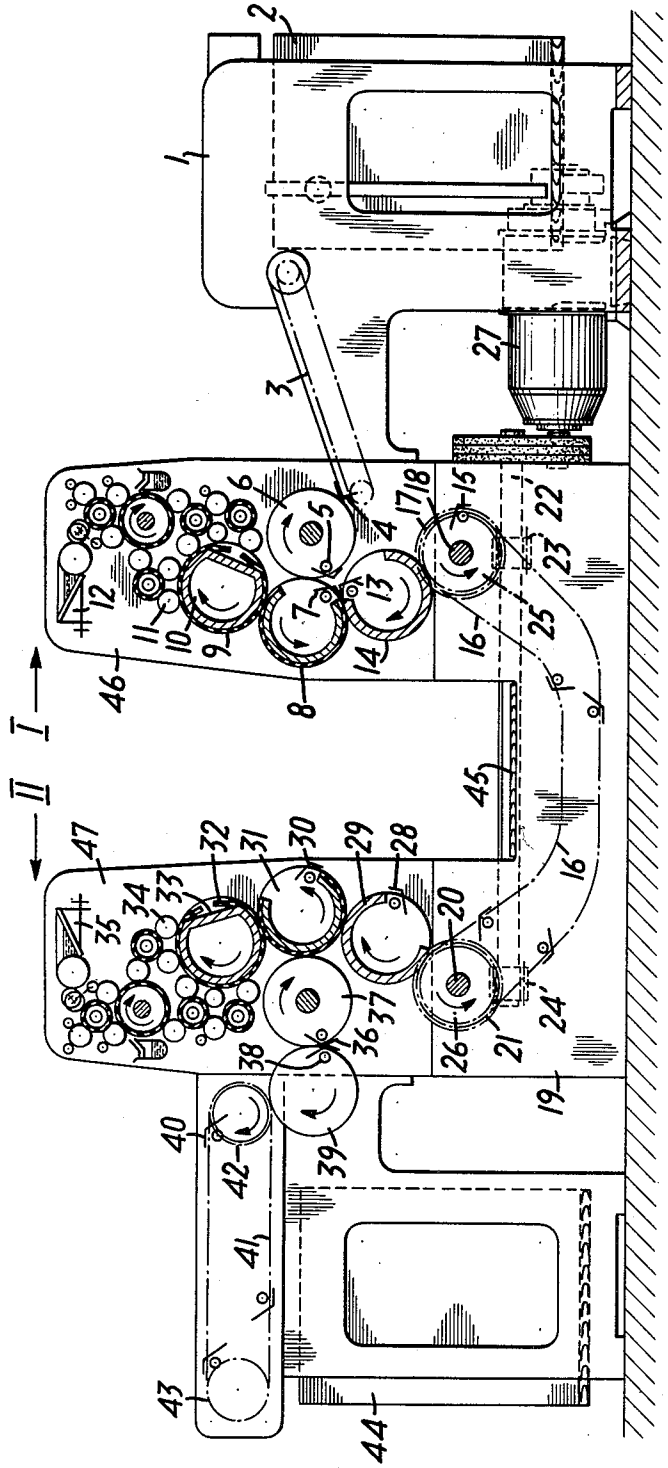
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ROTARY LETTERPRESS HAVING A MIRROR IMAGE CYLINDER ARRANGEMENT

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ROTARY LETTERPRESS HAVING A MIRROR IMAGE CYLINDER ARRANGEMENT

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The present invention relates to rotary letterpress printing presses and more particularly, to presses for relief and offset printing in which two or more printing units are arranged in series one behind the other.

The arrangement of the printing units for such tandem machines has heretofore been such that identical individual printing units are constructed with an operator's stand or control station for each printing unit. The units and control stations are arranged one behind the other. The sheet transfer cylinders or chain delivery grippers are situated beneath the operator's control station. This arrangement is preferred because it is advantageous for the operation of the inking and impression cylinders which in these presses are regularly situated above the transfer mechanisms and operating stands or stations. A disadvantage of this method of construction is that the overall length of the press is comparatively large due to the required number of operating stands or control stations, for example, four in a four color machine.

To reduce the space requirement in color printing presses, a different method of construction is also used. This method consists in having each pair of printing units arranged around a common impression cylinder, thus forming a twin or double-printing unit. In presses of this kind the cylinders of the first printing unit and also the associated inking mechanism, the inking rollers and fountain, are arranged above the common impression cylinder while the cylinders of the second printing unit together with the associated inking mechanism are arranged beneath the common impression cylinder. Both impression and inking mechanisms form a common operating station. This type of arrangement results in shorter overall length for two and four color printing presses, however, presses of this type have an inherent deficiency in that the cylinders of the lower printing unit, arranged beneath the impression cylinder, and more particularly the lower inking mechanism are inconvenient to operate. Moreover, such presses are increased in height which makes it necessary for the operator to mount steps at the control station in order to have access to the upper unit. Moreover, a deficiency in certain printing operations in relief printing is also presented by the use of a common impression cylinder for both printing units.

