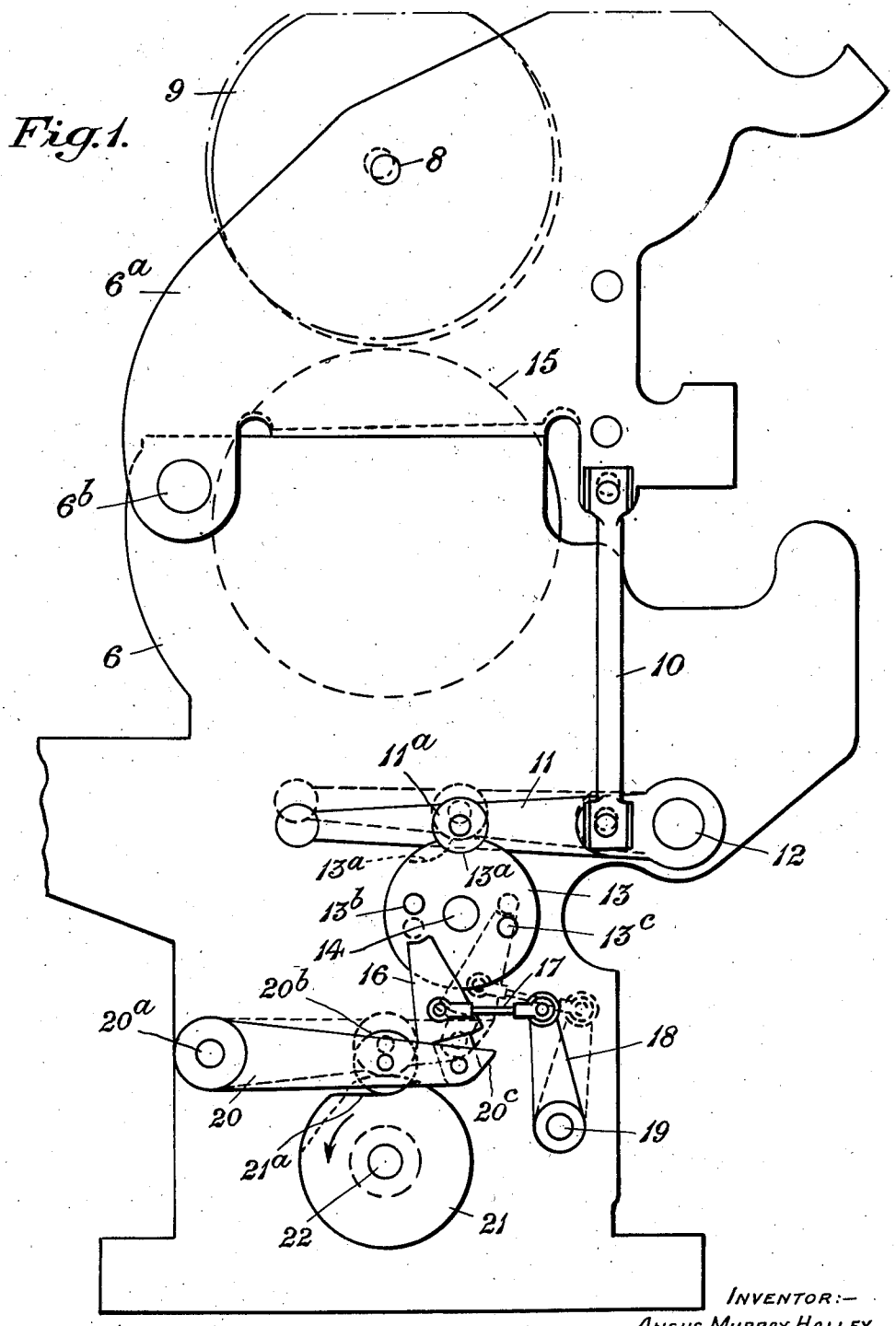
Dec. 16, 1941. A. M. HALLEY 2,266,460

ROTARY PRINTING AND NUMBERING MACHINE

Filed May 8, 1940 4 Sheets-Sheet 1

Fig. 1.



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ROTARY PRINTING AND NUMBERING MACHINE

Filed May 8, 1940 4 Sheets-Sheet 2

Fig. 2.

