Feb. 26, 1963 A. J. SORCHY 3,079,140

MAGNETIC WORK HOLDER

Filed Nov. 25, 1957 2 Sheets-Sheet 1

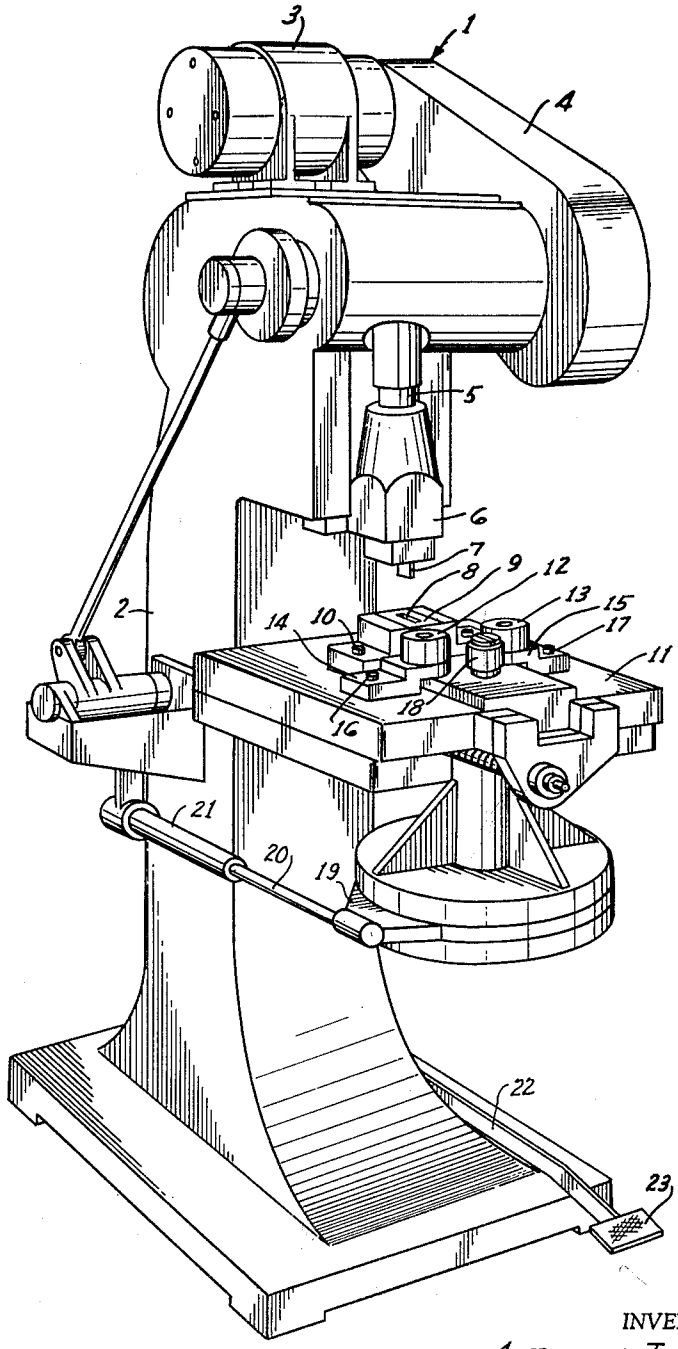


Fig. 1.

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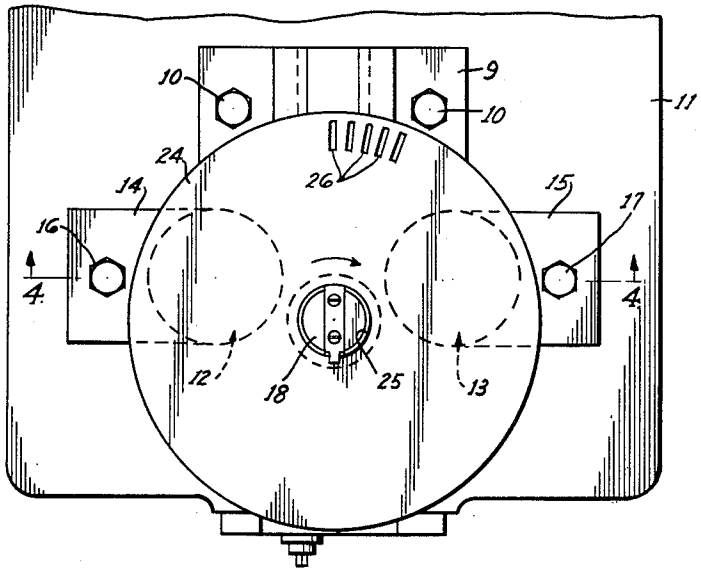