Other printing unit arrangements are known in which each impression cylinder is arranged offset, in the direction of the operating stand or control station, relative to the rubber blanket and plate cylinders arranged vertically over the impression cylinders. The object of this type of known arrangement is to transfer the sheets of stock from the first to the second printing unit by means of only one transfer cylinder of uniform diameter. The operating characteristics of the printing units of this type of arrangement are in fact good, but herein too, a disadvantage arises in that an operating stand or control station is required for each printing unit and consequently the space requirement of the machine is considerable.

Still other arrangements for color printing presses are known. In order to have more perfect registry for a

second printing these presses have the printing units disposed one behind the other or in juxtaposition so that the sheet transfer device of the first printing unit assumes a position opposite the sheet feed side of the second unit for better alignment. This arrangement requires a considerable floor space and does not conform to the modern method of series production, which forms the basis of the present invention.

It is a principal object of the present invention to provide a press in which the printing units have the advantages of the above-described known arrangement in which the inking mechanisms are disposed above the printing unit printing cylinders and which are readily operated without, however, having the disadvantages of a large overall length such as the color printing presses constructed in the known series arrangement or method of construction.

A feature of the rotary letterpress printing units according to the invention for color printing by direct relief or indirect relief and offset printing is that the printing units are arranged in a series construction with two units arranged as a pair facing each other. The paired units are built the same with respect to impression and transfer cylinders and the inking mechanism thereof. The two paired units are symmetrical relative to a plane between them and are mirror images of each other. In a printing press where a second and third pair of printing units are used, the third and fifth units are similar to the first unit while the second, fourth and sixth units are constructed as mirror images of the associated unit within the respective pair. A single operating station is provided for each pair of symmetrically constructed printing units.

The new and novel method of construction results in a shorter overall length of the press with an optimum operating arrangement of the printing and inking units and also results in a saving of weight and manufacturing costs even though each printing unit has its own impression cylinder. The principles of the invention are applicable to printing presses using the above-mentioned double-printing unit construction and results in reduction of length of the color printing presses having the above-mentioned double-printing units. In such a construction the double-units are arranged as mirror images of each other and the printing units and inking mechanisms therein can be reached from only one operating station. However, this latter type of unit still has a disadvantage that the lower printing unit and inking mechanisms are difficult to operate even though one operating station for four printing units and inking mechanisms is provided.

Other features and advantages of the printing press construction in accordance with the present invention will be better understood as described in the following specification and appended claims in conjunction with the drawing.

Although the present invention is directed at a printing press construction for relief and offset letterpress printing presses, the invention is described as applied to a two color letterpress printing press for relief printing in order to simplify the drawing. The application of the invention to offset color printing presses is likewise described with respect to the same drawing. Moreover, since a plurality of pairs of printing units, according to the invention, can be mounted in series with minor modifications of the printing press illustrated in the drawing the invention is applicable, and is described as applicable, to a printing press using a plurality of pairs of printing units arranged in series according to the invention illustrated in the drawing.

The printing press in the drawing is illustrated as a direct relief press and comprises a printing unit I and a second printing unit II spaced from and in series with the

printing unit I. The two printing units are symmetrical and are mirror images of each other as hereinafter described. According to the drawing a sheet feed device 1 picks individual sheets of stock off of a sheet stack or pile 2 and conveys these over a feed table or board 3 to front lays 4. The sheet feed device 1 may be of a known type or of the high-speed type disclosed in my copending appliaction Serial No. 270,019 filed April 2, 1963, filed of even date. The individual sheets which are aligned on the feed table lays are gripped successively by grippers 5 on a revolving by-pass or transfer cylinder 6 and subsequently transferred to grippers 7 of a central or impression cylinder 8. A form 9, which is secured on a curved cylinder 10 prints the first impression on the sheet. Inking of the form 9 is effected by inking mechanism above the printing cylinders comprising several application or inking rollers designated generally by the reference 11. The inking rollers are fed with ink supplied from an ink duct or fountain 12.

After an impression has been made grippers 13 of a lowermost transfer drum or cylinder 14 take the individual sheets successively from the grippers 7 and transfer them to chain grippers 15 of which there are several gripper systems fixed to revolving chain delivery means 16. The grippers 15 and chain delivery 16 are driven by means of driven means comprising sprockets 17 which are mounted on a shaft 18. The shaft 18 is pivotally mounted in a base 19 of the press. Below the second printing unit II is mounted a second shaft 20, which has sprockets 21 mounted thereon for likewise driving the chain delivery 16. The sprockets are arranged in a mirror image arrangement for effecting transfer of sheets between the lowermost cylinder of the unit I and unit II as hereinafter described.