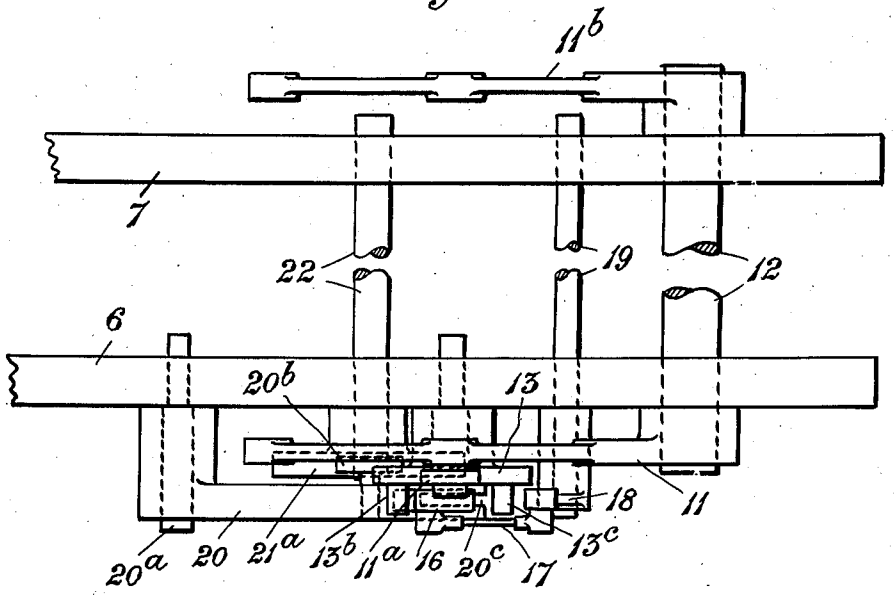
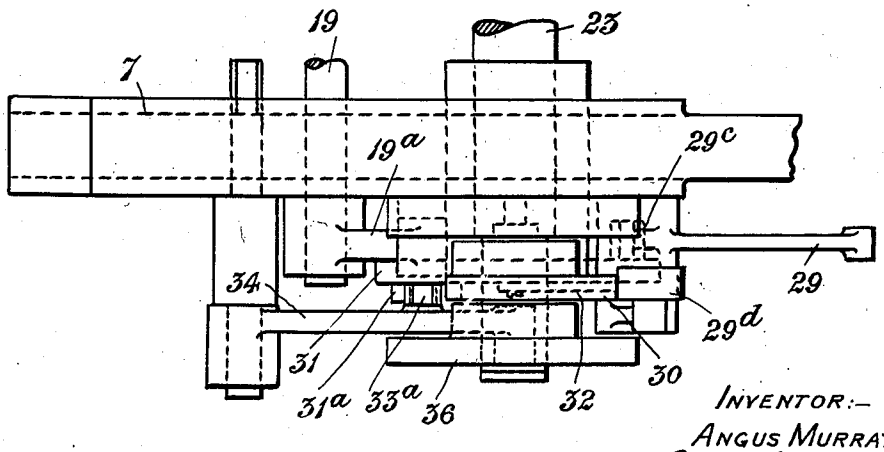


Fig. 5.



