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PRINTING AND PERFORATING APPARATUS

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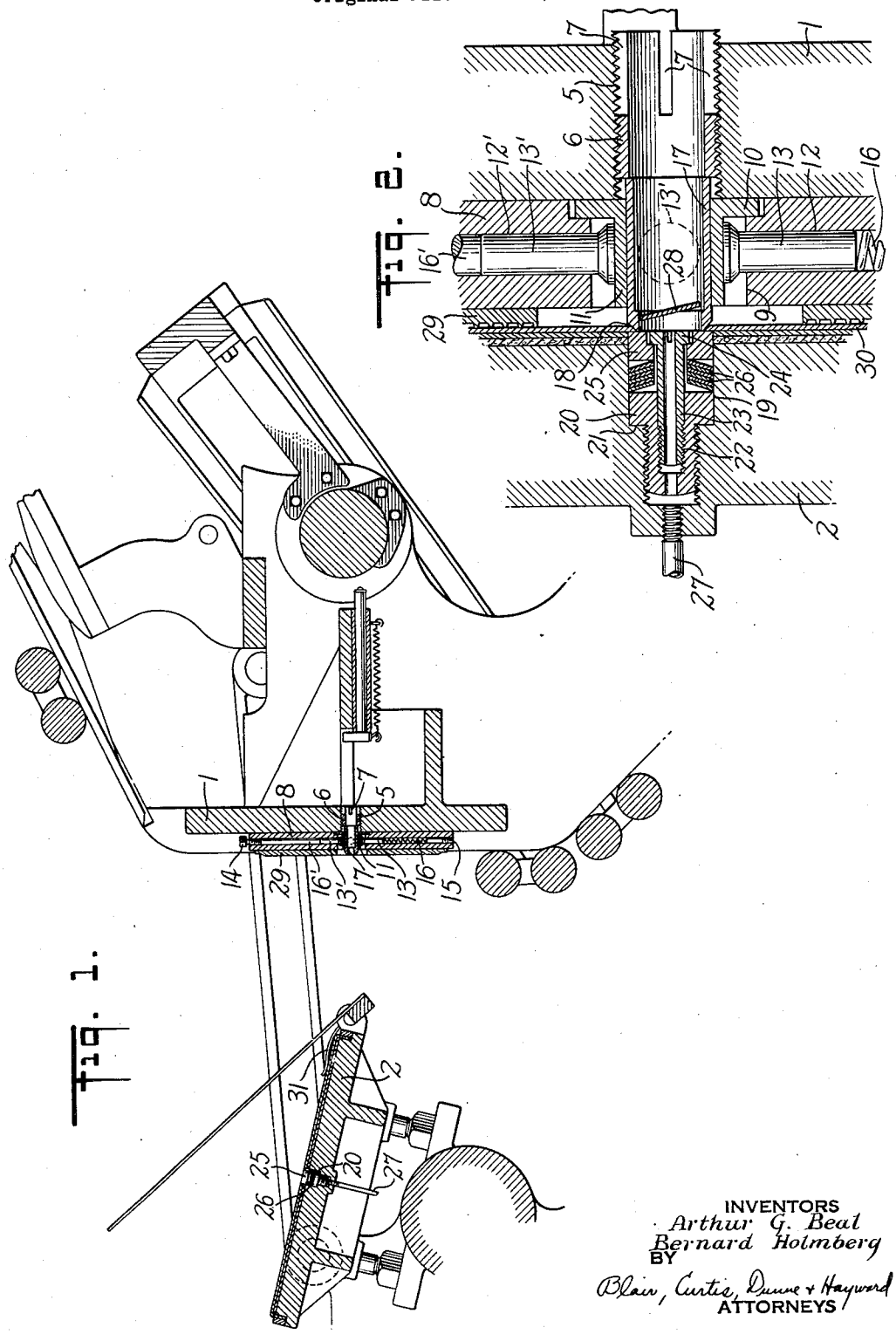


Fig. 1.

Fig. 2.

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PRINTING AND PERFORATING APPARATUS

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5 Claims. (Cl. 164—86)

The present invention relates to an improvement in printing and perforating apparatus which is employed advantageously in printing and perforating instrument charts having a center hole and circular fiducial markings concentric therewith.