The shafts 18 and 20, drive the chains delivery 16 and simultaneously serve as driving shafts for the two printing units of the press. The two shafts are coupled by a longitudinal power shaft 22 which is mounted on the side of the substructure or base 19 of the press and has worms 23, 24 fixed thereon which engage worm gears 25 and 26 which are rigidly connected with the shafts 18 and 20 as shown. A driving electrical motor 27 drives the power or drive shaft 22 by means of a V-belt in known manner.

The chain delivery 16 guided in the substructure or base 19 conveys the individual sheets taken from the first printing unit I to the second printing unit II and transfers the sheet individually to grippers 28 of a lowermost cylinder of the second printing unit which functions in this case as a transfer cylinder 29. The sheets are transported between the two printing units on the upper spans or runs of the chain of the chain delivery 16. The sheets are taken from the transfer cylinder 29 by grippers 30 on an intermediate cylinder functioning as an impression cylinder 31. The second printing impression takes place on the same side of the sheets as the first impression by means of a form 32 secured on a curved plate or form cylinder 33. The form 32 is inked by inking mechanism comprising several application rollers designated generally 34, which are supplied in known manner with ink by inking cylinders which receive ink from an ink duct 35.

After the printing of the second impression grippers 36 of a transfer cylinder 37 take the printed sheets and transfer them individually and successively to grippers 38 of another delivery drum or cylinder 39. The drum 39 rotates in a clockwise direction, as illustrated, and delivers the printed sheet to a chain delivery 41 driven by sprockets 42, 43 and delivers the printed sheet to a delivery pile or stack 44 and deposits it thereon. An operating stand or station 45 having a single principal level is arranged between the two printing units I and II.

The first printing unit I is mounted in the upright sidewalls of the printing press designated 46 and the second printing unit II in the printing press side walls portion designated 47. As can be seen in the drawing, the printing unit cylinders and the inking mechanism including the inking cylinders thereof, together with the duct or fountain of the printing unit II are arranged symmetrically as a mirror image, i.e. 180° out of position, with the elements of the printing unit I. This arrangement renders all of the cylinders and inking mechanism devices of both printing units conveniently accessible from the single operator's station 45 and from its single principal level.

The invention is applicable to printing presses, not shown, in which two, four or six units are mounted as pairs in series. In the event a plurality of pairs of units are to be arranged in series, for example four units, i.e., two pairs of the type illustrated, the transfer cylinder 39 delivers directly to a next first unit of a pair, not shown, i.e. to a transfer cylinder such as cylinder 6 thereof which is mounted behind the second printing unit. The final delivery to a stack takes place only after the sheet has passed through both pairs of printing units. In constructions of this type a single operator's station is required for each pair or set of mirror-image units. For example a four color press will have two stations only.

In constructing an offset machine for color printing the teachings of the invention illustrated in the drawing are applied thereto, however, with a simple difference that the transfer cylinder 6 cooperates not as shown with the central cylinder 8 but with the lowermost cylinder 14. The direction of rotation of cylinder 14 and the remaining cylinders is reversed as well as the direction or rotation of the chain delivery 16. The direction of rotation of the transfer drum 6, however, is retained in order to receive the input from the sheet feeder as indicated in the drawing. In such an arrangement the second printing unit is constructed such that the transfer drum 37, does not cooperate with the central cylinder 31 but with the lowermost cylinder 29. In offset machines or machines for indirect relief printing, the cylinders 14 and 29 become the impression cylinders of the units and the central cylinder 8 or 31 operate as a rubber sheet cylinder. However, in these constructions of printing presses, the units are still arranged as mirror images of each other as heretofore described.

Those skilled in the art will, of course, recognize that in the various embodiments of the invention described the three printing cylinders in each unit are arranged vertically with the form cylinder being the uppermost cylinder and a central cylinder functions as an impression cylinder in direct relief printing or is a blanket cylinder in indirect relief or offset printing. The lowermost cylinder is a transfer cylinder in an embodiment of the invention for direct relief printing and is an impression or offset plate cylinder for indirect relief or offset printing in a press for indirect relief or offset printing. In each case, however, the cylinders are arranged as illustrated in the drawing and the direction of rotation is the only thing that is different in each embodiment as to these cylinders. Moreover, in those cases where the transfer cylinders cooperate with the lowermost cylinders the printing units face each other and are mirror images of each other and symmetrical to a plane between them. In all cases the inking mechanism is above the impression cylinder and for the main part is disposed above the form cylinder.

It will be understood that in the various embodiments of the invention the three cylinders are driven in timed relationship with equal peripheral speeds and may be constructed of equal peripheral dimensions as illustrated.

While preferred embodiments of the invention have been shown and described it will be understood that many modifications and changes can be made within the true spirit and scope of the invention.

