(No Model.)

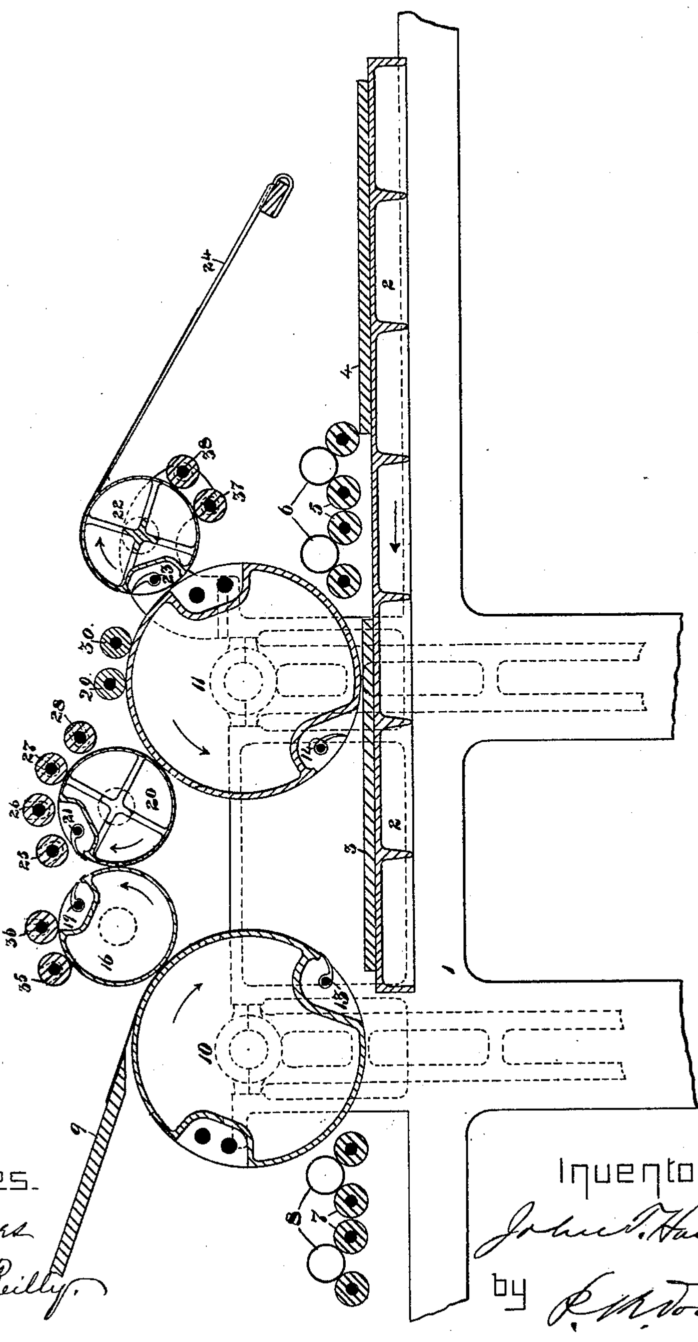
2 Sheets—Sheet 1.

J. T. HAWKINS.

PERFECTING PRINTING MACHINE AND MEANS FOR PREVENTING OFF-SET IN THE SAME.

No. 418,979. Patented Jan. 7, 1890.

Fig. 1.



Witnesses.
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Francis P. Reilly

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Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. T. HAWKINS.

PERFECTING PRINTING MACHINE AND MEANS FOR PREVENTING OFF-SET IN THE SAME.

No. 418,979. Patented Jan. 7, 1890.

Fig. 2.

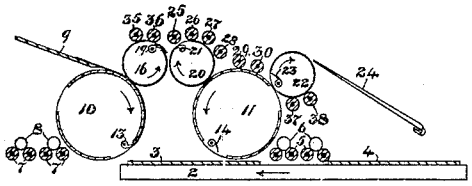


Fig. 3.

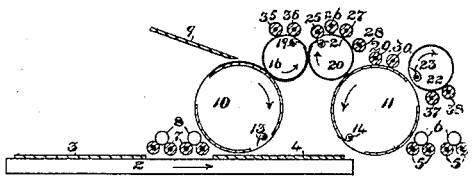


Fig. 4.

