Feb. 26, 1963 P. DUBECKY 3,078,574

PUNCH FOR FORMING PERFORATIONS IN COATED ASBESTOS-CEMENT SHEETS

Filed April 15, 1960 2 Sheets-Sheet 1

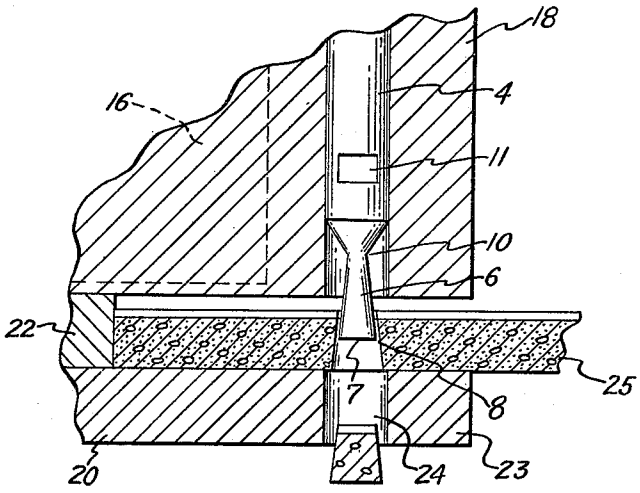

Fig. 1

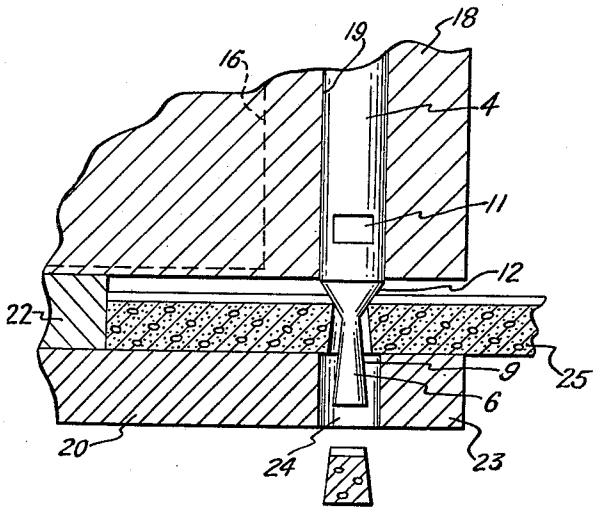

Fig. 2

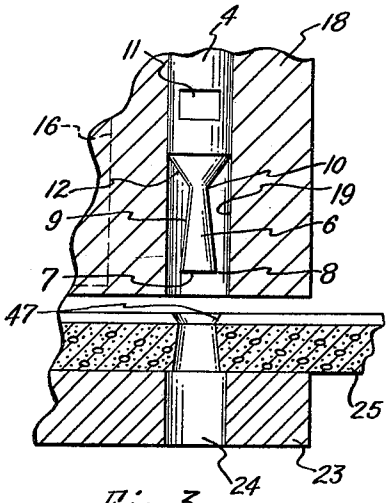

Fig. 3

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PUNCH FOR FORMING PERFORATIONS IN COATED ASBESTOS-CEMENT SHEETS

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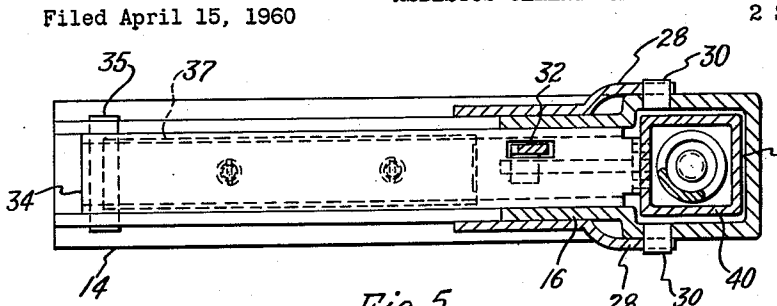