One object of our invention, as described and claimed in the present application which is a division of our co-pending application Serial No. 62,846 filed February 7, 1936, has been to provide apparatus whereby printed and perforated matter, including recording instrument charts for example, can be printed and punched with greater precision and more rapidly and economically than has heretofore been possible.

One embodiment of said invention as used in printing and punching charts—although in no sense restricted to such use—is illustrated in the drawing accompanying this specification and wherein—

Figure 1 is a substantially central vertical section of a portion of a well known form of printing press with the improved hole punching devices applied thereto and set for the printing and punching operation; and

Figure 2, a fragmentary view in section of a portion of the bed of the press shown in Figure 1.

Referring to the drawing, our improved devices are shown as applied to portions of one of the well known Kluge presses. Pertinent parts thereof include the bed 1 and the platen 2. As better seen in Figure 2, the bed 1 is provided with a recess or opening 5 threaded to receive a bushing 6 having longitudinal slots 7 opening through its rear edge. A base or bed plate 8 for supporting the cut from which the chart markings are printed is releasably secured on the outer face of bed 1 by any suitable means, such as bolts or the like, not shown, and has an opening or bore 9 enlarged at its inner end to receive the flange 10 of a cylindrical hollow sleeve 11 and to allow for transverse adjustment of said sleeve in bore 9 to make said sleeve concentric with chart markings on the cut. For this adjustment operation the bed plate 8 is also provided with two sets of opposed radial drill holes 12 and 12' spaced 90° apart and each extending from an outer edge of the plate to said bore 9. Each hole 12 is provided with a plunger 13 having an enlarged inner end forming a head which bears yieldingly against a peripheral portion of sleeve 11 and each hole 12' with a similar plunger 13' of which the head bears rigidly against sleeve 11 in opposition to said yielding heads. A bolt 14, Figure 1, is threaded in the outer end of each hole 12 and a plug 15 is secured in the outer end of each hole 12'. A spring 16 is interposed between and engages the opposed ends of the plunger 13 and the corresponding plug 15 respectively in each hole 12; and a rigid plunger 16' is similarly arranged between bolt 14 and plunger 13' in each hole 12'.

By the means just described, sleeve 11 is supported in its position in bore 9 by the two plungers 13 and the two plungers 13' and is capable of transverse adjustment therein to obtain concentricity with the chart markings of the cut to be printed from, by appropriate manipulation of the bolts or set screws 14 in co-operation with said springs 16; this arrangement being effective in obtaining extremely fine and accurately controlled adjustments.

The above described mechanism for supporting and transversely adjusting sleeve 11 embodies details of construction more particularly described and claimed in a co-pending application of B. C. Rost, Serial No. 119,758, filed January 9, 1937.

A hollow cylindrical cutter or die 17 having a lapped flat cutting surface or edge 18 at its outer end is fitted snugly into the bore of the sleeve 11 and with its rear edge bearing upon the inner end of threaded bushing 6. By unscrewing or backing out said bushing 6 the cutter can be repositioned longitudinally in the sleeve 11 to present the cutting edge at different distances beyond the outer edge of the bushing to accommodate different plates, or different thicknesses of material to be punched or cut, or to compensate for reduction in the length of the cutter due to regrinding of the cutting end thereof. The slots 7 provide holds for a suitable collapsible inside operating wrench; and where the wall portions at the end of the bushing between the slots 7 are slightly flared, they bear yieldingly against adjacent portions of the hole 5 and, to that extent, tend to prevent loosening or creeping of the bushing caused by vibration, or the like.

As shown more clearly also in Figure 2, the platen 2 has a central recess or opening 19 adapted to receive a screw plug 20 with its head flange seated against an inner annular shoulder 21. Plug 20 is made with a central passageway of which a portion as at 22, is threaded to hold a hollow stem 23 having a head 24 at its outer end. A counter or block 25 having a hardened lapped outer or cutter blocking surface is retained in operative position in the re-

cess 19 by the flanged head 24 and is yieldingly pressed outwardly against the under edge of said head by suitable means, as spring spacers or cup washers 26 which are shaped to permit a slight rocking or tilting movement of block 25 when engaged by cutter 17 in the punching operation to bring the whole flat cutting edge thereof into effective cutting relation to the flat outer surface of said block.

A pipe 27, connected to a source of air under pressure, not shown, is arranged to discharge into the passageway formed by plug 20 and stem 23, at predetermined intervals as by periodic operation of a control valve, not shown, or so as to blow out or eject cutout portions, as 28, of the blanks through the passageway formed by annular cutter 17 and annular bushing 6 and thence through suitable conduit means to a receptacle, not shown.

