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W. ZIMBEL

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CYLINDER PRINTING MACHINE WITH RECIPROCATING CARRIER

Filed March 10, 1925

2 Sheets-Sheet 1

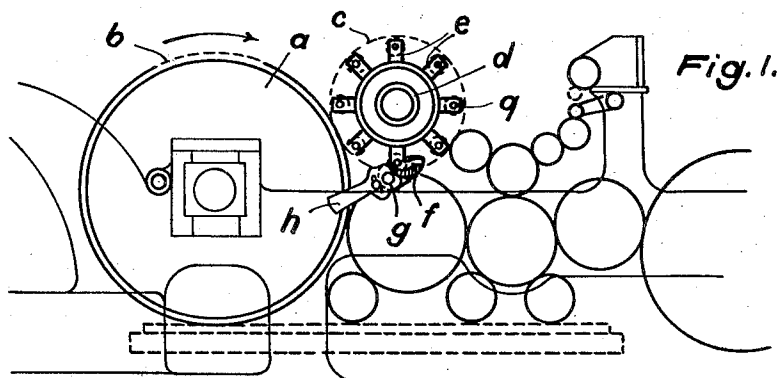


Fig. 1.

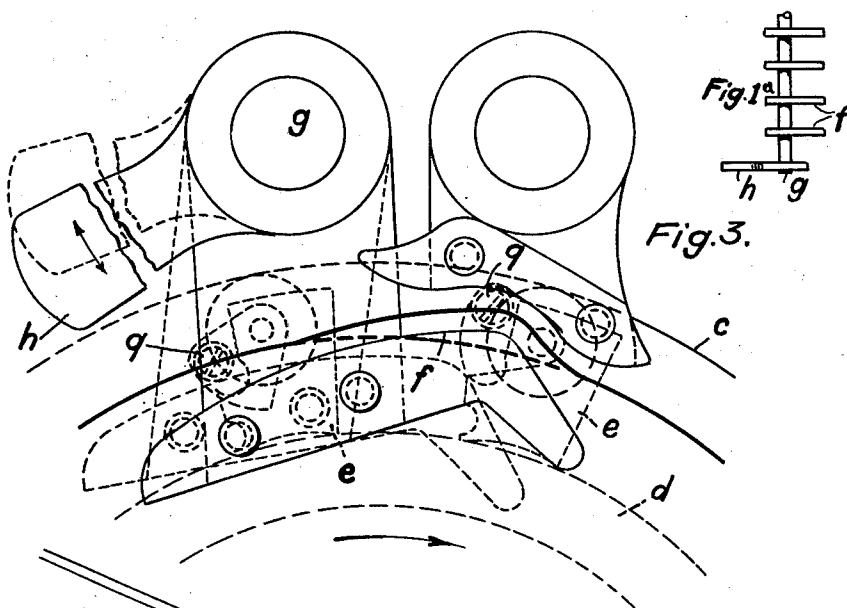


Fig. 1a.

Fig. 3.

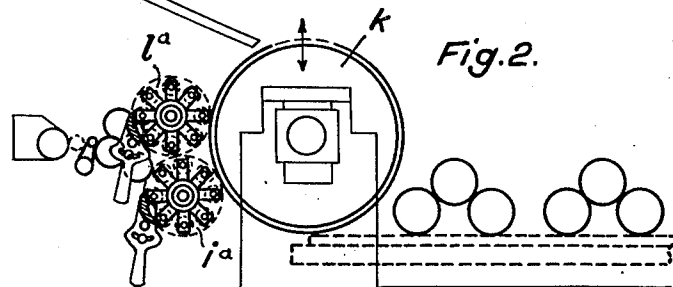


Fig. 2.

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2 Sheets-Sheet 2

Fig. 5.

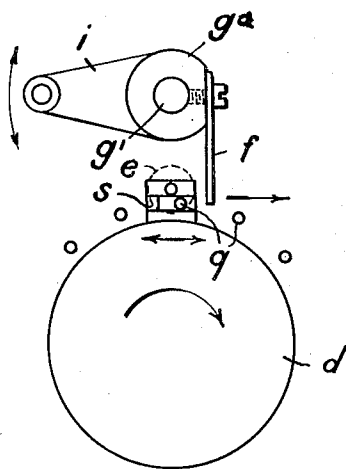


Fig. 6.