Fig. 5

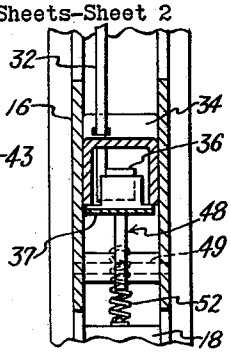

Fig. 6

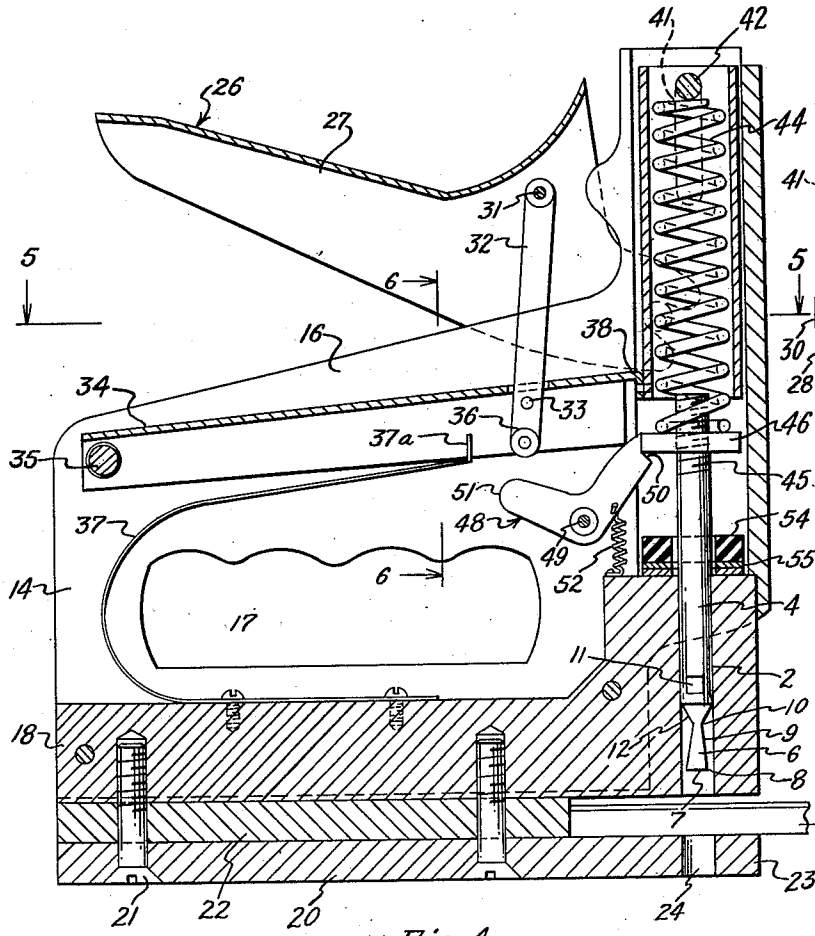

Fig. 4

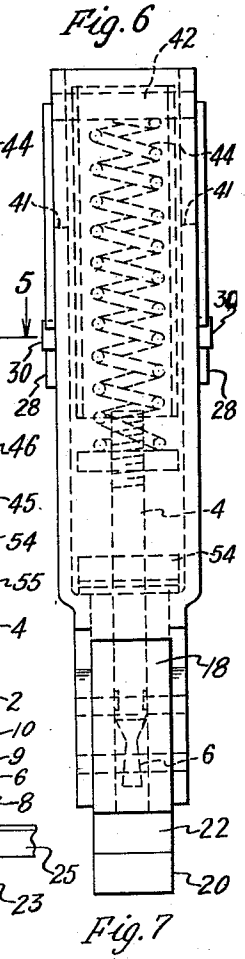

Fig. 7

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PUNCH FOR FORMING PERFORATIONS IN COATED ASBESTOS-CEMENT SHEETS

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1 Claim. (Cl. 30—358)

This invention relates to a punch for producing holes in thin frangible sheet materials such as asbestos cement shingles and sheets. It is especially adaptable to a transportable hand punch but has application to larger machines for punching holes in such sheets.