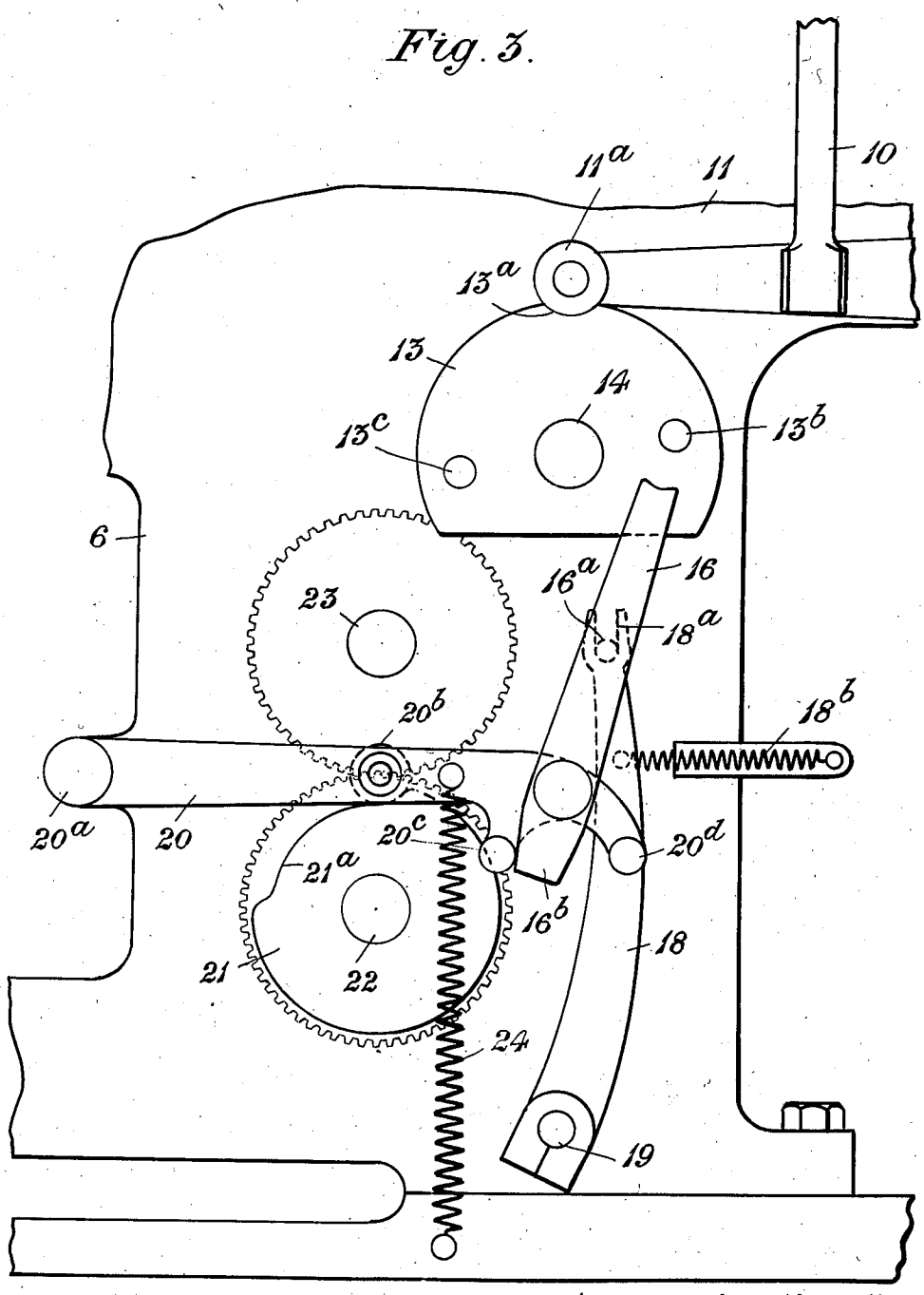
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ROTARY PRINTING AND NUMBERING MACHINE

Filed May 8, 1940 4 Sheets-Sheet 3

Fig. 3.



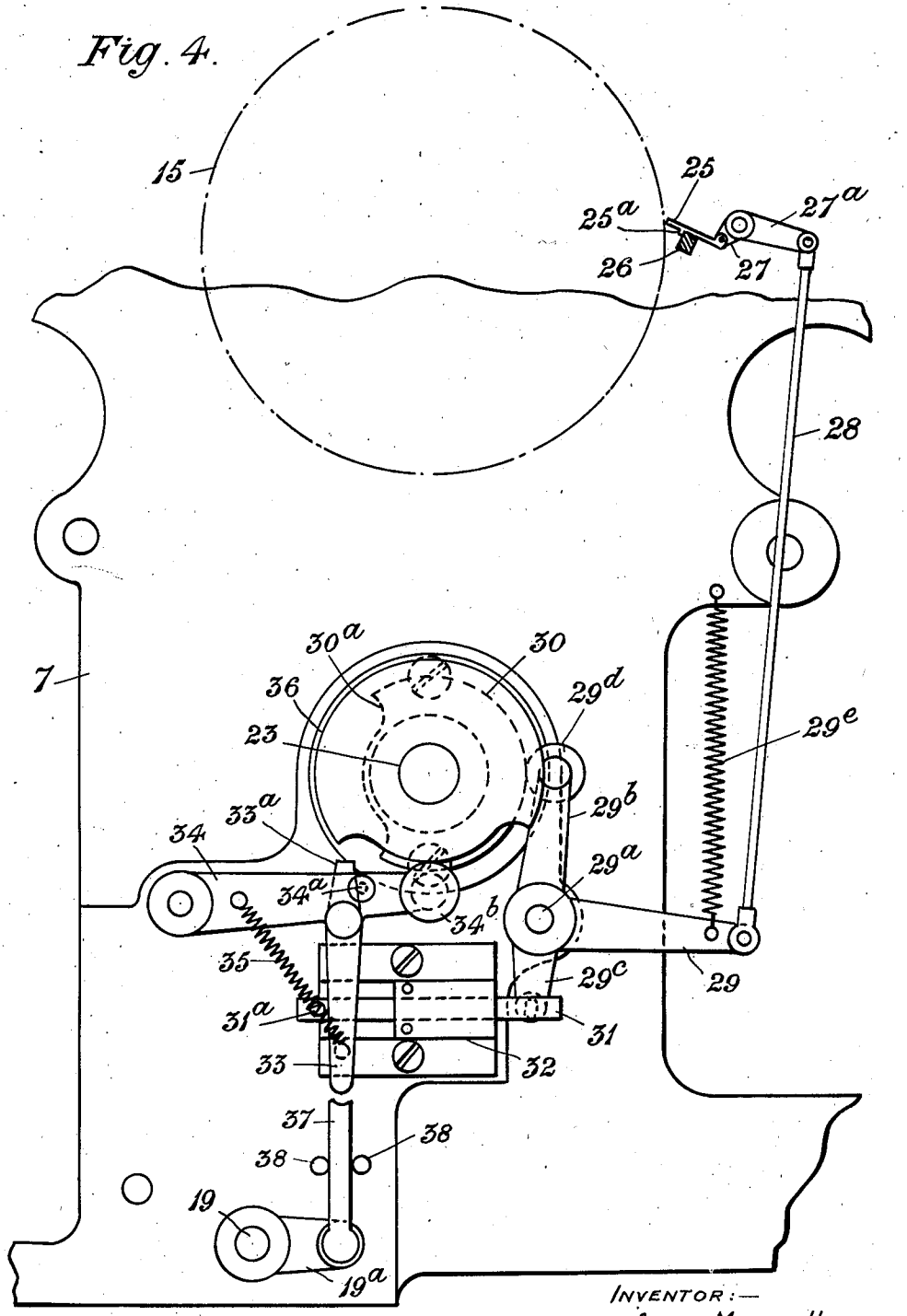
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ROTARY PRINTING AND NUMBERING MACHINE