Fig. 2.

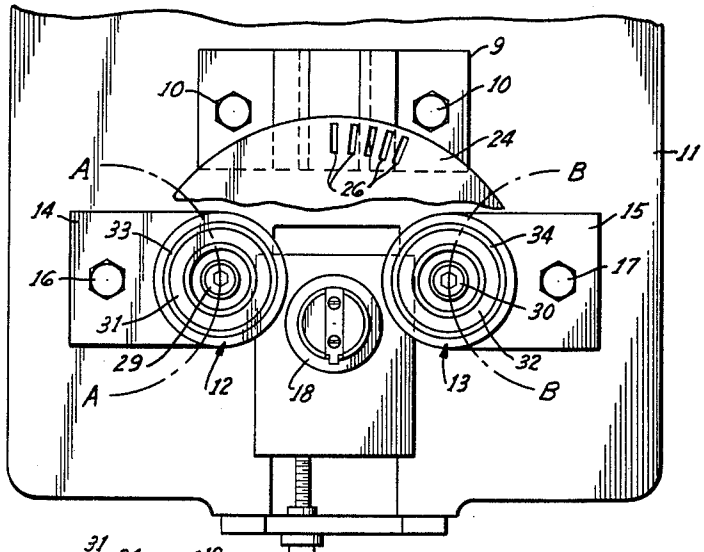


Fig. 3.

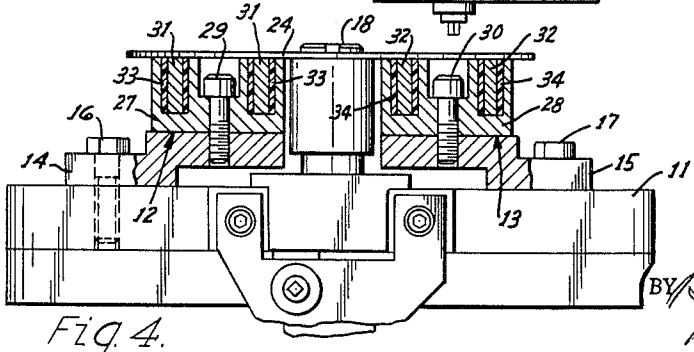


Fig. 4.

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3,079,140

Patented Feb. 26, 1963

3,079,140

MAGNETIC WORK HOLDER

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Filed Nov. 25, 1957, Ser. No. 698,549
3 Claims. (Cl. 269—8)

This invention relates to a press, in a preferred form of the invention a notching press, that is provided with means of novel type for holding down a metal work piece.

In the past, presses operating on metal work pieces have often been provided with elaborate hold-down means. Such means have included forwardly reaching arms extending from the frame of the machine toward the operator. The end of the arm next to the operator usually has been applied to the work piece from above. Thus the work piece, in effect, has been clamped in place between the hold-down arm or arms and the supporting table. By contrast, the present invention consists in and has for one of its objects the provision of hold-down means of a nature such as to permit of elimination of the hold-down arm or arms and any associated elements.

This it does by mounting on the supporting table one or more magnet assemblies so designed as to operate on a metal work piece from below rather than from above. According to the teachings of the invention, the magnet assembly or assemblies have smooth top surfaces over which a metal work piece may be moved more or less laterally, as by angling the work piece, without separating it bodily from the magnet assembly or assemblies. In such circumstances, a given work piece, if of metal, can be made to slide freely over smooth surfaces on one or more magnet assemblies without requiring the application to the work piece of any force normal to its general plane, this notwithstanding the fact that such a force would be required if one were to lift the work piece preparatory to relocating it elsewhere.