It is a particular object of the invention to provide a device of this type which will uniformly punch smooth holes in sheet material and which will in the same operation provide a surface countersink in said sheet for the head of nails or screws, if desired.

The invention is especially applicable to laminar products, such as coated asbestos cement shingles, where it is necessary to provide clean holes without fracturing the sheet material or disturbing the coating.

With punches heretofore available, wherein the operating end of the punch is of uniform diameter or upwardly and outwardly tapered, in the usual punch form, the holes initially are not as clean as desired, but where the tapered portion of the punch enters the material to enlarge the opening and is then withdrawn the withdrawal will often remove adjacent material, leaving an irregular surface. This is particularly true when such punches are used with coated sheets, the punch disrupting the coated surface and rendering ineffective the protective effect of the coating.

With the present invention smooth, clean holes are produced, with or without a bevel or countersink in the top surface and with no undesirable disruption of the upper surface of the sheet.

The above and other objects will be clear from the following description when considered in connection with the drawings wherein,

FIG. 1 is a fragmentary vertical sectional view through the head of a punch embodying my invention, showing the tip of the punch in cutting position.

FIGS. 2 and 3 are similar sectional views illustrating the punch in different operating positions.

FIG. 4 is a vertical sectional view of a hand actuated punch embodying my invention, showing the punch in retracted position.

FIG. 5 is a horizontal sectional view thereof on the line 5—5 of FIG. 4.

FIG. 6 is a fragmentary vertical sectional view on the line 6—6 of FIG. 4.

FIG. 7 is a front elevational view of the punch mechanism.

The construction of the punch is illustrated in FIGS. 1 to 3. The punch 2 is formed with a main body portion 4 and a cutting tip 6. The body is formed of a sturdy solid shaft of steel, preferably round, and having substantial mass for the purposes stated below.

The cutting tip 6 is formed with a transverse surface 7, which is flat and preferably perpendicular to the length or axis of the body portion, terminating in a knife edge 8 forming the perimeter of the surface 7. The shank 9 of the cutting tip is inwardly tapered, as shown, from the surface 7 up to the point 10 where it joins the bottom of an outwardly tapered shoulder portion 12 extending outwardly at an angle of approximately 45° to the base of the body portion 4. The cutting end of the punch, for convenience, is referred to herein as the lower end of the punch, it being understood that the punch may be positioned at any angle to the vertical with

the other elements correspondingly positioned. The tapered shank 9 has a substantial reduction in diameter from the cutting edge 8 to the point 10 for example a reduction from 1/8 inch at the cutting edge to 1/16 inch at point 10. The shoulder portion 12 serves to compress the surface material of the material being punched, to provide any desired bevel, shown at 47 in FIG. 3, but without attaching itself to the material of the sheet to disrupt the surface when withdrawn. Adjacent the lower end of the main body portion 4 there are provided two opposed flat surfaces 11, engageable by a wrench for turning the punch to adjust its position vertically.

Referring now to FIGS. 4 to 7, the punch operating mechanism includes a frame 14, comprising an outer sheet metal shell or casing 16 and a steel insert 18. The casing 16 has opposed and alined openings 17 for receiving the fingers of the operator. The insert 18 has a vertical passage 19 in which the main body 4 of the punch reciprocates as the punch is actuated. The anvil plate 20 is secured to the insert 18 as by machine screws 21. The metallic spacing plate 22 is of a thickness to space the free end 23 of the anvil plate a distance sufficient to permit easy introduction of the sheet 25 to be punched, between the insert 18 and anvil plate 20. The vertical aperture 24 in plate 20 is alined wtih the punch 2 so that material punched from the sheet will be discharged through the opening 24.

The mechanism for operating the punch includes a hand lever 26 of inverted U-construction provided with a hand grip 27 and forwardly extending yokes 28 engaging pins 30 on the shell 16 as a fulcrum about which the lever is turned. The hand lever is connected by pivot pin 31 to link 32, hinged by means of pin 33 to the forward portion of lever 34. The lever 34 is of inverted U-form with the rearward end of the lever supported loosely by pin 35, extending across between the side flanges of the casing 16. The lever is tensioned upwardly, into inoperative position by means of a strong leaf spring 37 secured to the steel insert 18 and bearing against the lower surface of the lever as shown, with a positioning tip 37*a* extending into the bottom opening in the lever 34. The lower end of link 32 carries a roller 36 for a purpose to be described.