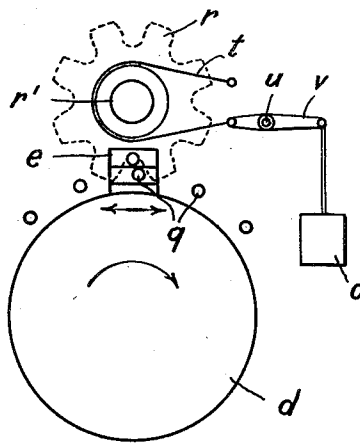
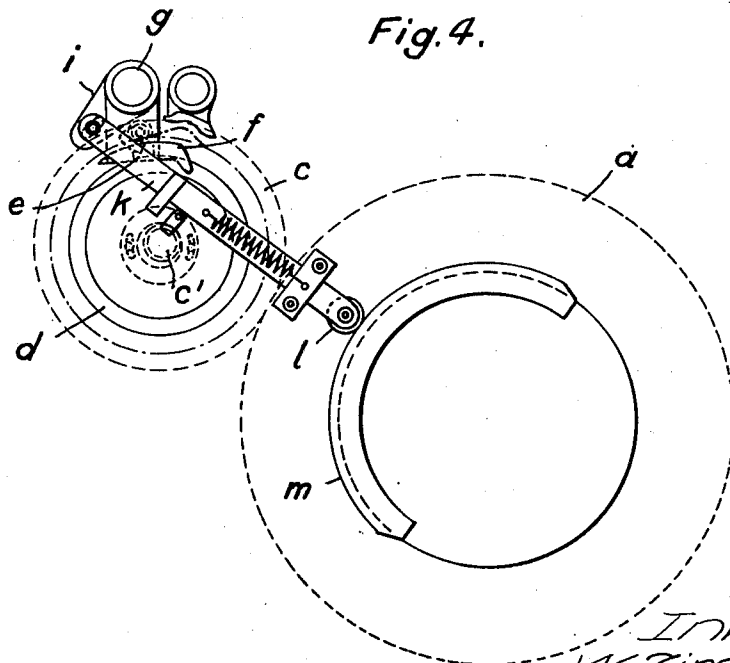


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CYLINDER PRINTING MACHINE WITH RECIPROCATING CARRIER.

Application filed March 10, 1925, Serial No. 14,547, and in Germany September 5, 1923.

This invention relates to cylinder printing machines with reciprocating carriers and its object is to provide means whereby sheets and the like may be printed and successively numbered in a single pass through the machine.

In continuously running rotary printing machines sheet numbering devices have been used in which the successive number types were brought into operative position by a cycloidal or like cam member. The application of such numbering devices to cylinder printing presses with reciprocating carriers has not hitherto been successful.

According to this invention a rotary numbering member operates against the printing cylinder of a cylindrical printing machine with a reciprocating carrier and this rotatable numbering member carries one or more numbering devices.

By this means the operations of printing and numbering the sheet are performed in a single working operation or pass, whereas it has hitherto been necessary to pass the sheets first through one cylindrical press to print the sheet and then through a second press to effect the successive numbering. In this known form the number of types are mounted in a very complicated frame which effects the resetting of the numbering mechanisms by the action of a fixed stop. Thus in addition to the elimination of a second printing operation, I am able to dispense with this complicated and expensive numeral frame. To these material advantages must be added the saving in time caused by the printing and numbering being effected simultaneously as the drying also proceeds simultaneously.

In some cases I effect the progressive changing of the numbering type by the combined action of a cam member mounted on the printing cylinder and operable by mechanism such as a roller and oscillatable lever so that the cam on the printing cylinder operates on the numbering device or devices at one revolution and is switched into a position, at the next revolution of the printing cylinder, in which the cam does not advance the number type.

According to the invention a plurality of numbering devices are arranged on rings, which are shiftably located in spaced relation on a special shaft and the types of each numbering device are shifted by means

of swinging interconnected levers, each of which is equipped with a cycloidal cam member by means of which the numbering device is reset.

The invention will be better understood from the following description of the forms illustrated by way of example in the accompanying drawings, in which,

Figure 1, is a diagrammatic side view of a printing press with an automatic numbering device organized in accordance with this invention and in which the cylinder is stopped after a single revolution.

Fig. 1^a shows a detailed view in plan of a plurality of the cams *f* on the common shaft *g* and the relation of the lever *h*.

