April 8, 1924. 1,489,878

H. BONHAM

PRINTING MACHINE

Filed Dec. 21, 1920 3 Sheets-Sheet 1

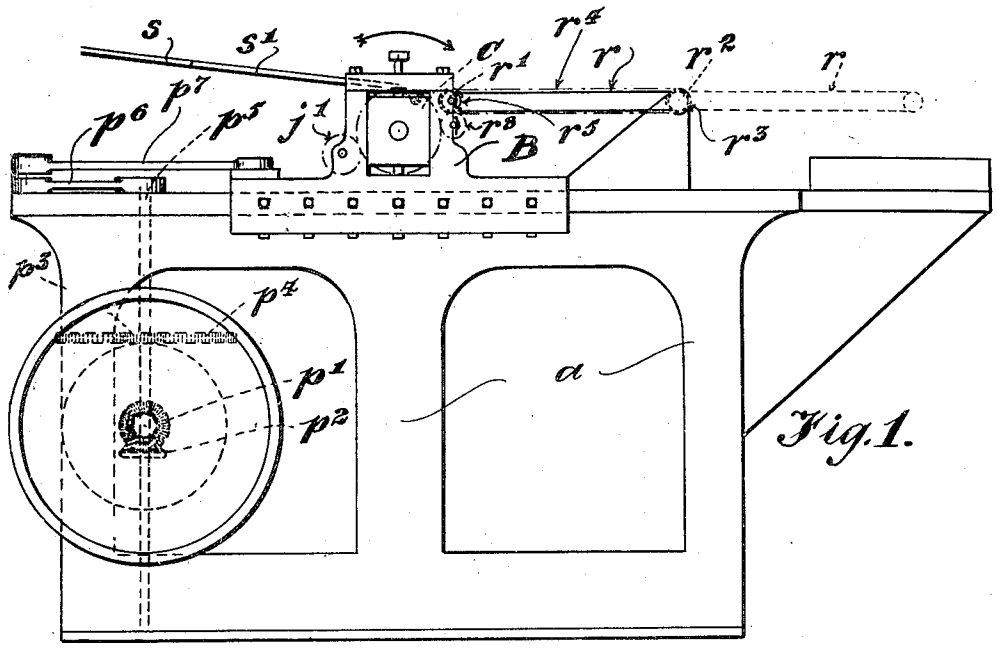


Fig. 1.

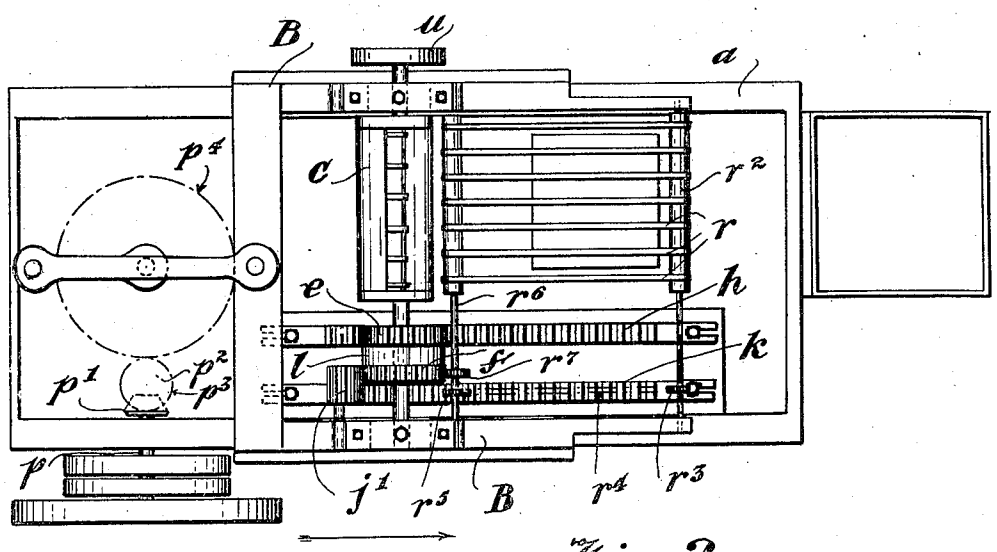


Fig. 2.

