Feb. 2, 1932. W. H. HUDSON 1,843,483

PUNCH AND COUNTERSINK MACHINE

Filed Oct. 19, 1929 2 Sheets-Sheet 1

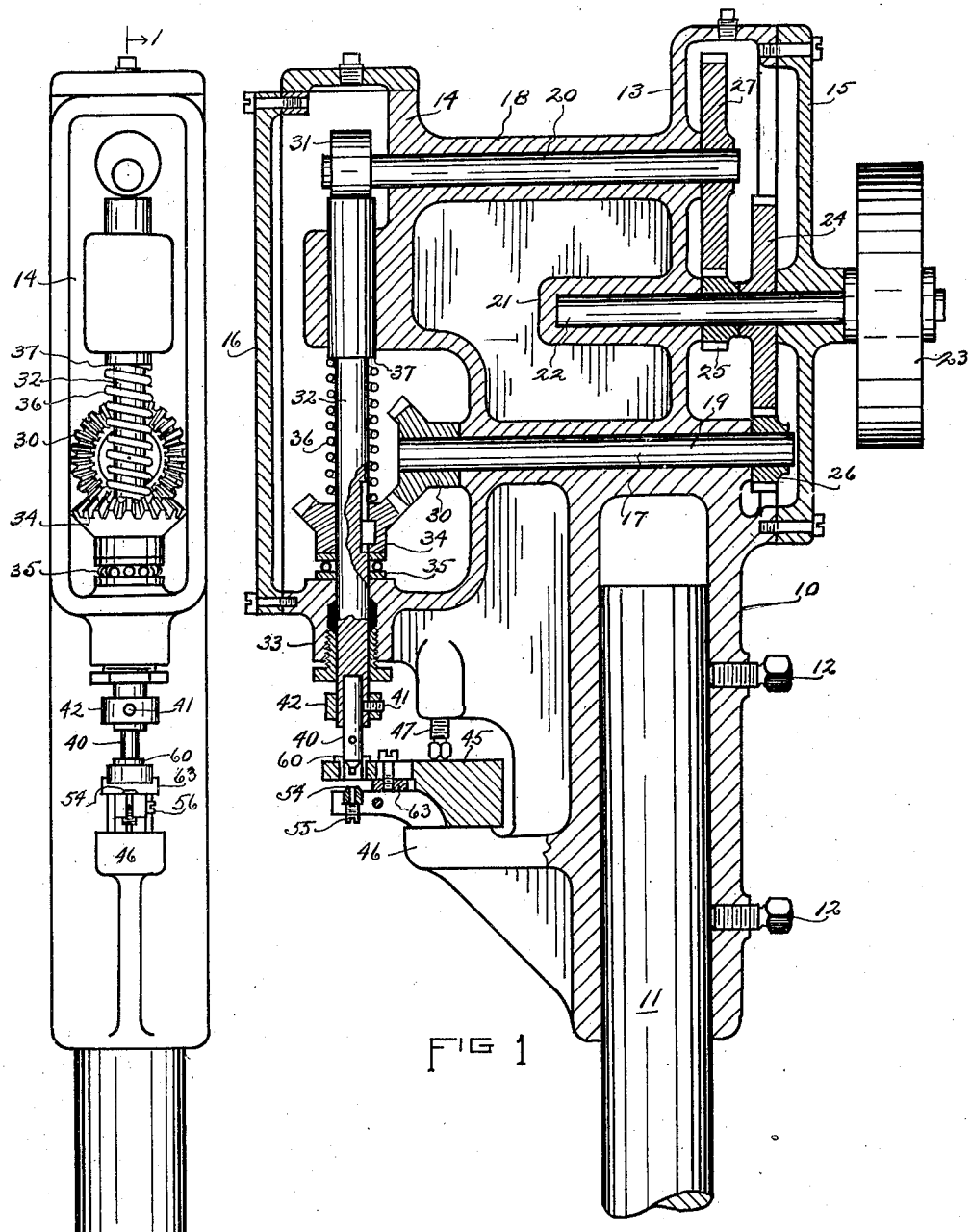


FIG 1

FIG 2

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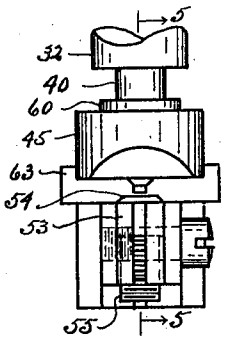