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

1. A rotary letterpress printing press for color-relief or offset printing comprising, in combination, at least one pair of series printing units, each pair of printing units

comprising a first printing unit and a second printing unit spaced from the first unit and disposed in series therewith, means to deliver sheet stock individually to said first unit for printing an impression thereon, means to automatically transfer and deliver said sheets individually from said first printing unit to said second unit for printing on a same side on which the first-mentioned impression is printed thereon, each printing unit comprising printing elements including a plurality of cylinders comprising at least three cylinders comprising a central cylinder, an uppermost cylinder comprising a form cylinder cooperative with said central cylinder, a lower cylinder cooperative with said central cylinder and inking mechanism comprising inking rollers upwardly of said uppermost form cylinder, said second unit having all of its cylinders including its central cylinder, form cylinder, lower cylinder, and inking mechanism including inking rollers disposed vertically symmetrically with said first unit in a mirror arrangement of said first printing unit, a single operators stand having a single principal level intermediate of said two units from which all of said cylinders and said inking mechanism are accessible, said principal level of said operators stand being disposed at a level lower than any of all of said cylinders, and said means to automatically transfer said sheets individually from said first printing unit to said second printing unit comprising driven means disposed in each of said printing units at least partially above said principal level operators stand in a mirror image arrangement for effecting transfer of sheets between said lower cylinder of each unit and said means to automatically transfer said sheets individually from said first printing unit to said second printing unit and comprising delivery means disposed below said operators stand.

2. A rotary letterpress printing press for color-relief or offset printing comprising, in combination, at least one pair of series printing units, each pair of printing units comprising a first printing unit and a second printing unit spaced from the first unit and disposed in series therewith, means to deliver sheet stock individually to said first unit for printing an impression thereon, means to automatically transfer and deliver said sheets individually from said first printing unit to said second unit for printing on a same side on which the first-mentioned impression is printed thereon, each printing unit comprising printing elements including a plurality of cylinders comprising at least three cylinders comprising a central impression cylinder, an uppermost cylinder comprising a form cylinder cooperative with said central impression cylinder, a lower transfer cylinder cooperative with said central cylinder and inking mechanism comprising inking rollers upwardly of said central impression cylinder, said second unit having all of its cylinders including its impression cylinder, form cylinder, transfer cylinder and inking mechanism including inking rollers disposed vertically symmetrically with said first unit in a mirror arrangement of said first printing unit, a single operators stand having a single principal level intermediate of said two units from which all of said cylinders and said inking mechanism are accessible, said principal level of said operators stand being disposed at a level lower than any of all of said cylinders, and said

means to automatically transfer said sheets individually from said first printing unit to said second printing unit comprising driven means disposed in each of said printing units at least partially above said principal level operators stand in a mirror image arrangement for effecting transfer of sheets between said lower cylinder of each unit and said means to automatically transfer said sheets individually from said first printing unit to said second printing unit and comprising delivery means disposed below said operators stand.

3. A rotary letterpress printing press for color-relief or offset printing comprising, in combination, at least one pair of series printing unit, each pair of printing units comprising a first printing unit and a second printing unit spaced from the first unit and disposed in series therewith, means to deliver sheet stock individually to said first unit for printing an impression thereon, means to automatically transfer and deliver said sheets individually from said first printing unit to said second unit for printing on a same side on which the first-mentioned impression is printed thereon, each printing unit comprising printing elements including a plurality of cylinders comprising at least three cylinders comprising a central blanket cylinder for operation in indirect relief or offset printing, an uppermost cylinder comprising a form cylinder cooperative with said central blanket cylinder, a lower impression cylinder cooperative with said central blanket cylinder for operation in indirect relief and offset printing, and inking mechanism comprising inking rollers upwardly of said central cylinder, said second unit having all of its cylinders including and inking mechanism including inking rollers disposed vertically symmetrically with said first unit in a mirror arrangement of said first printing unit, a single operators stand having a single principal level intermediate of said two units from which all of said cylinders and said inking mechanism are accessible, said principal level of said operators stand being disposed at a level lower than any of all of said cylinders, and said means to automatically transfer said sheets individually from said first printing unit to said second printing unit comprising driven means disposed in each of said printing units at least partially above said principal level operators stand in a mirror image arrangement for effecting transfer of sheets between said lower cylinder of each unit and said means to automatically transfer said sheets individually from said first printing unit to said second printing unit and comprising delivery means disposed below said operators stand.

References Cited by the Examiner

UNITED STATES PATENTS

2,515,355	7/50	Pritchard	101—142
2,593,180	4/52	Pritchard	101—142
2,702,002	2/55	Koch	101—177 X
3,007,406	11/61	Papa et al.	101—136 X

FOREIGN PATENTS

498,978	5/30	Germany.

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