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This invention relates to a printing press and particularly one in the form of an attachment for an existing printing press of the offset type, the attachment enabling the printing of a second color on the blanket cylinder of the existing press in addition to the single color normally applied thereto.

One object of the invention is to provide an attachable printing press including a plate cylinder and moistening and inking means therefor, the plate cylinder printing an impression on the blanket cylinder of the existing printing press in addition to the impression already thereon so that both colors are transferred at the same time from the blanket to the paper being fed through the press, thus accomplishing multi-color, single impression printing.

Another object is to provide an attachment which is so designed as to eliminate the necessity of drilling any holes in the frame of the existing press for mounting of the attachment.

A further object is to provide mounting brackets which are mounted on the existing press by means of set screws, and my attachable printing press is then mounted on these brackets in such manner as to be readily demountable therefrom when desired.

Still a further object is to provide the mounting means for my printing press on the brackets of such character that the plate cylinder of my attachable press may be adjusted into parallelism with the blanket cylinder of the existing press and locked in that position in such manner that thereafter demountable of the attachable press and mounting thereof can be accomplished with assurance that the plate cylinder of the attachable press will always be parallel to the blanket cylinder of the existing press, that the ink is spread perfectly regardless of the color applied by the attachable press with that of the existing press on the blanket of the cylinder, and the registration held indefinitely even though the attachable press is demounted from time to time when not needed.

Another additional object is to provide a micro-adjustment for the plate cylinder of the attachable press that eliminates the necessity of shifting the plate on the cylinder to obtain registration with the impression on the blanket of the cylinder, and a means to prevent ink from building up beyond the edge of the plate and transferring to the blanket and then to the paper being printed.

Another additional object is to provide water and ink fountains which are readily removable to facilitate cleaning thereof.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my printing press, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawings, wherein:

FIG. 1 is a perspective view of my printing press showing it mounted on the frame of an existing press;

FIG. 2 is a perspective view of a water trough of the dampening unit of my press illustrating the removable thereof;

FIG. 3 is an enlarged vertical sectional view on the line 3—3 of FIG. 1 and shows the cooperation of the plate cylinder of my press with the blanket cylinder of the existing press on which it is mounted;

FIGS. 3a and 3b are fragmentary detail views of a portion of FIG. 3 showing different adjustments of my printing press;

FIG. 4 is a horizontal sectional view on the line 4—4 of FIG. 3;

FIG. 5 is a front view of FIG. 4 as taken on the indicated line 5—5 of FIG. 4;

FIG. 6 is a vertical sectional view on the line 6—6 of FIG. 3 illustrating the micro-adjustment for the plate cylinder of my printing press;

FIG. 7 is a perspective view with portions cut away and other portions shown in section to illustrate certain features of the micro-adjustment shown in FIG. 6; and

FIG. 8 is an enlarged elevation of the right-hand end of FIG. 6.

On the accompanying drawings I have used the reference numerals 10 and 12 to indicate the left and right side frames respectively of an existing printing press such as a "Multilith" printing press. My attachment press rests on the side frames 10 and 12. The existing press also includes right and left frame members 14 and 16 each of which has a flange 18 to which I attach left and right brackets 20 and 22 for mounting my printing press as will now be described.

Each bracket 20 and 22 has a pair of U-shaped lugs 24 as shown in FIG. 3 which extend over the edges and back of the flanges 18 so that set screws 26 may be set against the outsides of the flanges 18 and set screws 26 may be set against the insides thereof, thus rigidly mounting the brackets 20 and 22 on the frame of the existing printing press. Thus I provide four sets of two-set screws each bearing directly across the flanges 18 from each other without placing undue strain on the flanges because of this arrangement of the set screws.

This type of mounting eliminates the necessity of drilling holes in such frame for mounting my attachment and at the same time provides brackets that are so mounted that they remain in fixed positions relative to such frame so that my attachment may be mounted on the brackets and adjusted, and will retain such adjustment even after demounting and mounting of the attachment relative to the brackets. Thus the existing machine is not defaced or impaired in any manner.