Filed May 8, 1940 4 Sheets-Sheet 4

Fig. 4.



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Patented Dec. 16, 1941 2,266,460

UNITED STATES PATENT OFFICE

2,266,460

ROTARY PRINTING AND NUMBERING MACHINE

Angus Murray Halley, Moseley, Birmingham, England, assignor to James Halley & Sons Limited, West Bromwich, England

Application May 8, 1940, Serial No. 333,970
In Great Britain May 24, 1939

3 Claims. (Cl. 101—247)

This invention relates to rotary printing and numbering machines and more particularly is concerned with rotary printing or numbering machines which embody mechanism whereby, on the mis-feed of a sheet during the running of the machine, the printing cylinder, or its equivalent such as the numerator head or carrier in the case of a numbering machine, is automatically moved from the normal or printing position into a non-printing position, and is returned automatically to the printing position when a correct or normal feed of the sheets is resumed.

The present invention has for its object to provide new or improved and simplified means or mechanism whereby the printing cylinder or equivalent of a rotary printing machine may be moved from the printing position to a non-printing position and restored thereto during the running of the machine, the operation of the said mechanism being controlled by the sheet detector mechanism embodied in the machine, the invention being especially applicable to machines wherein the printing cylinder, or its equivalent, is mounted in bearings carried by a pivoted part of the machine framing.

The invention will be further and more particularly described with reference to the accompanying drawings wherein it is illustrated in its application to a sheet numbering machine of known type embodying sheet feed detector mechanism such as is hereinafter more particularly referred to and wherein the numerator printing devices are mounted on a shaft which extends longitudinally across the machine, its ends being supported in bearings provided in the upper part of the respective side frames or standards of the machine, the said upper parts being so pivoted to the adjacent stationary parts of the frames as to permit them to be turned upwardly thereon for removing the numerator mechanism from the printing position relative to the impression cylinder.

Figure 1 of the drawings represents in side elevation and Figure 2 in plan one convenient embodiment of the invention, so much only of the ordinary machine being shown as is necessary to the understanding of the invention.

Figure 3 is a similar view to Figure 1 illustrating a modification in the construction and arrangement of certain of the parts hereinafter described.

Figure 4 is a side elevation of the machine viewed from the opposite side to Figures 1 and 3, and illustrating a convenient construction of sheet detector mechanism through the medium of which the operation of the mechanism provided in accordance with the present invention is automatically controlled.

Figure 5 is a plan showing certain parts of the said sheet detector mechanism.

Like numerals of reference indicate the same or corresponding parts in the several figures of the drawings.

Describing first the embodiment of the invention illustrated in Figures 1 and 2, the references 6 and 7 denote the respective side frame members of the machine and 6^a the pivoted upper part of the side member 6, a similar pivoted part being provided on the side member 7, the said pivoted upper parts being furnished with bearings for the spindle 8 on which a disc-like member 9, or a plurality of such members is mounted, the said member, or members, carrying the numerator devices (not shown) as is well understood.

The pivoted upper portions of the side frames 6 and 7 and the parts carried thereby are omitted from the plan, Figure 2.