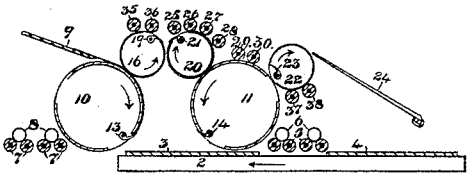


Fig. 5.

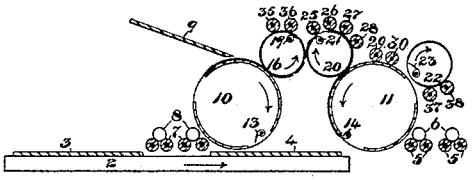
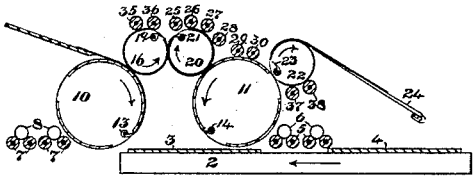


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

PERFECTING PRINTING-MACHINE AND MEANS FOR PREVENTING OFFSET IN THE SAME.

SPECIFICATION forming part of Letters Patent No. 418,979, dated January 7, 1890.

Application filed March 28, 1889. Serial No. 305,192. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented new and useful Improvements in Perfecting Printing-Machines and Means for Preventing Offset in the Same, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a perfecting printing-machine printing from flat forms adapted to operate with an apparatus for preventing offset of the ink from the freshly-printed first sides of the sheets upon the second impression-cylinder, by means such as shown in my pending application, Serial No. 305,191, filed herewith, as hereinafter particularly described.

The invention will first be described in detail, and then particularly set forth in the claims.

In the accompanying drawings, Figure 1 is a vertical section of so much of a flat-bed perfecting printing-machine as is necessary to fully illustrate this invention. Figs. 2 to 6, inclusive, are diagrams showing several positions of the parts of the machine in the course of printing the sheets.

In said figures the several parts are indicated by reference-letters as follows:

The number 1 indicates one of the main frames of the machine; 2, the type-bed carrying two forms, 3 and 4, 3 printing the first, and 4 the second, side of the sheet.

The number 5 indicates the ink-rollers and 6 the distributing-rollers for form 4, and 7 the ink-rollers and 8 the distributing-rollers for form 3. By suitable mechanism, in any of the well-known ways, the rollers 7 and 8 are raised at the proper time to clear the form 4, as shown, and, similarly, rollers 5 and 6 are raised to clear form 3.

The number 9 indicates the feed-board; 10, the first impression-cylinder, and 11 the second impression-cylinder, each cylinder geared, in any of the well-known ways, to the bed-reciprocating mechanism, so as to make two revolutions for each impression, and also, by any of the well-known methods, arranged to rise and lower alternately to escape the forms on the non-printing revolution and be held in contact therewith on the printing revolution.

The numbers 13 and 14 indicate the grippers, respectively, of cylinders 10 and 11.

The transfer-cylinder 16 carries grippers 19, which take the sheets from the grippers of impression-cylinder 10 and transfer them to the similar transfer-cylinder 20.

The transfer-cylinder 20, carrying grippers 21, is half the diameter of the impression-cylinders 10 and 11, and makes four revolutions to each sheet printed, receiving the sheets from the transfer-cylinder 16 and transferring them to impression-cylinder 11, carrying each sheet four times around it after receiving the sheet from transfer-cylinder 16 and before transferring it to impression-cylinder 11.

The transfer or delivery cylinder 22 carries grippers 23, receiving the sheets from impression-cylinder 11. A well-known oscillating fly 24 receives the sheets from the transfer or delivery cylinder 22 and delivers them upon a receiving-table. (Not shown.)

The impression-cylinders 10 and 11, transfer-cylinder 16, and transfer-cylinders 20 and 22 are all geared together by proper spur-gears on their respective axes meshing together at the lines of contact of the several cylinders, these gears being omitted as unnecessary to illustrate this invention and as well understood in the art in such a construction. Each of the two impression-cylinders 10 and 11 makes two and the transfer-cylinders 16, 20, and 22 each make four revolutions to each sheet printed.