The forward end of lever 34 carries a downward bent tip 38 attached to the rearward wall of a spring assembly tube 40, preferably of square construction. The tube 40 is loosely mounted in the vertical opening 43 in the forward or head portion of casing 16. At its upper end the tube 40 carries a transverse pin 42 extending across and engaging the top flat coil of actuating spring 44, the pin extending outwardly through opposed slots 41 in the casing 16. At its lower end the spring engages against a square steel disk 46, shaped to conform to the interior dimensions of the tube 40 and having an adjustable threaded connection to the threaded shank 45 at the upper end of the punch body 4. The spring 44 and tube 40 are constructed to cause the spring to be loosely housed in the tube, with either sliding freely along the other.

The punch is normally locked in elevated position by means of a bell crank latch lever 48 mounted on hinge pin 49 extending across the casing 16. The forward end of the latch has a notch 50 for engaging and holding the disc 46 and punch 2 in elevated positions. The rearward end 51 of latch lever 48 is positioned to be engaged by roller 36 when the hand lever approaches the limit of its downward travel, to release the punch. The latch is tensioned to latching position by coil spring 52.

The extent of downward movement of the punch 2 is limited by a stop disk 54 which surrounds the punch body 4 and is supported by engagement with the upper surface of insertion 18. The exact position of the stop disk is provided by adding one or more spacing disks or

shims 55 beneath the stop disk, thus providing for a predetermined stop position. The disk 54 is preferably formed of a moderately resilient material, such as rubber or plastic, or other compressible gasket material to prevent objectionable noise on operation of the punch and to avoid injury to the tool.

The operation of the punch will be clear from the above description. The operator grasps in his hand the assembled punch, in its position of rest, as shown in FIG. 4. By passing his fingers through the openings 17 and pressing downwardly on hand lever 26 lever 34 is moved downwardly about its pivot 35, producing downward movement of tube 40 and compressing spring 44. As the hand lever approaches the limit of its downward movement roller 36 presses downwardly on the operative end of latch lever 48, releasing disk 46 and the punch assembly. The compressed spring 44 then projects the punch assembly downwardly, the mass of the punch assembly being sufficient to carry the punch uniformly through its punching operation in forming an opening in the sheet material 25.

The position of the punch will have been set in advance to provide a clean cut hole through the sheet of material placed on the anvil 20 beneath the punch, or to provide such hole with a beveled upper surface 47 for the nail or screw head, as desired.

On release eof the hand pressure on lever 26, leaf spring 37 causes the lever to assume its normal inoperative position, thus returning the punch assembly and spring 44 to the positions shown in FIG. 4. The opening in the sheet material, even in laminar type sheets, is uniformly clean, with the surfaces of the adjacent material unbroken, with or without the bevel.

The particular construction here shown is set forth for purposes of illustration only, and not with any intention of limiting the invention, the scope of which is set forth in the appended claim.

I claim:

A punch mechanism for punching and finishing a hole in a hardened asbestos-cement sheet having a coating thereupon comprising a punch, said punch having a main body portion, a cutting tip on one end of said body portion, said cutting tip having a flat end surface extending in a plane perpendicular to the length of the body portion wtih a knife edge forming the perimeter of said flat end surface, said body portion having a reduced shank portion extending from said flat surface, said reduced shank portion extending along the body portion for a distance greater than the thickness of said sheet material, said shank portion having at one end thereof an outwardly flared shoulder at an angle of approximately 45° with the plane of said flat surface, a substantial portion of said outwardly flared shoulder being of greater cross section than the flat end surface of the cutting tip, said flared shoulder portion acting to trim the perforation in the coating after passage of the shank portion therethrough, a frame, a head thereon having a passage therein, and said punch being adapted to have the main body portion thereof reciprocating in said passage a distance sufficient to cause said flared shoulder to contact said sheet material.

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