The pivoted upper part 6^a of the side frame 6 has attached thereto adjacent the side thereof remote from its pivot 6^b a connecting rod 10, the said connecting rod 10 depending from the pivoted upper part 6^a of the side frame and its lower end having connection with a lever-like member 11, mounted in suitable location on the fixed part 6 of the said frame.

The attachment of the connecting rod 10 to the lever-like member 11 is made at a part intermediate the fulcrum thereof and a roller 11^a which is mounted on the said lever-like member, the fulcrum of the lever-like member being constituted by the end of the shaft 12 projecting from the outer side face of the frame member 6, the said shaft 12 extending transversely between and turning in bearings in the respective side frame members 6 and 7, its opposite end projecting from the outer side face of the frame member 7 and providing a fulcrum for a similar lever-like member 11^b which is connected to the pivoted upper part of the side frame 7 by a connecting rod similar to the connecting rod 10.

The roller 11^a projects laterally from the outer face of the lever-like member 11 and is located over and rests on the periphery of a disc 13 which is mounted and capable of rotation on a fixed stud 14 provided on the side frame 6, the centre of the said stud being preferably in vertical alignment with the centre of the roller 11^b.

The periphery of this disc 13 rotatably mounted on the side frame 6 is furnished with an arcuate

recess 13a into which, in one position to which the said disc 13 is adapted to be turned, as hereinafter described, the roller 11a on the lever-like member 11 drops as seen in the full line position of the parts in Figure 1, and when the roller 11a occupies this recess 13a the lever-like member 11 assumes the position in which the connecting rod 10 attached thereto is drawn down and holds the pivoted upper section 6a of the frame 6 to which its upper end is connected (and also the corresponding pivoted section 7 at the other side of the machine, since these pivoted upper sections of the side frame members are interconnected by the transverse spindle 8 whereon the numerator devices are mounted and through the medium of their respective connections with the transverse shaft 12) in the requisite position for permitting the performance of the printing operation on the sheets passing over the impression cylinder of the machine, which cylinder is indicated by the dotted circle 15 in Figure 1, and this position, which is the normal position, is maintained so long as sheets are being correctly fed to the printing position on the impression cylinder 15.

If the said recessed disc 13 be turned to a position in which the recess 13a is no longer located below the roller 11a of the lever-like member 11 the said lever-like member is caused to rise as is indicated by the dotted lines in Figure 1 thereby effecting the raising of the connecting rod 10 and therethrough the turning of the pivoted upper parts of the side frame members 6 and 7 into such position that the disc 9, or plurality of such discs (or a printing cylinder), mounted on the shaft 8 carried by the said pivoted sections will occupy the non-printing position and remain therein until the recessed portion 13a of the rotatable disc 13 is again brought below the roller 11a of the lever-like member 11.

The requisite operations of the rotatable disc 13 for moving the peripheral recess 13a therein into coincidence with the roller 11a of the lever-like member 11 and removing it from below the said roller are effected automatically in the running of the machine.

For the purpose of effecting these automatic operations the said disc 13 is furnished on the outwardly presented face thereof with a pair of projecting studs marked 13b and 13c respectively the said studs being disposed diametrically and at equal distances on opposite sides of the centre of the disc 13, one of the said studs, the one denoted by the reference 13b being located somewhat nearer the recess 13a in the periphery of the disc 13 than the other stud 13c, and with one or other of these studs a rockable pawl 16 is adapted to co-act according to the position to which the said pawl 16 is moved through the medium of its connection with sheet detector mechanism as for example the sheet detector mechanism represented in Figures 4 and 5 and hereinafter more particularly described with reference to the said figures.

In the arrangement shown in Figures 1 and 2 the pawl 16 has connection through the pivoted link 17 with an arm 18 mounted on the end of a rockable shaft 19 which has a bearing in and projects from the side frame 6 of the machine, the said shaft 19 extending to and having a bearing at its opposite end in the other side frame of the machine on which frame the sheet detector mechanism is disposed, the requisite rocking motions of the shaft 19 being communicated thereto by mechanism the operation of which is controlled through the action of the sheet detector mechanism.

The said rockable pawl 16 is mounted on a lever 20 fulcrumed on a stud 20a suitably located on the lower part of the side frame 6, the said lever 20, which is hereinafter referred to as the pawl carrying lever, being provided on one side thereof with a roller 20b so positioned intermediate its ends as to come under the action of a cam 21 carried by a longitudinally extending cam shaft 22 so geared to the driving shaft of the machine as to make one complete revolution per cycle of the machine.

