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SHAPING, PUNCHING, AND TRIMMING DIE MECHANISM

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2 Sheets-Sheet 1

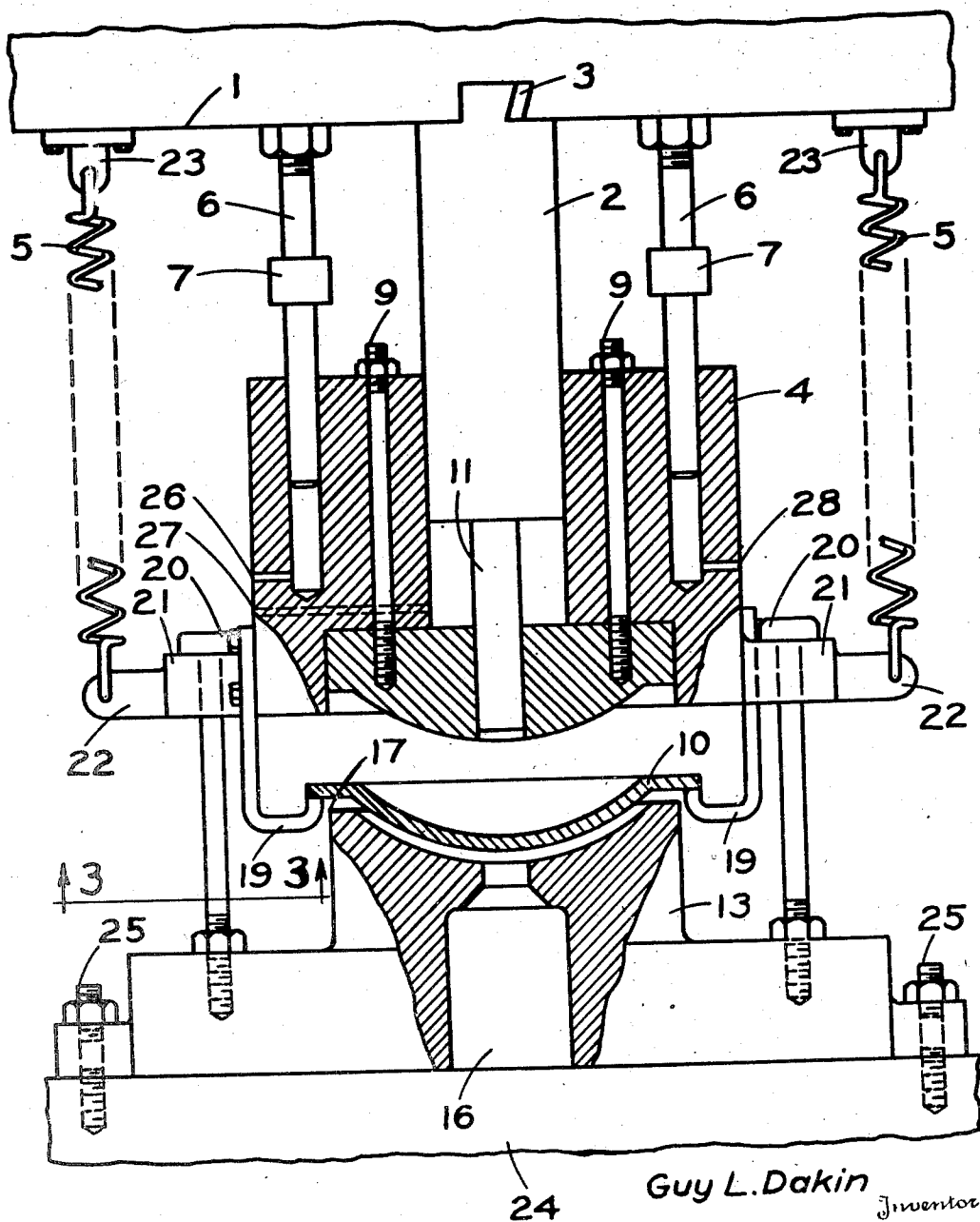


FIG. 1.