Describing my attachment printing press and its mounting on the brackets 20 and 22, I provide in general a pair of side frames 30 and 32 (left and right respectively) which are normally enclosed in guards 160 and 162, a plate cylinder 34, a dampening system therefor and an inking system therefor. The dampening system includes a water trough 36, a doctor roll 38, an oscillating transfer roll 40, an intermediate transfer roll 42, a distributor roll 44 (which is reciprocated axially) and a form roll 46. The inking system includes an ink trough 47, a doctor blade 49 and the usual series of set screws 51 for adjusting the pressure thereof against the doctor roll 48, an oscillating transfer roll 50, an intermediate transfer roll 52, a distributor roll 54 (which reciprocates axially), a form roll 56, a second reciprocating distributor roll 58, and a form roll 60. The dampening system and the inking system are substantially the same as used on the existing press hereinbefore mentioned and in many types of offset printing machines now on the market, and in general forms no part of my present invention. Likewise, the mechanism for oscillating the rollers 40 and 50 and for reciprocating the rollers 44 and 58 is not shown as it is substantially the same as found in "Multilith" and other printing presses and forms no part of my present invention. I do, however, provide novel means for quickly removing the water trough 36 and the fountain attached thereto as well as the ink trough 47 for ease of cleaning between printing jobs or when otherwise necessary.
Reference is made to FIGS. 2 and 3 wherein it will be noted that the water trough 36 and the ink trough 47 are provided with end members 72 and 72a respectively having round bores 74 and 74a interrupted by slots 76 and 76a somewhat narrower than the diameters of the bores. The side frames 30 and 32 have round studs 78 and 78a for the bores 74 and 74a of the end members 72 and 72a provided with flat spots 80 and 80a so that the water trough 36 may be rotated about 60° counterclockwise in FIG. 3 (after the water supply bottle 82 has been removed from the neck 84) and the entire trough removed in a downward direction toward the right so that it can be cleaned while removed from the machine. Likewise, the ink fountain 47 may be tilted about 30° counterclockwise in FIG. 3 and then removed bodily and toward the right for cleaning such as at the end of the day or between color changes.

In referring to a “water system” it is to be understood that the usual fluid actually involved is a weak acid solution whose purpose is to repel the ink from the non-image areas of the printing plate 35. There are many variations of this solution which will have a tendency to precipitate a residue which floats on the surface, thus hindering the transfer of water through the various rolls to the printing plate. Periodically (usually once each day) the fountain roll 56 must be wiped off or the fountain roll and the ink trough 47. In the existing machine this can be accomplished only partially since the trough is stationary and the removal of the roll quite complicated. With my system the trough is rotated on the studs 78 until the slots 74 are aligned with the flat sides 80 and the trough may be quickly removed which facilitates easy cleaning.

My attachment press is mounted on the brackets 20 and 22 by means of a supporting rod 86 (see FIGS. 4 and 5) mounted in the side frames 30 and 32 serving as a spacer therefor. The supporting rod 86 extends through horizontal perforations through the heads of three shouldered studs 88, 90 and 92 which rest on a support bar 96 and are provided with lock nuts 98 on their reduced threaded ends to lock them thereto. The stud 88 is pivoted to the bar while the studs 90 and 92 have limited adjustment relative thereto as indicated by arcs A in FIG. 4 and as permitted by slots 108a in the bar 96 (these slots are shown dotted in FIG. 4). Collars 94 are mounted on the supporting rod 86 to limit its longitudinal movement relative to the stud 88 and may be loosened for lateral adjustment of the entire attachment press relative to the existing press during the initial installation process. The stud 88 serves as a pivot point for the supporting rod 86 and the studs 90 and 92 together with their lock nuts 98 serve to lock the rod against pivoting.

