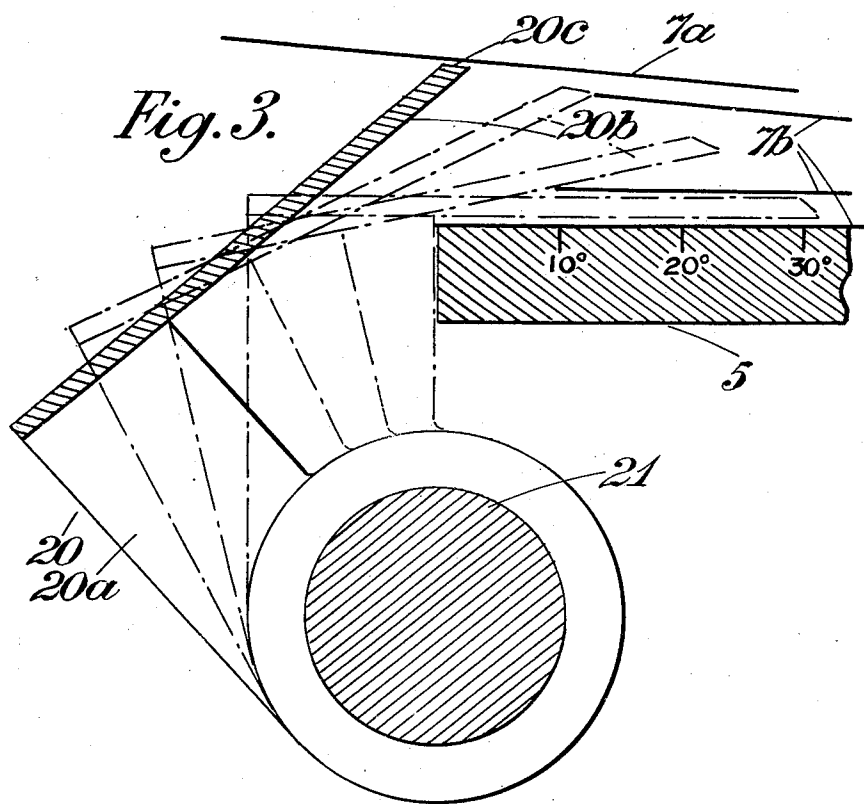
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,605,103

SHEET REGISTERING MEANS FOR PRINTING MACHINES AND THE LIKE

Headley Townsend Backhouse, Sunningdale,
EnglandApplication November 26, 1948, Serial No. 62,249
In Great Britain December 3, 1947

1 Claim. (Cl. 271—60)

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The invention relates to printing machines of the kind operating on successive sheets of paper, card or the like and embodying a printing mechanism, a feed-board, means for feeding a succession of partly overlapped sheets on to the feed-board to a position where registration of the sheets is effected and means for transferring the sheets one at a time from the feed-board to the printing mechanism.

It is desirable, in machines of the above kind, and with a view to reducing the interval between the removal of successive sheets with, in the case of a rotary printing machine, a corresponding reduction in the ineffective parts of the circumference of the cylinder to which the sheets are transferred, to effect the registration of each sheet during the removal of the preceding sheet from the feed-board and it is known for this purpose to provide front and side registering devices operating beneath the sheet being removed, the sheets being supplied to the feed-board in partly overlapped relation. In order that devices operating in this way may be effective it is necessary to ensure that the succeeding sheet does not adhere to the sheet being removed and is not carried into the printing machine with the latter sheet. It is an object of the present invention to provide simple means for engaging the leading edge of each sheet as it approaches the registering position and to separate that edge from the overlying sheet being removed.

With the above object in view the invention provides a printing machine of the above kind in combination with a scraper device arranged to operate below each sheet as it is removed from the feed-board to scrape the lower face of the sheet to engage the leading edge of a succeeding sheet as it approaches the registering position, and to separate that edge from the sheet being removed, which scraper device consists of a member having two arms at an angle and is pivotally supported about the free end of one of the arms, below the feed-board for oscillation about an axis parallel to the leading edge of the sheet to be engaged from a position in which the other arm (later referred to as the scraper arm) extends upwardly towards the underside of the sheet being removed to a position in which the scraper arm lies above and substantially parallel to the surface of the front edge portion of the succeeding sheet, the movement of the device as aforesaid being in a direction against the movement of the sheets and being followed by a return movement to the initial position, and means for oscillating the scraper device as aforesaid and in such timed relation with the feeding of the sheets

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that the free end of the scraper arm scrapes the underside of the sheet being removed at the position occupied by the leading edge of the next sheet as the sheet approaches the registering position and the scraper arm reaches the limit of its movement just before the sheet reaches the registering position.