The transfer-cylinder 16 is covered with rubber or any suitable substance with sufficient elasticity, and given an exterior coating of a compound varnish impermeable to and non-absorbent of printing-ink or any equivalent coating, preferably of a mixture of printing-ink and lithographic varnish with a suitable drier, which will readily receive offset of ink from the printed sheet under pressure and submit to cleansing by a more or less wiping action. The rollers 35 36 are covered with an elastic inner covering of felt, rubber, or other suitable substance, and an outer absorbent covering, preferably of common paper, running in contact with trans-

fer-cylinder 16, where the sheet does not pass upon it. They may be run by frictional contact at a uniform surface velocity with cylinder 16 or be geared to it so as to have a slight wiping action in a well-known way, as may be desired. I do not confine myself as to which of the transfer-cylinders 16 and 20 shall be provided with the elastic covering. The rubber or other elastic covering may be placed upon transfer-cylinder 20, in which case the non-absorbent varnish or other outer coating for receiving the offset from the first printed sides of the sheets may be applied directly to the metal of the transfer-cylinder 16; or the metal of the cylinder may be so grained and prepared as to readily receive ink as offset from the sheets.

The rollers 25 26 27 28, similar to rollers 35 and 6, run with a uniform surface velocity by gearing or frictional contact with the sheets as they pass upon the transfer-cylinder 20. These four rollers are arranged to rise and fall by any well-known means, so that on the first revolution of the cylinder 20 with the sheet upon it roller 25 only, on its second revolution roller 26 only, on its third revolution roller 27 only, and on its fourth revolution roller 28 only will be in contact with the sheet, three of said rollers at each revolution being raised from contact. The rollers 29 30, similar to rollers 35 and 36, run continuously upon the tympan-surface of the second impression-cylinder 11 at the top, where no sheet passes. The rollers 37 38, similar to rollers 35 36, run continuously in contact with the transfer or delivery cylinder 22 at a point where no sheet passes. In this arrangement of machine the two sets of inking-rollers 5 6 and 7 8 may be replaced by a single set, as 5 and 6, placed in the space between the two impression-cylinders 10 and 11, the one set inking both forms; but the arrangement shown is preferable for accessibility, perfection of distribution, and other reasons of a structural character.

The operation of the machine is as follows: The sheets are fed to the grippers 13 of the first impression-cylinder 11 from the feed-board 9, in the usual way. Following a first sheet, it is carried around cylinder 10, ready to commence printing on form 3, as shown in Fig. 1, then printed by the form 3 on its first side, carried up, and thence taken by the transfer-cylinder 16, thence by the transfer-cylinder 20, as shown in Fig. 3, passing between the transfer-cylinders 16 and 20, under pressure sufficient to cause superfluous ink to be offset upon transfer-cylinder 16, then making one revolution on cylinder 20, in contact with roller 25, when cylinder 10 will have taken a second sheet down, ready to commence printing, as shown in Fig. 4. The first sheet then takes a second revolution on cylinder 20 in contact with roller 26, a third in contact with roller 27, and a fourth in contact with roller 28, and is transferred to cylinder 11 and carried down, ready to be printed on its second side on form 4, the parts assuming the position shown in Fig. 5, in which the second sheet is just transferred from cylinder 16 to cylinder 20. While the second sheet is carried four times around cylinder 20, the first sheet is printed on its second side, transferred to the cylinder 22, and from it down the fly 24, when the cylinder 10 will have taken a third sheet, the parts assuming the position shown in Fig. 6. During these operations the rollers 35 36 remove the ink offset from the first printed sides of the sheets upon cylinder 16, the rollers 25 26 27 28 successively removing any residue and operating to dry and fix the remaining ink more perfectly upon the sheet; and, finally, the rollers 29 and 30 keep the tympan-surface of cylinder 11 clear of any slight residue that may be offset upon it from the first printed sides of the sheets. The rollers 37 and 38, in the same manner as rollers 35 and 36, keep the transfer or delivery cylinder 22 clear of any ink offset upon it from the freshly-printed second sides of the sheets.