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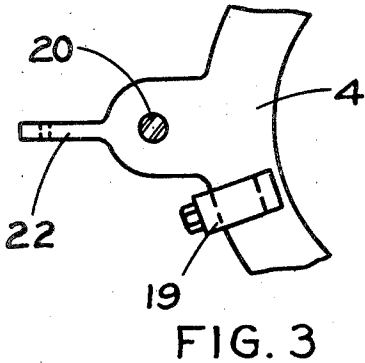
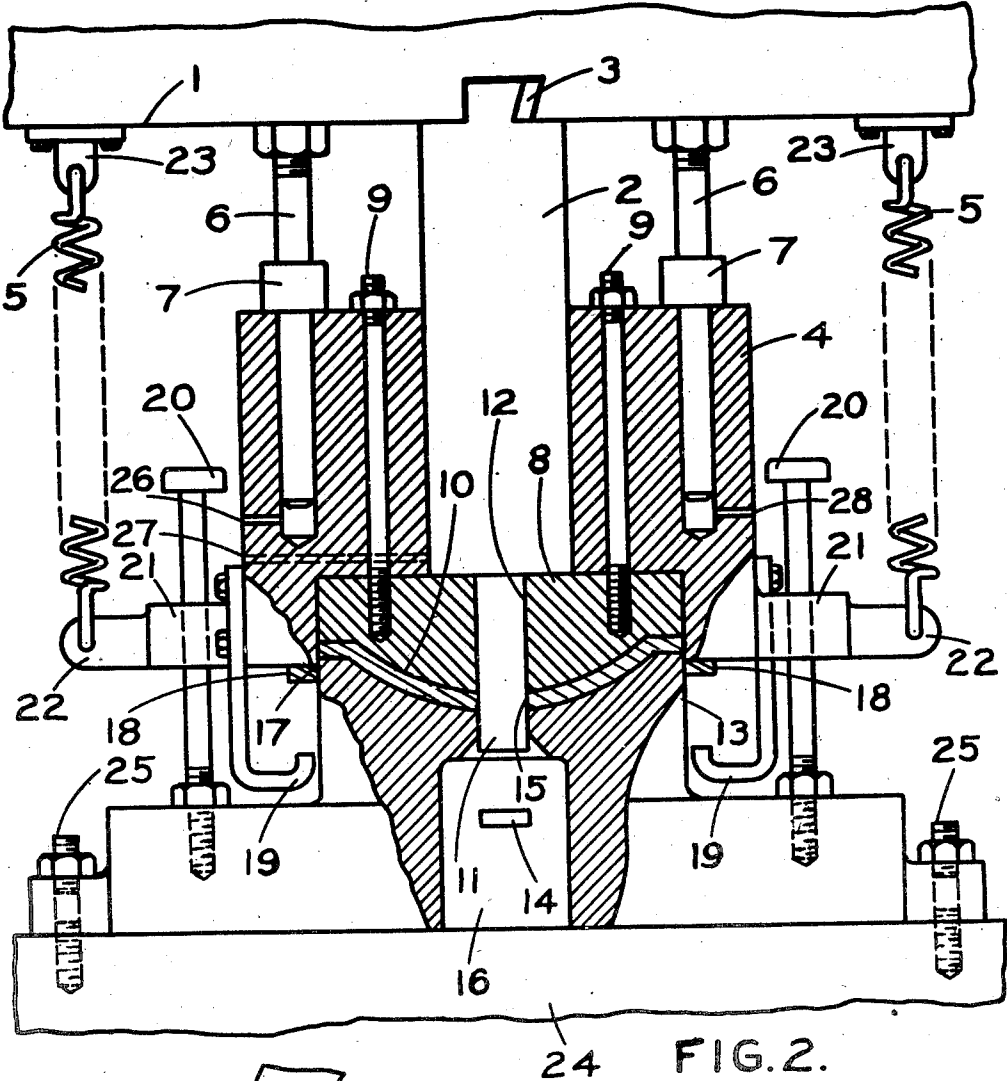
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UNITED STATES PATENT OFFICE

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SHAPING, PUNCHING, AND TRIMMING
DIE MECHANISM

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2 Claims. (Cl. 29—34)

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This invention relates to combination dies for metal presses, and has for its object the forming, punching and trimming of a drop forging in one operation of a metal press mechanism.

It is well known by this applicant that heretofore dies have been constructed that could form, trim and punch or punch and form a hot forging at one and the same operation but the applicant does not know of hot coin punch and trimmer in line actuating mechanism that will perform all three operations on a drop forging or other like metal work at one operation of the die press.

In the accompanying drawings forming a portion of this application the special construction and arrangement of the parts of this invention are illustrated.

Fig. 1 represents a front view of a press mechanism showing all the parts of this invention in their upper positions, the trimming, work supporting and pressure exerting members being drawn in vertical section, and the punching element in raised position.

Fig. 2 is a like illustration to Fig. 1 showing all the essential parts of the invention in lowered positions assumed during the operation and representing the trimming, punching and pressing of the work piece upon the support therefor.

Fig. 3 represents a portion of one side of the raising and lowering portion of the press, and shows the lifting bars adapted to detach the trimmed edge portions of the work piece.

Throughout the drawings and specification the same number is used to refer to the same part.