In the preferred form of the invention the scraper device also serves as a front lay or stop to secure approximate or accurate registration of the front edge of the succeeding sheet. The scraper device may also act as a smoother for the front edge portion of the succeeding sheet. In this latter arrangement the front edge portion of the sheet lies underneath the scraper after the latter has completed the scraping operation and has reached a position in which it lies above the feed-board and is spaced therefrom by an amount slightly greater than the thickness of the material being fed.

Normally, in carrying out the invention there will be at least two scraper devices operating at or near the opposite sides of the sheet and there may be more than two (e. g., four) such devices spaced apart across the width of the sheet.

In a more specific form of the invention the scraper device or each device comprises an angular hook-like member pivotally supported at the end of one of its arms below the feed-board for oscillation in timed relationship with the removal of the sheets from the board about an axis extending transversely of the board from a position in which the free end of the other arm (which constitutes the scraper) lies below the path of the sheets being taken from the board to a position in which the scraper arm lies above, and substantially parallel to, the upper surface of the board and serves as a smoother for the sheet to be registered and the first arm aforesaid extends perpendicular to the board and serves as a front registering stop, the arrangement being such that during the movement between the two positions as aforesaid the free end of the scraper arm engages the under-surface of the sheet being removed with a scraping action and tends to engage and separate from the sheet the leading edge of any succeeding sheet which may be adhering thereto and might otherwise be carried past the registering position. In this form of the invention the scraper device returns to the initial position in time to release the sheet being registered for removal from the board. The shape of the scraper arm is of considerable importance and should be such as to provide a sharp scraping edge which engages the under-side of the sheet being removed over a substantial part of the arc

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of movement of the device. For example, the arm may have its upper surface curved about the axis of oscillation and its lower flat or smoother surface intersecting the upper surface to form a sharp edge at the end of the arm or the upper surface may be flat and bevelled at the end of the arm to meet the lower surface in a sharp edge. The lower surface, which forms the smoother surface, may meet the inner face (i. e., the lay or gauge face) of the other arm of the device at right-angles, the gauge face being in a plane radial from the axis of rotation or parallel to such a plane and spaced therefrom to a small extent. The device may operate at the front edge of the feed-board or through a notch or slot in the feed-board at or near the front edge.

A specific embodiment of the invention in a printing machine will now be described by way of example and with reference to the accompanying diagrammatic drawings in which:

Figure 1 is a perspective diagrammatic view of the machine;

Figure 2 is a side view showing the scraper devices and swinging grippers to an enlarged scale, and

Figure 3 is a diagram illustrating the timing of the scraper devices and the sheets.

The machine forming the subject of this example is a rotary offset printing press, the sheets being carried by the lower roller 1 and printed by contact with the upper roller 2. The two rollers are supported in bearings in a frame 3. The lower roller carries grippers 4 arranged in well known manner to grip the front edge of a sheet presented to the roller and to carry the sheet around the roller for printing. The machine embodies a feed-board 5 supported by brackets 6 extending from the frame 3. This board is provided with conveyor tapes 7 driven from a roller 8 which is itself driven by chain 9 from the press rollers. The sheets 10 are conveyed to the feed-board by a feeder which forms no part of the present invention but which is of well known construction and supplies the sheets in the form of a continuous stream of partly overlapped sheets to arrive on the feed-board in timed relation with the operation of the printing machine. At the front end of the feed-board there are a series of scraper lays 20 carried on a shaft 21 beneath the feed-board, and between the front of the board and the roller 1 there are a series of swinging grippers 23 arranged to engage the front edge of each sheet after a preliminary registration by the lays 20, to effect a more precise registration and then to grip the front portion of the sheet and to transfer it to the grippers on the roller 1. The grippers 23 are carried on arms 24 dependent from a rock-shaft 25 which is driven through link 26 from a cam 27 on the shaft 28 of the roller 1. Each swinging gripper embodies a plate 29 constituting a registering gauge or lay and all the lays are to be aligned across the feed-board. The mechanism for opening and closing the grippers is well known and is not shown.

The scraper-lays 20 are each composed of two arms at right angles and each lay is secured to the shaft 21 at the end of the arm 20a. The inner face of the arm 20a is radial from the shaft 21 and constitutes the lay face. The free end of the arm 20b is bevelled to form a scraper edge 20c with the inner face of this arm which constitutes a smoother. As may be seen from Fig. 3, the effective length of scraper arm 20b, measured from the lay face to its free end, is about equal

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to the effective length of the arm 20a, measured from the axis of rotation to the underside of arm 20b. As shown in Fig. 2, the scraper lays move through an arc of about 90° so that the scraper and smoother arm 20b moves first upwardly toward sheet 7a and then downwardly over the edge of succeeding sheet 7b. The shaft 21 is arranged for oscillation by a cam 30 on the shaft 28 to move the scraper-lays from the full line position through the chain-line positions in Figure 2 and back again and also forwardly and downwardly out of the way of the sheet being fed. The lay faces of the several lays are aligned across the board, the lays being adjustable on the shaft 21 for that purpose and when in the most rearward chain line position of Fig. 3 the lay faces are very slightly in front of the rearward limit of the movement of the plates 29. In this position the smoother faces of the scraper-lays lie above the feed board and spaced from it by only a little more than the thickness of the sheets being fed.