Figure 2, shows the invention applied to a two revolution machine.

Fig. 3 shows the lever mechanism according to the invention and the cycloid cam mechanism connected to the same.

Figure 4, shows, also in diagrammatic form, a modification in which the progressive movement of the numbering mechanisms, carried on separate rotating members, is effected by a cam member on the printing cylinder and is adapted to be switched into or out of operative position by a cam rod and oscillating lever.

Figure 5, and 6 are diagrammatic views showing the ordinary type of numbering mechanisms mounted on a rotating numbering member or carrier instead of a numbering frame.

In carrying the invention into effect according to the form shown in Fig. 1, the cylinder *a* is stopped after each complete revolution. This cylinder is provided with a driving gear *b* which engages with a gear *c*, which also drives the ring *d* on which the numbering devices are mounted. The pitch circle of the gear *c* is an aliquot fraction of the pitch circle of the toothed ring *b* of the printing cylinder. The device here illustrated will be employed when numbering smaller sized sheets or cards. When the cylinder *a* rotates, the ring *d* also rotates and when the cylinder *a* is stationary, so also is the ring *d*.

The progressive advancement of the numbering type is effected by a cycloidal cam member *f* which may be switched into or out of operative position by operating the lever *h* to swing the cam member about the axis *g*. The numbering type boxes *e* are mounted on the ring *d* and the roller of the oscilla-

tion arm of the numbering mechanism *e* runs up the slope of the cam *f* and so moves the number type one step onward. At each revolution of the ring *d*, the numbers presented by the numbering devices are changed.

In the two revolution cylinder machine shown in Figure 2, the ring *i*^a is also an aliquot fraction of the printing cylinder *k*. In this case two rings *i*^a and *i*^b are necessary as the cylinder of two revolution machines is generally smaller in diameter than in the case of the machine illustrated in Figure 1. The paper lies over practically the entire periphery of the cylinder in this form while in the form of machine according to Figure 1, only about half of the periphery is encircled by the paper. The numbering carrier member is thus of necessity given a much smaller diameter in this second form. In consequence it is found necessary to support the numbering mechanisms on two carriers arranged one over the other so as to cover the entire paper. It will be understood that one numbering carrier prints on the first half of the paper, while the other prints the second half. The carrier bodies *i*^a and *i*^b are thus each of half the peripheral length of the printing cylinder. In this way the entire sheet, is numbered at the first complete revolution of the printing cylinder, whereupon the cylinder *k* is raised, as indicated by the double headed arrow in Fig. 2, and in this raised position it completes its second revolution while the carriage returns without effecting any printing operation. In this raised position the gears remain in engagement but the number types do not contact with the paper sheet.

According to the form shown in Fig. 4, the periphery of the printing cylinder *a* is generally double that of the pitch circle of the gear *c* which is mounted on the shaft *c*¹ which drives the annular carrier *d*. In this case the gear *c* rotates through two revolutions for each revolution of the printing cylinder. The paper, in operation, in this case only lies around about one half of the periphery of the printing cylinder so that the pitch circle of the gear *c* is substantially equal to the printing surface. Generally a fairly thick sheet is laid around the printing cylinder on the printing surface thereof and corresponding in size to the set-up face of the type. The rotatable annular carrier *d* is mounted on the axis *c*¹ and the numbering mechanisms *e* are fixed to this carrier in the known manner. It is necessary to operate these mechanisms to advance the number types by means of the cam member *f* but this must only occur at alternate revolutions of the gear wheel *c*, while at the intermediate revolutions the number changing gear must be inoperative.

The lever *i* is keyed to the shaft *g*. A roller *l* contacting with a segmental cam *m* on the printing cylinder operates a spring pressed cam rod *k* coupled to the lever *i*. The cam piece *f*, which operates the numbering mechanisms, swings with the arm *i* which is keyed to the axis *g*. Thus when the cam segment *m* co-operates with the roller *l* to swing the arm *i*, the cam piece *f* is out of operative position and the rotation of the carrier *d* can proceed without causing any fresh setting of the number type in the numbering mechanisms *e*.