The mechanism for operating the several sets of grippers and for elevating the rollers 25, 26, 27, and 28 is omitted, as these operations may be performed in many ways well known in the art. Said mechanism is therefore unnecessary to the illustration of this invention.

Having thus fully described my said improvements, as of my invention I claim—

1. A perfecting printing-machine having in combination the following-named elements: a reciprocating bed carrying two forms, as 3 and 4, two impression-cylinders, as 10 and 11, each making two revolutions to each impression, printing respectively on said forms, and each carrying grippers, as 13 14, a first transfer-cylinder, as 16, carrying grippers, as 19, and a second transfer-cylinder, as 20, carrying grippers, as 21, making four revolutions to each sheet printed, said transfer-cylinders and impression-cylinders being geared together in train and properly geared to and timed with said reciprocating bed in any well-known way, whereby the sheets taken by the grippers of the first impression-cylinder are printed by the first form, thence transferred to the first transfer-cylinder with their printed sides in contact therewith, thence to the second transfer-cylinder with their printed sides out and carried four times around said second transfer-cylinder, thence transferred to the second impression-cylinder with their printed sides in contact therewith, and printed upon their second sides by the second form, substantially as set forth.

2. A perfecting printing-machine having in combination the following-named elements: a reciprocating bed carrying two forms, as 3 and 4, two impression-cylinders, as 10 and 11, each making two revolutions to each impression, printing respectively on said forms, and each carrying grippers, as 13 and 14, a feed-board, as 9, leading to the first impression-

cylinder, a first transfer-cylinder, as 16, carrying grippers, as 19, a second transfer-cylinder, as 20, carrying grippers, as 21, making four revolutions to each sheet printed, a third transfer-cylinder, as 22, carrying grippers, as 23, and an oscillating fly, as 24, said transfer-cylinders and impression-cylinders being geared together in train and properly geared to and timed with said reciprocating bed in any well-known way, whereby sheets taken from said feed-board by the grippers of the first impression-cylinder are printed by the first form, thence transferred to the first transfer-cylinder with their printed sides in contact therewith, thence to the second transfer-cylinder with their printed sides out and carried four times around said second transfer-cylinder, thence transferred to the second impression-cylinder with their printed sides in contact therewith and printed upon their second sides by the second form, thence transferred to said third transfer-cylinder, and thence to the oscillating fly, or other final delivery apparatus, substantially as set forth.

3. In a perfecting printing-machine, printing from flat forms, as 3 and 4, in combination with two impression-cylinders, as 10 and 11, carrying grippers, as 13 14, a first transfer-cylinder, as 16, carrying grippers, as 19, covered first with a suitable elastic covering and having an outer non-absorbent coating impervious to printing-ink, a second transfer-cylinder, as 20, carrying grippers, as 21, said first and second transfer-cylinders being pressed into contact and so placed and timed in the machine as to receive between them and transfer the sheets printed on their first sides from the first to the second impression-cylinder, and one or more absorbent rollers, as 35 36, running in contact with said first transfer-cylinder, whereby superfluous ink on the first printed sides of the sheets is offset upon the surface of said first transfer-cylinder and removed therefrom by said absorbent rollers and offset of ink from the first printed sides of the sheets upon the second impression-cylinder prevented, substantially as set forth.

4. In a perfecting printing-machine, printing from flat forms, as 3 and 4, in combination with two impression-cylinders, as 10 and 11, carrying grippers, as 13 and 14, a first transfer-cylinder, as 16, carrying grippers, as 19, and having a non-absorbent surface adapted to readily receive ink offset from a printed sheet, a second transfer-cylinder, as 20, carrying grippers, as 21, and having a covering of rubber or other suitable elastic substance, said first and second transfer-cylinders being pressed into contact and placed and timed in the machine so as to receive between them and transfer the sheets printed on their first sides from the first to the second impression-cylinder, and one or more absorbent rollers, as 35 36, running in contact with said first transfer-cylinder, whereby superfluous ink on the first printed sides of the sheets is offset upon the surface of said absorbent rollers and offset of ink from the first printed sides of the sheets upon the second impression-cylinder prevented, substantially as set forth.