As embodied in a notching press, the invention in one of its specific forms is illustrated in the accompanying drawings, in which:

FIGURE 1 is a perspective of a notching press of the indexing type provided with the hold down means of the present invention.

FIGURE 2 is a plan of the supporting table with the work piece, in this case an annular metal lamina, in place on the supporting table.

FIGURE 3 is a similar view of the same parts with the work piece itself broken away to show the magnet assemblies.

FIGURE 4 is a front elevation of the supporting table with parts in section, the plane of the section being taken along line 4—4 of FIGURE 2.

In FIGURE 1, the notching press as a whole is designated 1. It includes a standard 2 surmounted by an electric motor 3 of the type shown, described and claimed in Sorchy Patent 2,802,121, granted August 6, 1957, for "Fast-Acting Brake for Motors and the Like." Being provided with a fast-acting brake, motor 3 can be cut in by switch gear and allowed to remain in operation continuously without being shut off each time the work piece is to be indexed. Preferably it is provided with suitable end pulleys and a multiple V-belt drive shielded by guard 4 by means of which V-belt drive the power developed by the motor is communicated to a vertical plunger 5 provided with a head 6 on the lower end of which is a notching punch 7. Punch 7 is designed to coact with an opening 8 of corresponding shape in a die 9 held by bolts 10 to supporting table 11 rigidly attached to standard 2, the die defining a work performing station on the table.

In the form of the invention shown in FIGURE 1, two magnet assemblies 12 and 13 are mounted on two offsetting brackets 14 and 15 that are held in place on supporting table 11 by bolts 16 and 17, respectively. By virtue of brackets 14 and 15, magnet assemblies 12 and 13 may be adjusted laterally through the arcs A—A and B—B indicated in dotted lines in FIGURE 3. Mounted on supporting table 11 in proximity to magnet assemblies 12 and 13 is a centering device 18 connected to indexing means 19, 20, 21 which, notwithstanding the presence of magnet assemblies 12 and 13, operate in conventional fashion to turn centering device 18 at regular intervals. The extent of the rotation is determined in the usual way by limit switches (not shown). A lever 22 provided with a pedal 23 is used by the operator to actuate the switch gear by which the above-described continuous operation of motor 3 is initiated.

Work piece 24, depicted in the form of a thin steel annulus with a central opening 25 and an incomplete series of notches 26, is seen in plan in FIGURE 2 and in elevation in FIGURE 4.

In the preferred form of the invention, illustrated in FIGURES 3 and 4, two magnet assemblies 12 and 13 are located symmetrically of a central vertical plane paralleling the two sides of supporting table 11. Although symmetrically positioned in the sense just mentioned, the two magnet assemblies are not necessarily symmetrically located when viewed from either the left hand side or the right hand side of the supporting table. Neither are they in alignment with centering device 18; rather, they are offset from it in the general direction of die 9 in the manner best seen in FIGURE 3. By so positioning them, magnet assemblies 12 and 13 are enabled to exert a more nearly uniform pressure on that portion of work piece 24 which is to be subjected to the action of punch 7 and die 9. Although insufficient to overcome the action of the indexing means, the forces so exerted are sufficient to hold the work piece stationary when it is not being indexed.

Although the two magnet assemblies may take other forms, in the embodiment of the invention shown in FIGURES 3 and 4, they include mild steel retainers ("keepers") 27 and 28 held by bolts 29 and 30 to brackets 14 and 15, respectively. In a circular channel in each of the two retainers is centered a ring magnet jacketed by a non-conducting material. Referring to FIGURE 4, it will be seen that ring magnets 31 and 32, the former at the left and the latter at the right, are surrounded on all sides by the synthetic resin insulation indicated at 33 and 34. The synthetic resin may advantageously be a commercial resin of the "epoxy" type that can be prepared in liquid form, mixed with a suitable liquid catalyst, and poured into the channel to form the desired jacket for the ring magnet. If necessary, the magnet assemblies are machined at this stage to make sure that their top surfaces are flat and smooth.