The supporting bar 96 is mounted on ears 102 at the lower ends of the brackets 20 and 22 by means of cap screws 104 in each ear, and forward and rearwardCow5

levering screws 106 and 108 respectively, the purpose of which will hereinafter appear.

In addition to the parts just described under reference numerals 86 through 108, a yoke connection is provided between my attachment printing press and the brackets 20 and 22 comprising a yoke rod 110 and a pair of turnbuckles 112 connecting the ends thereof to the ends of the shaft for the plate cylinder 34 which shaft is indicated 114. The rod 110 is adapted to enter through slots 116 of the brackets 20 and 22 that terminate in round bores 116a (see FIG. 4) and as permitted by slots 108a in the bar 96. The yoke rod 110 is made of sufficient diameter to pass through the slots 116 and is smaller than the bores 118, the intermediate space being filled with bushings 120. As shown in FIG. 4, these bushings are slidable along the rod 110 to the dotted position shown for a purpose which will hereinafter appear and it will also be noted that the ends of the bushings 118 are countersunk as indicated at 119 to provide a relatively narrow contact of the bore with the bushing to facilitate alignment as will be described later.

Referring to FIG. 3, a gear is shown on the blanket cylinder 62 meshing with gears on the plate cylinders 34 and 36, and other gears drive the form rollers 44, 56 and 60, all in timed relation to the blanket cylinder in the usual manner. Since this is the usual conventional construction I have not referred to the gears by reference numerals. The plate cylinder 34 is provided with a printing plate 35 having its ends secured to cross bars 37 and 39, and the cross bars 37 and 39 are constructed as is usual construction, to provide a relatively narrow contact of the bore with the bushing to facilitate alignment as will be described later.

Referring to FIGS. 6, 7 and 8, a micro-adjustment for horizontal movement of the plate cylinder 34 is shown. The plate cylinder shaft 114 journaled in the side frames 30 and 32 has eccentric ends on which the turnbuckles 112 are mounted so that oscillation of this shaft can move the plate cylinder and in fact the entire attachment printing press about the supporting shaft 86 as a pivot to place the printing plate 35 selectively into or out of engagement with the blanket on the cylinder 62. An impression handle 122 is provided for accomplishing this adjustment, the handle being secured to a boss 124 which in turn is secured by a set screw 126 to the shaft 114. The boss 124 has a latch dog 128 pivoted at 127 to drop into a notch of a disc 130 on the frame 30 in the “impression” position of the handle 122. This again is usual practice.

Referring now (FIG. 6) to the micro-adjustment specified, the handle 122 is pivotally mounted on a shaft 138 which is slidable longitudinally of the shaft 114 and are spaced apart by sleeves 132 and 134, which have cam ends 132a and 134a respectively, located in a set collar 136 so that relative rotation of these cam ends will provide an adjustment of the length of the spacer sleeve 132—134. The shaft 114 is provided with a through-slot 138 in which a head 140 of a rod 142 is mounted. This head is connected by a pin 144 to the sleeve 134 so that this sleeve may be adjusted longitudinally of the shaft 114, the through-slot 138 being axially longer than the head 140 to permit such adjustment.

The rod 142 terminates in a threaded part extending out of the right-hand end of the shaft 114 in FIG. 6 which end is provided with a central bore to accommodate the rod 142 and a micrometer adjusting nut 145 is threaded thereon and graduated as indicated at 152 against an index 154 on a set sleeve 148. A set collar 150 is also located on the tubular portion of the shaft 114 near the impression handle 122 as shown in FIGS. 6 and 8. A lock nut 146 is provided for retaining the adjustment of the micrometer adjusting nut 145. A similar set collar 150a is provided on the left-hand end of the shaft 114 against the handle 122.

It will be noted that the ends of the plate cylinder 34 are under-cut at 156 relative to the printing plate 35. This prevents undesirable build-up of the ink transferred from the plate cylinder 34 to the blanket cylinder 62, a common occurrence in prior printing machines and a great nuisance.