It will be understood that in the form shown in Fig. 1, the first half of the paper sheet is printed with one number and the second half with the next following number. In the form shown in Fig. 4, however, the advancement or re-setting of the numbering type is intermitted and an inoperative or idle revolution follows the number printing revolution. Fig. 1 thus illustrates the method of re-setting the numbers while the mechanism described with reference to Fig. 4 illustrates how the re-setting is made intermittent in such a way as only to take place once at each revolution of the printing cylinder. In this way sheets of any desired size, within the limits of practice, may be successively numbered, whereas the device according to Fig. 1 applies only to smaller sized sheets or cards.

In Figures 5 and 6, the type of numbering mechanism, hitherto only employed in numbering frames, is shown as mounted in a rotatable carrier with suitable operating mechanism for effecting the progressive re-setting of the numeral types.

According to the form shown in Fig. 5; the numbering mechanism *e* of the known type is mounted on a ring *d*. The mechanism is provided with a roller *q* adapted to move backwards and forwards in a guide slot *s* in the path indicated by the double headed arrows. This reciprocating movement resets the number type. In machines using numbering frames, this resetting or operation of the roller *q* was effected by links mounted on a special frame. According to this form of the present invention, the roller *q* is operated by contacting in its revolution with a fixed spring *f*, which holds up the movement of the roller sufficiently long to effect the resetting of the numeral type. The roller *q* on completion of the resetting operation is at one extremity of its stroke and it then forces the spring *f* to the right in the direction of the arrow and the reset numbering device moves on with the rotation of the carrier body *d*. The spring *f* now freed from contact with the rollers reverts to its normal position. The spring *f* is fixed to a ring *g*^a fixed to shaft *g*¹ and rotatable by means of a lever *i*.

In the form shown in Fig. 6, the known numbering mechanism *e* is mounted on a rotatable carrier *d* as before and the roller *g* is adapted to contact with the teeth of a star wheel *r* rotatable about the axis *r*¹. The star wheel *r* is subjected to the action of a brake such as a band *t* around a brake disc on the axis *r*¹. The brake band *t* is attached to one end of a lever *v* mounted to swing about the pivot *u* and subjected to the action of a weight *o*. The friction on the brake is sufficient to cause the roller *g* to be moved to re-set the numeral printing type and when the roller reaches the end of its operative stroke the star wheel *r* is moved forward into a position to co-operate with the next on-coming roller *g*. Other types of numbering mechanism may be applied such as the star type of numbering mechanism.

I claim:

1. In a cylinder printing machine having a reciprocating carrier and a numeral printing mechanism, a rotatable shaft for the numeral printing mechanism, a plurality of carrier members longitudinally shiftable on said shaft, a plurality of numbering devices on each carrier member, a shaft arranged parallel to the shaft of the numeral printing mechanism, a plurality of levers on said shaft corresponding in number to the number of carrier members individually adjustable along the said shaft and simultaneously operable, a cam member on each of the said levers to effect a resetting of its respective numbering device when brought into operative contact with the same and means for moving the said levers with their cams into and out of contact with the said numbering devices.

2. In a cylinder printing machine having

a reciprocating carrier and a numeral printing mechanism, a rotatable shaft for the numeral printing mechanism, a plurality of carrier members longitudinally shiftable on said shaft, a plurality of numbering devices on each carrier member, a shaft arranged parallel to the shaft of the numeral printing mechanism, a plurality of levers on said shaft corresponding in number to the number of carrier members individually adjustable along the said shaft and simultaneously operable, a cycloidal cam member on each of the said levers adapted to effect a resetting of its respective numbering device when brought into operative contact with the same and automatic means for moving the said levers with their cams into and out of contact with the said numbering devices.

3. In a cylinder printing machine having a reciprocating carrier and a numeral printing mechanism, a rotatable shaft for the numeral printing mechanism, a plurality of carrier members longitudinally shiftable on said shaft, a plurality of numbering devices on each carrier member, a shaft arranged parallel to the shaft of the numeral printing mechanism, a plurality of levers on said shaft corresponding in number to the number of carrier members individually adjustable along the said shaft and simultaneously operable, a cycloidal cam member on each of the said levers to effect a resetting of its respective numbering device when brought into operative contact with the same, a rod linkedly connected to the shaft of the numbering mechanism at one end and equipped with a roller at the other end, and a cam on the end face of the printing cylinder, said cam lifting the said rod when in engagement with the same, thereby swinging the cam-shaped ends of the said resetting levers out of the path of the said numbering devices.

In testimony whereof I affix my signature.
WILHELM ZIMBEL.