Inventor-
Herbert Bonham
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Howson & Howson

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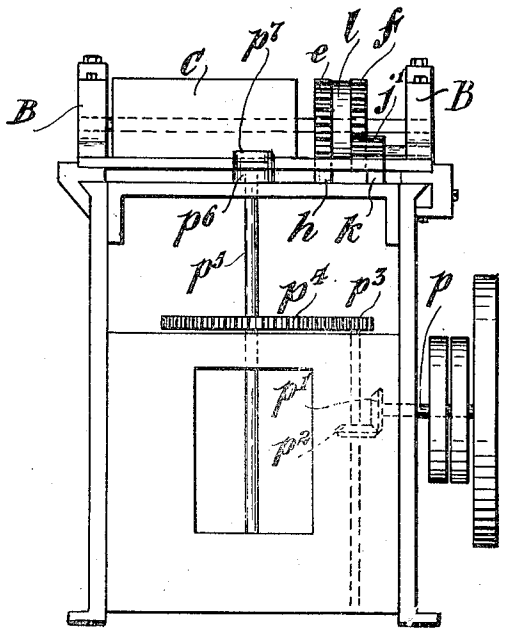


Fig. 3.

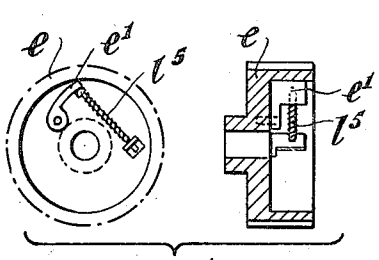


Fig. 4.

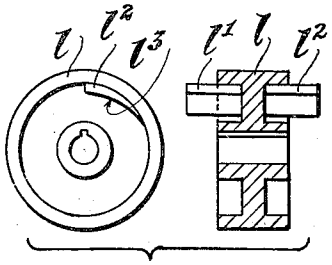


Fig. 5.

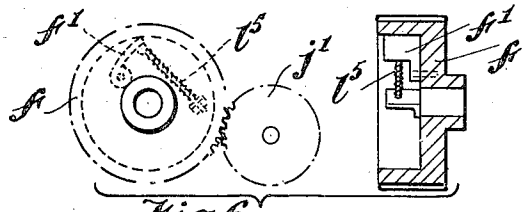


Fig. 6.

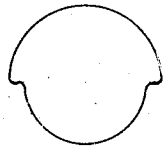


Fig. 7.

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PRINTING MACHINE

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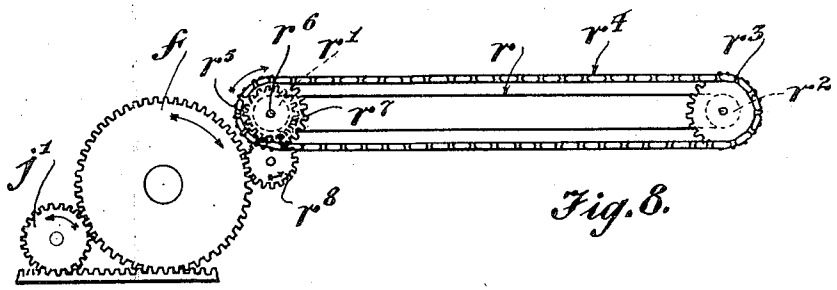


Fig. 8.

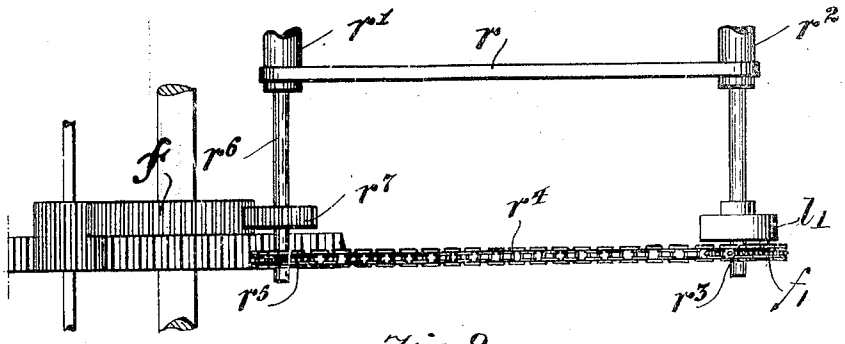


Fig. 9

Inventor—
Herbert Bonham.
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Patented Apr. 8, 1924. 1,489,878

UNITED STATES PATENT OFFICE.