The connection of the rockable pawl 16 to the pawl carrying lever 20 may be effected by bifurcating the end 20c of the said lever at which the pawl is pivoted, the pivoted end of the pawl being reduced in thickness to fit between the said forked end portion 20c of the lever, and the shouldered parts formed by reducing the end of the pawl 16 serve to limit the angle through which it can be turned by its link connection with the rocking arm 18 aforesaid.

Briefly the operation of the mechanism described is as follows:

In the initial setting of the parts the recessed disc 13 turnably mounted on the side frame 6 of the machine is so disposed that its peripheral recess 13a is located below the roller 11a on the lever-like member 11 which operates the connecting rod 10 attached to the pivoted upper section 6a of the side frame 6, wherein a bearing for one end of the shaft 8 of the numerator carrying disc 9 or equivalent printing device is provided, and the said numerator carrying disc or the like in this position of the said recessed disc 13 is in proper printing position.

When the machine is running normally and a sheet is fed, by a tape or other feed, to the impression cylinder 15 on each consecutive cycle of operations, the sheet detector mechanism, which may as aforesaid be of the construction hereinafter described with reference to Figures 4 and 5 (or of any ordinary or suitable construction adapted on the failure of the sheet feed to effect the requisite motion of the rocking arm 18), by its control of the said rocking arm 18 which is linked through the member 17 with the rockable pawl 16 mounted on the pawl carrying lever 20 will, as the roller 20b on the said pawl carrying lever 20 comes on to the fall 21a of the continuously rotating cam 21 on which it bears, cause the rockable pawl 16 to remain in such a position namely that shown in full lines in Figure 1 that its free end is in alignment with but does not make contact with the stud 13b on the recessed disc 13 which stud lies nearer to the recess 13a in the disc than does the other stud 13c, but as the pawl 16 does not in this position of the disc 13 make contact with the said stud 13b, the disc remains stationary so long as normal running and the feed of sheets continues, and the numerator carrying disc 9 or printing cylinder, or its equivalent, is not moved from the proper printing position.

If however a mis-feeding of a sheet occurs, the sheet detector mechanism when, in the continuing motion of the machine, the roller 20b on the pawl carrying lever 20 next comes on to the fall 21a of the continuously rotating cam 21, so acts on the rocking arm 18 controlled by the said detector mechanism, as to turn the arm 18 through such an angle that the rockable pawl 16 linked thereto is brought, as indicated by the dotted lines in Figure 1, into alignment with the

stud 13c on the recessed disc 13, and when, by the motion of the cam 21, the pawl carrying lever 20 turns upwardly, the pawl 16 so acts on the said stud 13c as to turn the recessed disc 13 through a sufficient angle to remove the recess 13a therein from below the roller 11a of the lever 11 to which the connecting rod 10 from the part 6a carrying the numerator disc, printing cylinder, or the like, is connected, the connecting rod 10 being thereby raised and moving the said numerator disc, printing cylinder, or its equivalent to the non-printing position indicated by the dot and dash lines in Figure 1, in which position it is retained until the disc 13 is again turned in the direction proper to bring the recess 13a therein below the roller 11a of the lever-like member 11 on which the said disc acts, when the said lever-like member turns downwardly and the connecting rod 10 brings the numerator disc 9 or printing cylinder, or equivalent part, back into the correct position for printing.

The automatic movement of the recessed disc 13 back to its initial position on the restoration of the feed of the sheets is effected by the action of the detector mechanism on the rocking arm 18 turning the rockable pawl 16, at the appropriate stage in the motions of the parts, into the position in which it again comes into alignment with the stud 13b on the said disc, and since this stud has by the movement of the disc 13 which takes place on the failure of the feed, been brought to such position that the pawl 16 makes contact therewith on the rising motion of the pawl carrying lever 20, the requisite turning motion is given to the disc 13 for restoring it to its initial position below the roller 11a of the lever 11 on which roller the disc 13 acts, and the roller drops into the recess thereby effecting the return of the numerator disc 9 or printing cylinder, or the like, to the correct printing position.

It will be appreciated that the construction and arrangement of the parts of the mechanism described may be varied without departing from the invention.

For example, as shown in Figure 3 of the drawings, the position of the studs 13b and 13c relative to the centre of the disc 13 may be reversed in which case the angular motions performed by the rockable pawl 16 and the arm 18 whereby the pawl is moved for bringing it into the positions in which it acts on one or other of the said studs 13b and 13c will be in the opposite direction from that of the similar parts in the first described arrangement.