Practical operation

After the brackets 20 and 22 are installed on the frame members 16 and flanges 18 of the existing printing machine, as hereinbefore described, so that these brackets are in a fixed position relative thereto, my attachment press including the supporting bar 96 from which the cap screws 104 have been removed and including the yoke rod 110, is mounted with the bar 96 resting on the four set screws 104 and 108 and with the rod 110 in the bores 118 as shown in FIG. 3, whereupon the cap screws 104 are inserted through the ears 102 and tightening bar. The cap screws 104 are not tightened at this time. The bushings 120 are slid from the dotted position shown in FIG. 4 to the solid line position within the bores 118 and set screws 158 for the bushings 120 are tightened. My attachment press is then ready for adjusting of its plate cylinder shaft 114 to a position of parallelism with respect to the blanket cylinder 62 of the existing printing press. This is best done by adjusting the shaft 114 to a
level position in a substantially vertical plane (providing of course the axis of the cylinder 62 is level) and then adjusting in a substantially horizontal plane. For adjusting in the vertical plane the cap screws 104 are loosened and the set screws 106 and 108 adjusted until the shaft 114 is level or in a substantially horizontal plane parallel to a substantially horizontal plane passing through the axis of the blanket cylinder 62 whereupon the cap screws 104 are tightened.

The three lock nuts 98 below the supporting bar 96 (FIG. 5) are then loosened slightly for free pivoting of the supporting rod 86 about the axis of the boss 88 and adjustment is accomplished by means of the turnbuckle 112 until the shaft 114 in its substantially vertical plane parallel to a substantially horizontal plane through the axis of the blanket cylinder 62. This is approximately determined by having the impression handle 122 in the impression position (no printing plate 35 on the cylinder 34) and sighting between the cylinder 34 and the blanket of the cylinder 62.

The press is now ready for checking parallelism by printing a horizontal line from the plate 35 or "laying a stripe" on the blanket. If the stripe is uneven in weight, the turnbuckles are adjusted until it is even all the way across the blanket. When this stripe from the plate 35 is parallel to one from the plate cylinder 64, the press operating is parallel to a horizontal plane through the axis of the blanket cylinder 62. The shaft 114 is then parallel to the axis of the blanket cylinder 62, and the lock nuts on the turnbuckles and the three lock nuts 96 are tightened.

My attachment press is now ready for operation to print a second color on the same sheet and from the same blanket on the cylinder 62 that prints from the plate cylinder 64 of the existing press. When only a single color is to be run, my attachment press can be disregaged merely by loosening the set screws 108 so that the bushings 110 can be slid back from the end of the boss 88 to the dotted position shown in FIG. 4 and the yoke rod 110 will then drop back in the bores 118 from the position shown in FIG. 3 to the position shown in FIG. 3 which removes the printing plate 35 from contact with the blanket on the cylinder 62 at which time the attachment press will be in the position shown by dotted outline in FIG. 3.

For extended runs of a single color, my attachment press may be entirely demounted by the removal of the two cap screws 104 and the lifting of the press off the ears 102 of the brackets 20 and 22, the yoke rod 110 being lifted out of the bores 118 through the slots 128. Another possibility is to let the attachment press idle particularly if the run is short and a two-color run is coming up immediately following.

The adjustment of my attachment press, so that the axis of its shaft 114 is level, is extremely important since the two plate cylinders 64 and 34 make contact with the blanket along a given line and should 114 not be level with 62, that line would appear crooked on the paper when it in turn is transferred from the blanket to the paper. To illustrate this point in exaggerated form, assume we have two identical printing plates with an image of one horizontal straight line on each, and one of these plates is put on the existing press and one on the attachment press. Next, assume the cylinder 34 is ¼ inch low on one end instead of parallel to the axis of the blanket cylinder. Since the plates are identical they should print the two images, one right over the other. However, since the yoke rod is not level, the line printed by it will fall ¼ inch below the other image on one end. Obviously, it is extremely important to have a leveling device to prevent this from happening. The cap screws 104 and the four set screws 106 and 108 accomplish the desired result admirably. On the other hand, the turnbuckles 112 provide a convenient adjustment for laying the stripes from the printing plate evenly on the blanket and finally on the paper, and between the two types of adjustments absolute parallelism of the cylinder 34 relative to the cylinder 62 is accomplished with a minimum of time and effort. Once accomplished, need for further adjustment is eliminated even though my attachment press is demounted and remounted at intervals.