HERBERT BONHAM, OF GLASGOW, SCOTLAND.

PRINTING MACHINE.

Application filed December 21, 1920. Serial No. 432,219.

To all whom it may concern:

Be it known that I, HERBERT BONHAM, a subject of the King of Great Britain and Ireland and the Isle of Man, and a resident of Broomhill, Glasgow, Scotland, have invented new and useful Improvements in and Connected with Printing Machines, of which the following is a specification.

This invention relates to single cylinder continuous revolution printing machines.

Under my invention two loosely mounted gear wheels are provided on the shaft of the cylinder which latter is reciprocated by any suitable means over a stationary bed which has secured thereto a rack or racks.

By means of the said rack or racks and intermediate gearing, said gear wheels are, when the cylinder is reciprocated, each rotated alternately and in opposite directions. Means are provided whereby each of said gear wheels alternately drives the cylinder which latter has a recessed or cut away portion on its periphery.

The arrangement is such that when the cylinder is reciprocated over the bed the said gear wheels are driven, as aforesaid, in opposite directions. By connecting each of said gear wheels alternately so as to drive the cylinder the latter is rotated in the same direction during both the backward and forward strokes. During the non-printing stroke the said recessed or cut away portion of the periphery of the cylinder passes over the form but not in contact therewith.

I also provide improved means for driving the delivery tapes.

In order that my invention may be properly understood I have hereunto appended an explanatory sheet of drawings illustrating by way of example one embodiment of my invention and whereon,

Figure 1 is a front elevation.

Figure 2 is a plan view and Figure 3 is an end elevation of a printing machine in accordance with my invention.

Figures 4, 5 and 6 illustrate details of a suitable form of gearing.

Figure 7 illustrates diagrammatically a cross section of a suitable form of a cylinder.

Figures 8 and 9 illustrate, diagrammatically, elevation and plan views of the tape driving mechanism.

Referring to the drawings,

a is the machine frame and B a frame to which a reciprocatory motion is imparted.

Mounted in bearings in the said frame B is the cylinder C the spindle of which carries the loosely mounted toothed wheels e and f and has keyed thereon the driving member l. The wheel e gears with the rack h and the wheel f with the pinion j^1 which latter gears with the rack k. The said racks are rigidly secured to the frame a of the machine. The driving member l has two projections l^1 and l^2, see particularly Figure 5, one of which when the machine is in operation is always driven by pivoted catches e^1 or f^1 of the wheels e and f respectively, see Figures 4 and 6.

Motion is transmitted to the driving shaft p which, through bevel gearing p^1 and p^2 and spur gearing p^3 and p^4 rotates the vertical shaft p^5. To the latter is rigidly secured a horizontal arm p^6 to the outer end of which is pivotally connected the arm p^7. The other end of the arm p^7 is connected to and consequently reciprocates the frame B over the frame a. As the frame B carrying therewith the cylinder C, is reciprocated the gear wheels e and f are rotated but in opposite directions. The pivoted catch of one of said wheels comes in contact with a projection of the member l which latter and consequently the cylinder C is rotated.

Assume the cylinder C to be travelling in the direction indicated by the arrow in Figure 2 then gear wheel e gearing with the rack h transmits its motion through its pivoted catch e^1 and driving member l to the cylinder C which is thereon rotated in the direction indicated by the arrow in Figure 1, gear wheel f in the meantime rotating idly. At the end of the stroke the direction of movement of the frame B reverses and this time the catch f^1 of the wheel f, which is driven by pinion j^1 in gear with rack k, comes in contact with the projection l^2 of the driving member l and thereby rotates the cylinder C. As the direction of the frame B has been reversed and the wheel f driven by the intermediate wheel j^1 the direction of rotation of the cylinder C remains as formerly.