In the drawings 1 marks the ram, a strong, transverse cross-piece adapted to be raised and lowered with the plunger to which the ram is secured by the key 3, or suitable attaching means. The body portion of the plunger 2 is of such length that it is never out of guiding contact with the carrier and trimmer 4, shown in section. The trimmer 4 is usually a heavy sleeve-like formation substantially as shown, and it is yieldingly supported by the side springs 5 attached to the ram 1. The carrier 4 is guided up and down with respect to the ram 1 by the like rods 6 and 6 secured to the ram and having the attached limiting collar blocks 7 and 7 whereby the pressure of the ram is applied to the carrier 4 in the downward or punching movement. The upper die 8 is secured to the trimmer 4 by six or more stud bolts 9. The work piece 10 is shown as hot coin pressed on the lower die 13, and the punch 11 passes through the guide passage 12

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in the upper die 8. The work piece 10 is shown as hot coin pressed upon the die 13. The lower end of the plunger 2 exerts the main pressure on the upper surface of the upper die 8. Pressure for the hot coin pressing is secured by means of the collar blocks 7 on rods 6. The parts 6 and 7 may be omitted at the option of the operator of the invention. It will be understood that the precise size, forms and lengths of the ram, the plunger, the rods and carrier as shown may be modified within the scope of this invention.

As stated hereinabove the part 4 is a sleeve formation yieldingly supported by springs 5. The sleeve acts as the trimmer and carries the upper die 8 with it under punch plunger 2, and trims the flashing 18 over lower die 13. The lower part 11 of the punch, which may have any shape, punches out the slug 14 leaving a hole 15 in the work piece 10. The slug 14 drops out through the hole 16 in the die 13. As the holding and punching operation is completed, the inner edge 17 of the die carrier 4 trims off the flashing 18 leaving flashing 18 around the upper part of die 13. As the ram ascends, die 4 and the lifting hook-shaped bars 19 are carried with it until stopped by the headed rods 20 which are secured to the base portion of the die 13. When punch 11 draws out of the work piece 10 leaving the work piece on lower die 13, it will be noted that carrier 4 and upper die 8 rise upon the vertical guide rods 20, which are attached to the carrier 4 movably by means of the side extensions 21 and 22. The heads of the bars 20 limit the rising movement. During the upward movement of carrier 4 the lifting hook bars 19 press upwardly on the flashing 18 loosening it from lower die 8, from which it may be removed by tongs as usual. The lifting side springs 23 are attached as shown by connecting devices 23 to the ram 1. In explanation of the complete and different functions of the die 8, it will be noted best in Fig. 2, that the die in combination with the coacting mechanism not only presses and holds the work in position, but at the same time presses the work into the desired shape, and at the same time punches the hole 15 as described. In other words this invention is not the die alone, but in essential combination with the trimming devices cutting off the work parts 18 as in Fig. 2, together with the operating parts necessary of the machine.

A part of the bed 24 of the punch press is shown in the Figs. 1 and 2, secured by suitable nut and bolt attaching devices 25.

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It is advantageous to the operation as desired to provide air vent openings 26, 27 and 28 as shown in Figs. 1 and 2, to allow the free rise and fall of the plunger and the carrier 4. The work piece may be previously either fully or partly formed in order to engage the lower die and to be trimmed as described. It is believed the above description sufficiently outlines the operation of the invention, and having therefore explained my invention, I claim:

1. In a metal punching and trimming die apparatus, a ram, a plunger attached to the ram, the plunger having a punch projecting from the end thereof a die carrier movably fitting the plunger, said carrier having an upper die secured thereto, said upper die having a passage for the said punch, side springs connecting the said ram and the said carrier, rods projecting from the said ram and engaging the said carrier, said rods having thereon collar blocks arranged to bear upon the said carrier, a lower die having an opening for the passage of the said punch, guide rods projecting upwardly from the base of said lower die and constructed and arranged to guide the

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said carrier, and the said lower die having a chamber arranged to receive parts of the flashing of the work piece punched out by said punch.

2. In a metal punching and trimming apparatus, a ram, a plunger attached to the ram, the plunger having a punch projecting from the end thereof, a die carrier movably fitting the plunger, said carrier having an upper die secured thereto, said upper die having a passage for the said punch, side springs connecting the said ram and the said carrier, rods projecting from the said ram and engaging the said carrier, said rods having thereon collar blocks arranged to bear upon the said carrier, a lower die having an opening for the passage of the said punch, guide rods projecting upwardly from the base of said lower die and constructed and arranged to guide the said carrier, said carrier and said lower die having coacting trimming edges arranged to trim the flashing of the work piece, and said carrier having hook bars adapted to detach the trimmed pieces of the flashing and to loosen the work piece.

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