In operation of the apparatus thus far described, the printing plate, cut, or electrotype 29 of the matter, as chart markings, to be printed, is suitably secured to bed plate 8 by known means and is adjusted as closely as practical to make the concentric circular printing ridges on the cut approximately concentric with the sleeve 11. Final adjustment is made by adjusting bolts 14. The sheets or blanks, as 30, of paper, or other suitable material, are then placed one at a time on the platen 2 by well known feeding devices and retained in position by clips 31, Figure 1, or other suitable means. With a press of the kind shown in the drawing, the blanks are automatically fed in succession from a stack to the platen which swings from retracted position toward the bed and back again in a well known manner. During each complete reciprocation of the platen, the chart design is printed on one face or side of a sheet or blank and the center hole or perforation is punched therein, after which, the printed and perforated sheet is automatically removed from the platen and stacked with other like sheets.

Where the above described apparatus or its equivalent is employed, as above described, advantageous results are obtained by exercising care in establishing concentricity between the electrotype and the cutter or cutter holding sleeve before printing. In practice, the accuracy of the assembly of the bed plate 12, the sleeve 11 and the electrotype 29 can be effectively tested by placing the bed plate 12 on a turn table and carefully observing variations of the plate markings or of the sleeve end from concentricity with the hub of the turn table by reference to a fixed fiducial point when the table and the bed plate are rotated past said point, the accuracy of these observations being facilitated by employing a magnifying glass.

The tested bed plate assembly is now secured to the bed 1, and a trial or test printing and punching is made on a chart blank which is then tested on the turn table with the aid of the magnifying glass. If the center hole and the chart markings are found to be accurately positioned, i. e. concentric, the required number of blanks or sheets can now be center holed and printed by automatic operation of the cutting and printing devices first above described, or their equivalent. If it is found that the center hole and the chart markings are not exactly concentric within the limits of the accuracy of the electrotype, they may be brought into concentricity by adjusting the bolts 14.

We claim—

1. Punching apparatus comprising a hollow cutter having a cutting edge, a support for said cutter, a block carrier having a recess provided with an inner shoulder, a block slidably mounted in said recess, resilient means interposed between said block and said inner shoulder, a flanged retainer engaging said block to hold the same in position in the recess and in operative relation to said resilient means, and means for effecting relative movement between the cutter support and the block carrier to cause the cutter to engage and disengage the block.

2. Punching apparatus comprising a hollow cutter having a cutting edge, a support for said cutter, a plate having a recess provided with an inner shoulder, a plug having a flanged head bearing on said shoulder, a block having a central opening provided with an inner shoulder, a headed retainer engaging said shoulder and extending through said opening and secured to said plug to hold the block in operative position, resilient means interposed between said block and said plug, and means for effecting relative movement between the center support and the block carrier to cause the cutter to engage and disengage the block.

3. Punching apparatus comprising a hollow cutter having a cutting edge, a support for said cutter, a plate having a recess provided with an inner shoulder, a hollow plug having a flanged head bearing on said shoulder, a block having a central opening provided with an inner shoulder, a headed retainer engaging said shoulder and extending through said opening and secured to said plug to hold the block in operative position, said retainer having a longitudinal passageway opening through its head portion, a resilient buffer between the block and the hollow plug, means for supplying air under pressure to be released through said plug and said retainer, and means for bringing said cutter and said block into sheet punching engagement.

4. Punching apparatus comprising a hollow cutter, a support for said cutter, a block carrier having a recess, a block slidably mounted in said recess, a spring cushioning device supported in said recess and yieldingly engaging said block, a retainer engaging said block to hold the same in position in the recess and in operative relation to the spring cushioning device and means for effecting relative movement between the cutter support and the block carrier to cause the cutter to engage and disengage the block.

5. Punching apparatus comprising a hollow cutter, a support for said cutter, a block carrier having a recess, a block slidably mounted in said recess, a spring cushioning device supported in said recess and yieldingly engaging said block, a retainer engaging said block to hold the same in position in the recess and in operative relation to the spring cushioning device, said retainer having an open ended passageway, means for supplying air under pressure to be released through said passageway and means for bringing said cutter and said block into operative engagement.

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