Just before the end of the stroke the catch e^1 or f^1 that is not driving the member l is depressed by the wedge shaped side of the projections l^1 or l^2 and the arrangement is such that just when the direction of the frame B is reversed the disengaged clutch e^1 or f^1 is forced outwardly by the spring l^5 and bears against and drives one of the pro-

jections of the member l immediately said frame commences to travel in the opposite direction. This cycle of operations is continued, the cylinder always rotating in the same direction irrespective of the direction of the reciprocating frame B. The stroke of said frame would be exactly equal to the periphery of the cylinder so that for one forward stroke exactly one revolution of the cylinder takes place and the stops return to the precise position from which they started. The stops or catches e^1 and f^1 must be timed exactly so that when one lets go the other picks up and ensures a continuous revolving motion of the cylinder.

A cross section of the cylinder preferably used is illustrated diagrammatically in Figure 7.

When the cylinder on the printing stroke is passing over the forme the larger diameter is lowermost and in contact therewith. During the non-printing stroke as the cylinder still rotates in the same direction the smaller diameter passes over but not in contact with the forme.

A suitable form of delivery, which is shown in detail in Figures 8 and 9, comprises endless tapes r passing over rollers r^1 and r^2 both of which are supported on brackets carried by the travelling frame B. The roller r^2 may be driven during the non-printing stroke only by means of a free-wheel mechanism r^3 of any well-known form, say that employed in this invention for interconnecting the clutch element l with either of the driving clutch elements e or f, and this is the form illustrated in Figures 8 and 9 by the characters f_1 l_1. The operation of the clutch elements f_1 l_1 is otherwise the same as that of the previously mentioned clutch elements. The clutch element f_1 of the free-wheel mechanism r^3 may be driven by a chain r^4 passing over the chain wheel r^5. This wheel is keyed to a spindle r^6 while the roller r^2 is loosely mounted on the same. The spindle r^6 also has a pinion r^7 keyed thereon which is driven from the toothed wheel f by means of a pinion r^8.

The arrangement is such that during the non-printing stroke of the cylinder the tapes are driven from the toothed wheel f, pinions r^8 and r^7, chain wheel r^5, chain r^4 and free wheel mechanism r^3 and the printed sheets fed from the cylinder to the tapes during this movement. During the printing stroke the chain r^4 is driven by the aforesaid mechanism in the reverse direction but by the action of the free wheel mechanism r^3, the tapes are then not driven. During the next non-printing stroke the tapes are again driven and the sheet thereon delivered to the delivery board and a fresh sheet delivered from the cylinder to the tapes.

The frame carrying the tapes is preferably capable of swinging about the spindle at the delivery end and the feed board s has preferably a hinged member s^1. The tapes and feed board can thus be swung clear of the type and render the machine accessible for making ready.

In setting the racks the reciprocating cylinder is placed at the end of its stroke the racks inserted below their respective toothed wheels and pushed along the bed until the catch e^1 and f^1 come in contact with the projections l^1 and l^2. The racks are then secured by bolts and nuts and to permit of adjustment the racks are slotted.

u is a band brake adjusted to provide a slight retarding action on the rotation of the cylinder and by which the latter is prevented from overrunning.

Of course my invention is not limited to the form of clutches illustrated which may be considerably modified without departing from the spirit of my invention.

By a printing machine I mean any type of reciprocating cylinder used either for letter press, lithographic or any other process of printing.

In operation sheets are fed on the feed board s on top of the cylinder into stops or guides, and the cylinder c is placed with the gripper mechanism in position to seize the sheet from the feed board on the first revolution of the cylinder, and on the second revolution these grippers pass the feed board and are then opened to release the sheet into the delivery mechanism. The mechanism operating the grippers is not shown.

What I claim and desire to secure by Letters Patent is:—

1. In a single cylinder two revolution printing machine a cylinder having a recessed portion on its periphery, means for reciprocating the cylinder over a stationary bed, two gear wheels loosely mounted on the cylinder spindle, a rack fixed to the bed and driving directly one of said gear wheels, a rack secured to the bed and driving through an intermediate pinion the second gear wheel and means to connect each of said gear wheels alternately with the cylinder so as to drive the latter in the same direction during both backward and forward strokes, the recessed part of the cylinder passing over but not in contact with the forme on the non-printing stroke, substantially as described.