Further in this modification the arm 18 is designed to act directly on the pawl 16 instead of through the medium of a link connection therewith, the upper end of the said arm being slotted as at 18a to engage with a laterally projecting stud 16a on the pawl 16, and the said arm is under the control of a spring 18b whereby it is retained in the position which it occupies relative to the stud 13b when the machine is running with correct feeding of the sheets.

A modified construction of the pawl 16 and lever 20 whereon it is mounted is also illustrated in the said Figure 3, the pawl 16 being designed for mounting on one side of the lever 20 instead of in a bifurcated end thereon and being furnished with a heel piece 16b adapted to contact with projections 20c and 20d provided on the lever 20 for limiting its angular turning motion in one or the other direction.

In either of the arrangements described the lever 20 may perform its rising and falling motions under the control of a spring, such as the spring 24 shown in Figure 3.

Suitable sheet detector mechanism through the medium of which the operations of the mechanisms described may be automatically controlled in the running of the machine is illustrated in Figures 4 and 5.

The said sheet detector mechanism embodies a member 25, hereinafter referred to as the latch member, which is so disposed in relation to the periphery of the impression cylinder 15 as to come under the action of the sheets which are fed to the said cylinder by any ordinary and suitable sheet feed mechanism, not shown. The said latch member rests on a bar 26 fixed to the machine framing and has on the underside thereof a projection 25a which, when no sheets are being fed on to the impression cylinder, co-acts with the said bar 26 to prevent motion of parts of the mechanism hereinafter described.

The latch member 25 is pivotally attached to a lever arm 27 integral with a second lever arm 27a which in turn has pivotal connection with the upper end of a connecting rod 28 the lower end whereof is pivoted to the arm 29 of a triple armed lever-like member fulcrumed at 29a on the side frame 7 of the machine, the other arms of the said lever-like member being denoted by the references 29b and 29c respectively.

The arm 29 of the triple armed lever-like member is connected by a spring 29e to a fixed point on the side frame of the machine, the said spring so operating as to tend to turn the arm 29 in an upward direction, but such upward motion is prevented so long as the projection 25a of the latch 25 remains in its latching engagement with the bar 26, that is to say, so long as no sheets are being fed to the impression cylinder 15.

The unpivoted end of the arm 29b is furnished with a roller 29d which bears on a cam 30 carried by the main shaft 23 and which consequently rotates continuously during the running of the machine, while the third arm 29c is in operative connection with a bar 31 mounted and adapted for a sliding motion in a guide block 32 fixed on the side of the machine, the said bar 31 carrying a projection 31a which in one direction of the motion of the bar acts on and effects the turning motion of a rod 33 depending from and pivoted on a lever 34 fulcrumed on the side frame, the turning motion of the said depending bar being effected against the restraining action of a spring 35 suitably anchored thereto and to the lever 34.

The rod 33 is furnished at its upper end with an extension 33a which co-acts with a projection 34a on the lever 34 to maintain the rod in the vertical position under the action of the controlling spring 35.

The lever 34 whereon the depending rod 33 is pivoted is provided at its unpivoted end with a roller 34b which comes under the action of a cam 36 mounted on the main shaft 23 and continuously rotating therewith, and when the rise of the said cam 36 is travelling over the roller 34b the lever 34 is depressed thereby depressing the pivoted rod 33.

The lower end of the said rod 33 is, when the said rod is in its vertical position, located directly over a rod 37 which is adapted to slide between guides such as the projections 38 on the side frame 7 of the machine, the said rod 37 having pivotal connection at its lower end with a crank-like arm 19a on the shaft 19 the other end whereof carries the arm 18 which effects the movement

of the rockable pawl 16 to one or other of the positions in which it may act on the projecting studs 13b or 13c on the disc 13 hereinbefore referred to and for the purpose specified.

The operation of the sheet detector mechanism described is as follows:

In the normal running of the machine each sheet which is fed to the impression cylinder 15 acts in the manner well understood to turn the latch member 25 to a sufficient extent to release the projection 25a thereon from its engagement with the fixed bar 26, and when this release is effected such relative turning of the lever arms 27 and 27a can take place as will permit the connecting rod 28 to move upwardly when the roller 29d on the arm 29b of the triple-lever armed member passes on to the fall 30a of the cam 30 and this is timed to take place in synchrony with the release of the latch member 25.

On the turning of the triple arm lever during the upward movement of the connecting rod 28 the arm 29c thereof draws the slidable bar 31 in the direction proper to bring the projection 31a thereon against the pivoted rod 33 depending from the lever 34, thereby turning this rod, against the action of the spring 35 from out of alignment with the rod 37 on the crank-like arm 19a on the shaft 19, and consequently the rod 37 is not acted on by the rod 33 when the rise of the cam 36 depresses the lever 34 from the position which it occupies when the fall of the said cam 36 is passing over the roller 34b on the said lever, and as no motion is communicated to the shaft 19 and the arm 18 on the opposite end thereof, the rockable pawl 16 remains in the position in which it is presented to the stud 13b on the rotatable disc 13.