The timing of the oscillation of the scraper-lays in relation to the arrival of the sheets at the front edge of the board is important and is illustrated in Figure 3. As can be seen from that figure the scraper edge 20c is timed to move backwardly (clockwise as viewed in Figure 3) under the sheet 7a which is being removed by the swing grippers, to engage the front edge of the next sheet 7b just before (in this example 10° before) the edge reaches the registering position. The scraper edge then separates the sheet 7b from the overlying sheet, 7a, and diverts the sheet downwardly progressively until the sheet lies on the feed board with its front edge registered against the lay faces of the scraper lays.

In order that the angularity of the front edges of the registered sheets may be adjusted, the bearings 40 are adjustable on the frame 3 to move the shaft 21. This adjustment may also be used to vary the exact position of registration of the sheets.

The operation of the machine is as follows. The sheets are fed, (e. g. from a sheet separator operable to separate the sheets from a pile) in a continuous stream of partly overlapped sheets timed to arrive at the front lay position to coincide with the rearward movement of the scraper-lays as described above. The scraper-lays separate the front edge of each sheet from the overlying sheet if they be adhering and effect a preliminary registration of the front edge of the sheet while holding it down on the feed-board. The swing grippers then move backwardly until the lay plates 29 carried thereby engage the front edge of the sheet and press it slightly backwardly to effect a precise registration thereof. The grippers then take hold of the sheet and swing with it to the press roller where they transfer the sheet to the grippers 4 carried thereby. To enable the sheet to be removed the scraper lays move forwardly and downwardly to the chain-line position shown in Figure 2 just before the swing grippers begin to move with the sheet.

It is an important advantage of the construction provided by the invention that the upper surface or scraping edge of the scraper arm lifts the sheet being removed and enables side registration of the underlying sheet to be effected by suckers or other gripping devices operating underneath the upper sheet.

The position of the pivotal axis of the scraper-lays is important and may be below the registering position of the front edge of the sheets or

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below and slightly behind or in front of that edge.

The scraper devices may be positively moved forwardly and downwardly into the inoperative position to release the sheet after the front edge of the sheet has been gripped by the grippers and the scraper devices may be returned by spring means as shown or they may be moved positively in both directions, it being preferred that in either case the operative position be accurately defined by a stop.

The invention includes a stream-fed printing machine having swinging transfer grippers and combined scraper and registering gauges as described above, and so arranged that as, or just before, each sheet is taken by the grippers, the gauges move forwardly and downwardly to release the front edge of the sheet and then move upwardly and backwardly with a scraping action under the sheet to a registering position, the return movement being synchronised with the arrival of the next sheet at the registering position in such manner that the leading edge of that sheet, if it adheres to the underside of the sheet being removed, will be engaged by the edges of the scrapers, detached thereby from the upper sheet and directed downwardly to a registering position under the upper arms of the scrapers.

As previously mentioned, the scraper and front registering gauges provided by the invention may be employed to secure exact or approximate registration of the front edges of the sheets. If approximate registration only is obtained completion of the registration may be effected by means of swinging grippers provided with registering stops as described. Registration in two stages in this way has the advantage that a lighter construction of the scraper devices may be employed.

I claim:

In apparatus of the type described, operating on successive sheets stream-fed in partly overlapped relation across a feed-board and having swinging transfer grippers for taking the sheets one at a time from the feed-board; front registering means for the sheets comprising, scraper-lays having stop arms and scraper arms arranged at right angles to one another, means for pivotally

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supporting the stop arms at their free ends below the feed-board for rotation about an axis extending transversely of the feed-board and so positioned that the free ends of the scraper arms move upwardly against and scrape along the underside of a sheet being removed and move downwardly over the end of the oncoming succeeding sheet into parallelism with the feed-board, said scraper arms having flat under surfaces to smooth the end of the sheet and sharp leading edges to separate from the sheet being fed the leading edge of the succeeding sheet should it be adhering thereto, means for positioning said stop arms so that they preliminarily front register the sheet slightly ahead of its finally registered position, lay plates carried by said grippers, means for moving said grippers toward the edge of the sheet preliminarily registered by said stop arms to effect slight rearward movement of the sheet by said lay plates to finally front register the sheet at the end of the gripper stroke prior to the taking of the sheet by the grippers, and means for rotating the scraper-lays on said axis to clear the sheet as the grippers move it off the feed-board and to return the scraper-lays to sheet-registering position simultaneously with the delivery of the succeeding sheet.

HEADLEY TOWNSEND BACKHOUSE.

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