FIG 4

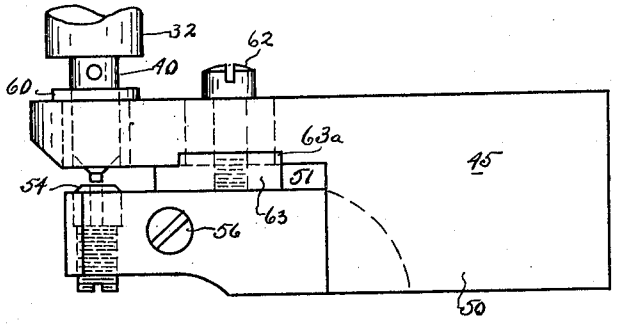


FIG 3

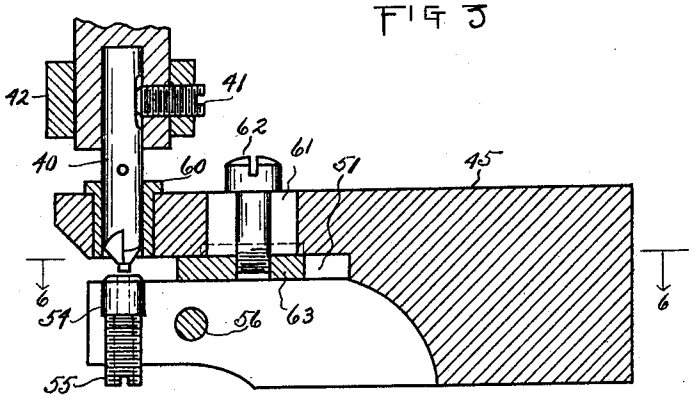


FIG 5

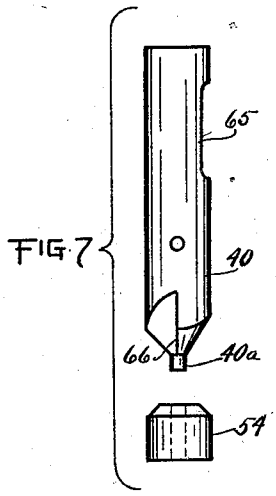


FIG 7

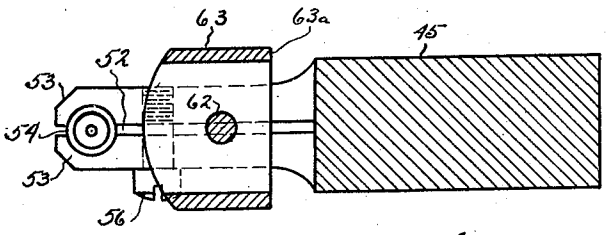


FIG 6

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PUNCH AND COUNTERSINK MACHINE

Application filed October 19, 1929. Serial No. 400,791.

The present invention relates to machines for perforating or countersinking sheet metal plates.

Among the objects of the invention is a machine which first perforates a suitable opening in a sheet of metal and then provides the opening with a countersunk portion for the reception of a screw or nail head, the countersinking following immediately upon the punching operation and being accomplished by the same tool.

Another object is a machine of the type indicated by means of which a metal sheet may be provided with a large number of countersunk nail or screw holes and the edge of the sheet guided or directed during the operation so that the openings may be reasonably accurately placed with a minimum amount of effort.

Still other objects will readily occur to those skilled in the art upon reference to the following description and the accompanying drawings in which

Fig. 1 is a vertical central section through the machine showing the operating mechanism as well as the punch and die mechanism and taken on the line 1—1 of Fig. 2.

Fig. 2 is a front elevation of the machine with the front cover plate of the gear housing removed.

Fig. 3 is a side elevation of the punch and die parts.

Fig. 4 is a front elevation thereof.

Fig. 5 is a central longitudinal section of the parts shown in Fig. 3 taken on the line 5—5 of Fig. 4.

Fig. 6 is a section of the same parts on a horizontal plane on line 6—6 of Fig. 5.

Fig. 7 is an elevation of the punch and die.

As indicated in the drawings the machine comprises a gear housing and bearing member 10 mounted on the upper end of a suitable standard 11 and adjustable thereon, being fixed in adjusted position by means of set screws 12. This housing member 10 has in its front and rear portions gear housing 13 and 14 covered by means of plates 15 and 16 respectively.

Bearing portions 17 and 18 extend from one housing to the other and support therein the shafts 19 and 20. A third bearing portion 21 opens into the rear housing 13 and has supported therein a shaft 22 extending through the housing and the plate 15, having a bearing in the latter. The outer end of the shaft 22 carries a drive pulley 23 and keyed to the shaft within the housing are the two gears 24 and 25. The gear 24 is somewhat larger than the gear 25 and meshes with a third gear 26 carried on the shaft 17. This gear 26 may be of the same size as the gear 25 and preferably the gear 27 is of the same size as the gear 24.

The opposite ends of the shafts 19 and 20 carry respectively the beveled gear 30 and a cam 31 located in the housing 14, both of which actuate a vertically arranged shaft 23 carried in a suitable bearing within the housing 14 and extending out through the bottom thereof through a suitable packing gland 33. Splined on this shaft 32 within the housing 14 is a beveled gear 34 meshing with the beveled gear 30 and supported on the bottom of the housing upon a suitable thrust bearing 35 and held upon the thrust bearing by means of a spring 36 in compression between said gear 34 and a suitable shoulder 37 provided on the shaft 32. The upper end of the shaft 32 acts as a cam follower for the cam 31 carried by the shaft 20.