When the fall of the cam 36 again comes on to the roller 34b the depending rod 33 is brought back into alignment with the rod 37 but is again removed out of alignment by a repetition of operations described each time the latch 25 is tripped by the continuous feed of the sheets to the impression cylinder.

In the event of the failure of the sheet feed the latch 25 remains in engagement with the bar 26 and acting in conjunction with the lever arms 27, 27a associated therewith prevents the upward movement of the connecting rod 28 necessary for communicating the requisite motion to the lever arm 29c for effecting the sliding of the bar 31 in the direction proper for deflecting the rod 33 from alignment with the rod 37, and hence when the rise of the cam 36 comes on to the roller 34b of the lever 34 and the depending rod 33 is depressed it acts on the rod 37 and the shaft 19 is turned and effects the motion of the arm 18 at its other end in the direction for bringing the rockable pawl 16 into the position in which it can act on the stud 13c when the lever 20 is raised by the cam 21, the action of the said pawl 16 on the stud 13c turning the disc 13 into the position in which it acts to raise the numerator disc 9 (or the like) from the normal printing position.

As long as no sheets are fed the pawl 16 simply oscillates to the positions it can assume relative to the studs 13b and 13c, but immediately the sheet feed is restored the rockable pawl 16 on the following rising movement of the cam 20 so acts on the stud 13b as to turn the disc 13 back to the position in which the recess 13a comes under the roller 11a, when the lever 11 falls and thereby lets down the connecting rod 10 and parts connected therewith so as to bring the numerator disc (or the like) back to the printing position, and the machine then continues to operate normally until the next cessation of the feed of the sheets.

It is to be understood that the invention is not limited to the precise details in construction or design of the parts described and represented in the drawings as the same may be varied without departing from the essential or characteristic features of the invention.

What I claim is:

1. In a rotary printing machine, a driving member, a cam adapted to be shifted on its axis between two positions, a cam-shifting means actuated by said driving member, said cam-shifting means being controlled by the feed of sheets to move between two positions and being actuated when in one position to shift said cam into one position, said cam-shifting means being actuated when in its other position to shift said cam into its other position, said cam-shifting means being moved into position to shift said cam into one position on cessation of normal feed and being moved into position to shift said cam into its other position on resumption of normal feed, and a movable member bearing against said cam that throws off the impression when moved in one direction and throws on the impression when moved in the opposite direction, the movement of said member to throw off the impression being produced by the shifting of the cam into one position, and the movement of said member to throw on the impression being produced by the shifting of the cam into its other position, and the drive of said member by said cam being irreversible whereby said cam remains in one position until shifted into its other position by the cam-shifting means.

2. In a rotary printing machine, a member that oscillates continuously during the operation of the machine, a cam adapted to be shifted on its axis between two positions, a pawl mounted upon said member that is controlled by the feed of sheets to move between two positions relative to said member, said pawl when in one position engaging said cam to shift said cam into one position, and when in its other position engaging said cam to shift said cam into its other position, said pawl being moved into position to shift said cam into one position on cessation of normal feed and being moved into position to shift said cam into its other position on resumption of normal feed, and a movable member bearing against said cam that throws off the impression when moved in one direction and throws on the impression when moved in the opposite direction, the movement of said member to throw off the impression being produced by the shifting of the cam into one position, and the movement of said member to throw on the impression being produced by the shifting of the cam into its other position, and the drive of said member by said cam being irreversible whereby said cam remains in one position until shifted into its other position by said pawl.

3. In a rotary printing machine, a member that oscillates continuously during the operation of the machine, a cam adapted to be shifted on its axis between two positions, having two studs, a pawl mounted upon said member that is controlled by the feed of sheets to move between two positions relative to said member, said pawl when in one position engaging one stud to shift said cam into one position, and when in its other position engaging the other stud to shift said cam into its other position, said pawl being moved into position to shift said cam into one position on cessation of normal feed and being moved into

position to shift said cam into its other position on resumption of normal feed, and a lever bearing against said cam that throws off the impression when moved in one direction and throws on the impression when moved in the opposite direction, the movement of said lever to throw off the impression being produced by the shifting of the cam into one position, and the movement of said lever to throw on the impression being produced by the shifting of the cam into its other position, and the drive of said lever by said cam being irreversible whereby said cam remains in one position until shifted into its other position by said pawl.

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