The countersinking of the bores 118 gives narrow bearing surfaces for the bushings 120 in the brackets 20 and 22 which allows the bushings to tilt slightly in a self-aligning manner to accommodate slight differences in the position of alignment of the two brackets with respect to each other. Were it not for this feature a slight tilt in one bracket might cause the yoke shaft to come out of line and prevent it entering the bracket on the other side. The yoke bushings enter over-size bores so that the yoke shaft can be easily dropped through slots and the bushings slipped into and out of the bores for quick mounting or demounting, and the bushings can be slipped out of the bores to allow the attachment press to tilt back just enough to disengage the drive gear which in turn means it can set in place without idling, and to again start the attachment press one needs only to tilt it forward, insert the yoke bushings and start the presses running.

The three-point suspension disclosed provides a pivot point in the center, and right and left turnbuckles with the studs 99 and 92 in two elongated holes for adjustment, and lock nuts to insure the press maintains its position once set. As the turnbuckles are adjusted, pivoting on the center boss 88 occurs and in this manner it is possible to align the cylinder 34 and blanket with the turnbuckles without the danger of twisting or straining the attachment press. Heretofore, in registering two plates on a single blanket it was necessary to shift the printing plate bodily (after it is released from a clamped position on the cylinder) which presents a great problem when the amount it is to be moved is quite minute, such as a few thousandths of an inch. My micro-adjustment facilitates the movement of the entire plate cylinder which accomplishes the same end but eliminates the problem of releasing and thus losing control of the printing plate during a registering operation. My arrangement is therefore more accurate and much faster and in fact the shift can be made while the printing press is in operation.

With my micro-adjustment 145, the printing plate 35 does not have to be moved on the cylinder 34 but rather the entire cylinder is moved which allows hairline registration (that can be accomplished while running, if desired), for the entire plate rather than the plate on the cylinder facilitates another special design feature which is the under-cut 156 beyond the edges of the plate. In this manner tracking from the edges of the plate cylinder onto the blanket is impossible since the printing forms do not bear on this area.

Some changes may be made in the construction and arrangement of the parts of my printing press without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may reasonably be included within their scope.

I claim as my invention:

1. In an attachable printing press of the character disclosed for removable cooperation in attachment relationship with an existing printing press and having a printing cylinder to cooperate with the printing cylinder of the existing printing press, a pair of laterally spaced brackets, one for attachment to each side frame of the existing printing press, a horizontal supporting bar having its ends supported on and vertically adjustable relative to said brackets, a supporting rod pivoted on a vertical axis to said supporting bar and connected to the attachable printing press to support it, a yoke rod, adjustable connections between said attachable printing press and the ends of
said yoke rod, said yoke rod ends being carried by said brackets and said adjustable connections effecting pivotal adjustment of said rod and thereby alignment of said printing cylinder of said attachable printing press relative to the printing cylinder of the existing printing press, and means to thereafter lock said supporting rod against pivotal movement relative to said supporting bar.