The ring magnet is preferably made of a high-flux sintered composition of the type supplied by Indiana Steel Company under the name Alnico-V, although other compositions, including ceramic magnet compositions, may be used instead. Before the magnet assemblies are bolted in place, each is itself magnetized. This treatment has the effect of converting the magnet assembly as a whole into one large magnet, of which the ring magnet represents one pole and the steel of the retainer constitutes the opposite pole.

When work piece 24 is first applied to centering device 18, it takes the form of an annular blank without notches near its periphery. Such notches are formed one at a time as punch 7 descends into opening 8 in die 9. Upon withdrawal of punch 7, indexing means 19, 20, 21 operate to rotate centering device 18 by a few degrees, thus posi-

tioning work piece 24 for another application of the punch. This continues at short intervals until notches 26 have been formed around the entire periphery of work piece 24, at which time indexing ceases until such time as the controls have been reset by the operator. As represented in FIGURES 2 and 3, work piece 24 has five notches 26, of which the fifth, counting from right to left, is the one last formed by application of the punch. Indexing means 19, 20, 21 are about to rotate centering device 18 clockwise in order to move work piece 24 into the position to be assumed in preparation for the sixth stroke of plunger 5.

In the operation of the hold-down device of the present invention, it is never necessary that work piece 24 be lifted from the supporting structure and bodily relocated between successive strokes of the plunger. In part because magnet assemblies 12 and 13 are provided with smooth upper faces, work piece 24 can slide across them without difficulty. Notwithstanding the presence of the magnet assemblies, little force is required to rotate work piece 24 in this fashion, certainly much less than would be expended if it were necessary to lift the work piece out of position and bodily relocate it for each stroke of the plunger. The operation is rapid, repetitive, and of a nature such as to require attention from the operator only when a completely notched work piece is to be replaced by a fresh blank. At this stage, the operator manually effects the substitution of one for the other, thereafter starting the cycle in motion again by application of his foot to pedal 23.

It will be evident that the hold-down means of the present invention have utility in presses of other types than the notching press shown in the accompanying drawings, taking the place of the more elaborate, cumbersome and expensive installations heretofore used. It is also evident that, if desired, electromagnets may be used in place of the permanent magnets shown in the accompanying drawings, although the simplicity of permanent magnets is of course an advantage of considerable importance. The number of magnet assemblies may be increased from two to three, four, five or more, as by spacing them equidistantly about centering device 18; similarly, the number may be reduced to one by mounting a ring magnet of large diameter concentrically of centering device 18. Other changes will be apparent to those skilled in the art to which the invention obtains.

It is intended that the patent shall cover, by summarization in appended claims, all features of patentable novelty residing in the invention.

I claim:

1. In a press or the like, a standard, a stationary supporting table on said standard, rotary centering means engageable with a workpiece and projecting above said table, a plurality of brackets on the upper surface of said table, means connecting each bracket to said table and permitting adjustment of the bracket through a lateral arc over the upper surface of the table, and a flat topped magnetic member carried by each of said brackets and extending upwardly to a level below that of said centering means.

2. In a press or the like, a standard, a stationary supporting table having a work performing station on said standard, rotary centering means engageable with a workpiece and projecting above said table, a plurality of brackets on the upper surface of said table, means connecting each bracket to said table and permitting adjustment of the bracket through a lateral arc over the upper surface of the table, and a flat topped magnetic member carried by each of said brackets and extending upwardly to a level below that of said centering means, and said connecting means holding said brackets being offset toward said station out of alignment with said centering means.

3. In a press or the like, a standard, a stationary horizontal supporting table on said standard, centering means projecting above said table, a bracket resting flatly on the upper surface of said table, holding means securing said bracket to the table in fixed position and operable to permit selective swinging adjustment of the bracket through an arc in a plane parallel to the upper surface of the table, and a flat topped magnetic member carried by said bracket to retain a workpiece in position thereon and extending upwardly to a level below that of said centering means.

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