2. In a single cylinder two revolution printing machine a cylinder having a recessed portion on its periphery means for reciprocating the cylinder over a stationary bed, two gear wheels loosely mounted on the cylinder spindle a rack fixed to the bed and driving directly one of said gear wheels, a rack secured to the bed and driving through an intermediate pinion the second gear

wheel, a member secured to said cylinder spindle and having projections which engage alternately with clutch members carried by said gear wheels so as to drive the cylinder in the same direction during both backward and forward strokes, the recessed part of the cylinder passing over, but not in contact with the forme on the nonprinting stroke, substantially as described.

3. In a single cylinder two revolution printing machine a cylinder having a recessed portion on its periphery, means for reciprocating the cylinders over a stationary bed, two gear wheels loosely mounted on the cylinder spindle, a rack adjustably secured to the bed and driving directly one of said gear wheels, a second rack also adjustably secured to the bed and driving through a pinion the second gear wheel, means to connect each of said gear wheels alternately with the cylinder so as to drive the latter in the same direction during both backward and forward strokes, the recessed part of the cylinder passing over, but not in contact with, the forme on the nonprinting stroke, substantially as described.

4. In a single cylinder two revolution printing machine a cylinder having a recessed portion on its periphery, means for reciprocating the cylinders over a stationary bed, two gear wheels loosely mounted on the cylinder spindle, a rack fixed to the bed and driving directly one of said gear wheels, a rack secured to the bed and driving through an intermediate pinion the second gear wheel, means to connect each of said gear wheels alternately with the cylinder so as to drive the latter in the same direction during both backward and forward strokes, the recessed part of the cylinder passing over but not in contact with the forme on the nonprinting stroke, delivery tapes reciprocated with the cylinder and having gearing and free wheel mechanism by which said tapes are caused to travel on the nonprinting stroke, substantially as described.

5. In a single cylinder two revolution printing machine a cylinder having a recessed portion on its periphery, means for reciprocatng the cylinders over a stationary bed, two gear wheels loosely mounted on the cylinder spindle, a rack fixed to the bed and driving directly one of said gear wheels, a rack secured to the bed and driving through an intermediate pinion the second gear wheel, means to connect each of said gear wheels alternately with the cylinder so as to drive the latter in the same direction during both backward and forward strokes, the recessed part of the cylinder passing over but not in contact with the forme on the nonprinting stroke, delivery tapes reciprocated with the cylinder and carried by a pivotally mounted frame and gearing and free wheel mechanism by which said tapes are caused to travel on the nonprinting stroke, substantially as described.

6. In combination, a revolubly mounted cylinder, means for bodily reciprocating the cylinder, and means for interconnecting said cylinder and said first-mentioned means in such manner that said reciprocating movement of the cylinder causes a unidirectional rotative movement of the same.

7. In combination, a revolubly mounted cylinder, means for bodily reciprocating the cylinder, means for so interconnecting said cylinder and said means that said reciprocating movement of the cylinder causes a substantially continuous rotative movement of the cylinder, and delivery means operable for bodily movement of said cylinder in one direction only.

8. In combination, a revolubly mounted cylinder, means for bodily reciprocating the cylinder to establish a printing stroke and a non-printing return stroke, said cylinder having a portion of enlarged diameter adapted to engage a forme only during the printing stroke, means for so interconnecting said cylinder and said means that said reciprocating cylinder movement causes a substantially continuous rotative movement of the cylinder, and delivery means operable only during the non-printing stroke.

9. In combination, a cylinder mounted for rotation and for bodily reciprocation, means for bodily reciprocating said cylinder, oppositely revolving means actuated in accordance with the cylinder bodily movement, and clutch means interconnecting one or the other of said oppositely revolving means and said cylinder, depending upon the direction of bodily movement thereof, whereby said cylinder may be substantially continuously revolved in one direction only.

10. In combination, a cylinder mounted for rotation and for bodily reciprocation, means for bodily reciprocating said cylinder, oppositely revolving means actuated in accordance with the cylinder bodily movement, clutch means interconnecting one or the other of said oppositely revolving means and said cylinder, depending upon the direction of bodily movement thereof, whereby said cylinder may be substantially continuously revolved in one direction only, and delivery means operated in accordance with the bodily movement of said cylinder.

H. BONHAM.

Witnesses:
CECIL C. CALL,
J. SIME.