5. In a perfecting printing-machine, printing from flat forms, as 3 and 4, in combination with two impression-cylinders, as 10 and 11, carrying grippers, as 13 and 14, a first transfer-cylinder, as 16, carrying grippers, as 19, and having a non-absorbent surface to receive ink offset from the first printed sides of the sheets, a second transfer-cylinder, as 20, carrying grippers, as 21, said first and second transfer-cylinders being pressed into contact and placed and timed in the machine so as to receive between them and transfer the sheets printed on their first sides in their passage from the first to the second impression-cylinders, one or more absorbent rollers, as 35 and 36, running in contact with said first transfer-cylinder, and one or more absorbent rollers running in contact with the sheets passing upon said second transfer-cylinder, whereby superfluous ink on the first printed sides of the sheet is offset upon the surface of said first transfer-cylinder, removed therefrom by said first series of absorbent rollers, and residual superfluous ink not so removed absorbed from the sheet by said second series of absorbent rollers and offset of ink from the first printed sides of the sheets upon the tympan-surface of the second impression-cylinder prevented, substantially as set forth.

6. In a perfecting printing-machine, printing from flat forms, as 3 and 4, in combination with two impression-cylinders, as 10 and 11, carrying grippers, as 13 and 14, a first transfer-cylinder, as 16, carrying grippers, as 19, having a non-absorbent surface to receive ink offset from the first printed sides of the sheets, a second transfer-cylinder, as 20, carrying grippers, as 21, said first and second transfer-cylinders being pressed into contact and placed and timed in the machine so as to receive between them and transfer the sheets printed on their first sides from the first to the second impression-cylinder, one or more absorbent rollers, as 35 and 36, running in contact with said first transfer-cylinder, one or more absorbent rollers running in contact with the sheets passing upon said second transfer-cylinder, and one or more absorbent rollers, as 37 and 38, running upon the tympan of said second impression-cylinder at a point where no sheet passes, whereby superfluous ink on the first printed sides of the sheets is offset upon the surface of said first transfer-cylinder, removed therefrom by said first series of absorbent rollers, residual superfluous ink removed from the printed sides of the sheets by said second series of absorbent rollers, any residual ink offset upon the tympan of the second impression-cylinder removed by said third series of absorbent rollers and reoffset of ink upon the sheets

from the tympan of the second impression-cylinder prevented, substantially as set forth.

7. In a perfecting printing-machine, printing from flat forms, as 3 and 4, in combination with two impression-cylinders, as 10 and 11, carrying grippers, as 13 and 14, a first transfer-cylinder, as 16, carrying grippers, as 19, having a non-absorbent surface to receive ink offset from the first printed sides of the sheets, a second transfer-cylinder, as 20, carrying grippers, as 21, said first and second transfer-cylinders being pressed into contact and placed and timed in the machine so as to receive between them and transfer the sheets printed on their first sides from the first to the second impression-cylinder, one or more absorbent rollers, as 35 36, running in contact with said first transfer-cylinder, one or more absorbent rollers, as 27 28, running in contact with the sheets passing upon said second transfer-cylinder, and one or more absorbent rollers, as 29 30, running upon the tympan of said second impression-cylinder at a point where no sheet passes, a third transfer or delivery cylinder, as 22, carrying grippers, as 23, geared to and timed with said second impression-cylinder so as to receive the perfected sheets from it and deliver them upon or to a final delivery apparatus, and a fourth series of absorbent rollers, as 37 and 38, running in contact with said third transfer-cylinder, whereby superfluous ink on the first printed sides of the sheets is offset upon the surface of said first transfer-cylinder, removed therefrom by said first series of absorbent rollers, any residual ink removed from the printed sides of the sheets by said second series of absorbent rollers, any residual ink offset upon the tympan of the second impression-cylinder removed by said third series of absorbent rollers, reoffset of ink upon the sheets from the tympan of the second impression-cylinder prevented, and ink offset from the second printed side upon said third transfer-cylinder removed by said fourth series of absorbent rollers, substantially as set forth.

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