Assuming the gears 24 and 27 to be of a five to one ratio with the gears 26 and 25 respectively, the drive of shaft 32 will be to rotate the latter twenty-five times for each rotation of the cam 31 so that the shaft 32 receives a rotary and a longitudinal movement simultaneously but provides for the rotation to be twenty-five times as frequent as its longitudinal movement.

Mounted in the lower end of shaft 32 in a suitable opening therein is a punch and countersinking member 40 preferably fixed in position by means of a set screw 41 extending radially into the opening and threaded through a collar 42 surrounding the lower end of the shaft. The use of this collar permits making the walls surrounding the punch holding opening rather thin so as to receive a reasonably large shank and yet provide a sufficient number of threads for the

set screw 41 to hold the punch 40 firmly in position.

The punch 41 cooperates with a die and guide bushing, as will be describe, in a block 45 clamped upon a suitable anvil portion 46 provided on the housing member 10 and held securely fixed in position by means of a screw 47.

The die, bushing, and the parts holding it are shown on enlarged scale in Figs. 3 to 7. In these figures the block 45 is shown as having a body portion 50 narrowed somewhat towards its forward end and slotted horizontally as indicated at 51. The lower portion of the block below the slot 51 is slotted longitudinally in a vertical plane as indicated at 52, and between the portions 53 separated by the slot 52 is clamped a die 54 fixed in vertical adjusted position by means of a screw 55, being held firmly in adjusted position by the clamping screw 56 passing through the parts 53.

It is preferred to provide the punch 40 with a suitably flattened portion 65 so that it may be held firmly in position and against turning by means of the screw 41 and to provide near its lower end the countersinking cutting edges 66, so that after the punch proper 40*a* has perforated the metal the rotating punch 40 will countersink the hole in the desired manner.

In using the device for perforating a row of openings near the edge of a sheet, a guide block 63 is preferably set in the slot 51 and fixed in position by a screw 62 passing through the slotted opening 61. This block 63 is preferably of the shape in plan as shown in Fig. 6, that is, the front edge is somewhat curved to permit curved edges and angular portions of the sheet to be perforated The guide is also preferably provided with the ears or flanges 63*a* adapted to maintain it against rotation and consequent misadjustment.

In setting the block 45 on the machine, the bushing 60 is slipped up over the punch 40 and the block 45 upon the anvil or base 46, whereupon the screw 47 is turned down to firmly fix the block in position. It is preferred to so locate the punch 40 in the shaft 32 that in its stroke it will not pass out of the guide bushing 60, and therefore, the punch tends to maintain the block 45 in its proper position, while the latter strips the work from the punch on the upward movement of the latter.

Now having described the invention and the preferred forms of embodiment thereof, it is to be understood that the said invention is to be limited, not to the specific details herein described, but only by the scope of the claims which follow.

Claims:

1. In combination, a support, a housing member carried thereon and including a plurality of shaft bearings, a vertical shaft having a countersink and punch in one end and mounted as to move axially and rotatably on its vertical axis, a horizontal rotating shaft having a cam on one end adapted to cause axial movement of said vertical shaft, a third shaft having a driving connection with said vertical shaft and adapted to cause rotation thereof, said connection being such that the vertical shaft is caused to rotate at a greater rate than it is caused to move axially.

2. In a punching machine, a support, a die block secured to said support and having a bore therein, a punch mounted so as to reciprocate in said bore and means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch.

3. In a punching machine, a die block having a die therein and having a bore in alignment with said die, a punch mounted so as to reciprocate in said bore, means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch, and means to adjust the position of said die with respect to said bore.

4. In a punching machine, a die block having a die therein and having a bore in alignment with said die, a punch mounted so as to reciprocate in said bore, means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch, and means to adjust the position of said die with respect to said bore, said die block having a work receiving slot, and a gauge block in said slot.

5. In a punching machine, a die block having a die therein and having a bore in alignment with said die, a punch mounted so as to reciprocate in said bore, means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch, and means to adjust the position of said die with respect to said bore, said die block having a work receiving slot, and a gauge block in said slot, and means for adjusting the portion of the gauge block.

6. In a punching machine, a die block having a die therein and having a bore in alignment with said die, a punch mounted so as to reciprocate in said bore, means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch, and means to adjust the position of said die with respect to said bore, said die

block having a work receiving slot, and a gauge block in said slot, and means for adjusting the portion of the gauge block, the latter being U-shaped.

7. In a punching machine, a die block having a die therein and having a bore in alignment with said die, a punch mounted so as to reciprocate in said bore, means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch, and means to adjust the position of said die with respect to said bore, said block having a slot in which said die is disposed.

8. In a punching machine, a die block having a die therein and having a bore in alignment with said die, a punch mounted so as to reciprocate in said bore, means for limiting the normal movement of said punch so that a portion thereof is constantly disposed within said bore, whereby the block is held against movement on its support by the punch, and means to adjust the position of said die with respect to said bore, said block having a slot in which said die is disposed, and means for causing the portions on both sides of said die to approach each other to hold the die in place.

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