2. An attachable printing press for an existing printing press comprising a pair of brackets, one for attachment to each side frame of the existing printing press, the means for attachment comprising at least two U-shaped portions on each bracket to receive flanges of the existing printing press frame, opposite set screws in each U-shaped portion to set against said flanges, a supporting bar having its ends supported on said brackets, the means of support comprising set screws in said brackets for said supporting bar to contact and cap screws for holding the supporting bar against said set screws, a supporting rod pivoted to said supporting bar and connected to the attachable printing press to support it, a yoke rod, turnbuckle connections between said attachable printing press and said yoke rod to adjust their angular relationship and thereby the printing cylinder of the attachable printing press relative to the printing cylinder of the existing printing press, said yoke rod being removably carried by said pair of brackets by means of enlarged bores of said brackets to receive said yoke rod, said brackets having narrow entrance slots to said bores to permit entrance of said yoke rod therein, bushings slidable on said yoke rod into and out of said bores, and means to lock said supporting rod against pivotal movement relative to said supporting bar.

3. In an attachable printing press for an existing printing press, a pair of brackets, one for attachment to each side frame of the existing printing press, an supporting bar having its ends supported on said brackets, the means of support comprising set screws in said brackets for said supporting bar to contact and cap screws for holding the supporting bar against said set screws, a supporting rod pivoted to said supporting bar and connected to the attachable printing press to support it, a yoke rod, turnbuckle connections between said attachable printing press and said yoke rod to adjust the angle of the attachable press relative to the existing press, said yoke rod being removably carried by said pair of brackets by means of enlarged bores of said brackets to receive said yoke rod, said brackets having narrow entrance slots to said bores to permit entrance of said yoke rod therein, bushings slidable on said yoke rod into and out of said bores, and means to lock said supporting rod against pivotal movement relative to said supporting bar after adjustment of said turnbuckle connections.

4. In an attachable printing press for an existing printing press, a pair of brackets, one for attachment to each side frame of the existing printing press, a supporting bar having its ends supported on said brackets, the means of support comprising set screws in said brackets for said supporting bar to contact and cap screws for holding the supporting bar against said set screws, a supporting rod pivoted to said supporting bar and connected to the attachable printing press to support it, a yoke rod, turnbuckle connections between said attachable printing press and said yoke rod to adjust the angle of the attachable press relative to the existing press, said yoke rod being removably carried by said pair of brackets whereby adjustment of said turnbuckle connections changes the angle of the printing cylinder of the attachable press relative to the existing printing press, and means to lock said supporting rod against pivotal movement relative to said supporting bar after such adjustment.

5. For use with an existing printing press, an attachable printing press of the character disclosed comprising a pair of brackets for attachment to each side frame of the existing printing press, the means of attachment comprising at least two U-shaped portions on each bracket to receive flanges of the existing printing press frame, op-
relative to said supporting bar after said adjustable connections are adjusted, said attachable printing press including a plate cylinder, means for securing a printing plate thereto, the ends of said plate cylinder being undercut relative to the ends of said printing plate to prevent ink tracking on the blanket of a blanket cylinder of the existing printing press.

9. In an attachable printing press for an existing printing press, a pair of brackets, one for attachment to each side frame of the existing printing press, a supporting bar having its ends supported for vertical adjustment on said brackets, a supporting rod pivoted centrally to said supporting bar and connected to the attachable printing press to support it, a yoke rod spaced from and parallel to said supporting rod, adjustable connections between said supporting rod and said yoke rod, said yoke rod being removably carried by said pair of brackets, and means to lock said supporting rod against pivotal movement relative to said supporting bar after adjustments of said adjustable connections have been made, said attachable printing press including a plate cylinder, and means for securing a printing plate thereto.

10. In an attachable printing press of the character disclosed, a pair of brackets, one for attachment to each side frame of an existing printing press, a supporting bar having its ends supported for adjustment toward and from said brackets, a supporting rod pivoted centrally to said supporting bar and connected to the attachable printing press to support it, a yoke rod, adjustable connections between said supporting and yoke rods, said yoke rod being removably carried by said pair of brackets, and means to lock said supporting rod against pivotal movement relative to said supporting bar following manipulation of said adjustable connections, said attachable printing press including a plate cylinder, means for securing a printing plate thereto, the ends of said plate cylinder being undercut relative to the ends of said printing plate to prevent ink tracking on the blanket of the existing printing press.

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