

Apr. 17, 1923.

1,452,224

R. S. SMITH

PUNCHING PRESS AND DIE THEREFOR

Original Filed Oct. 20, 1919

FIG. 1

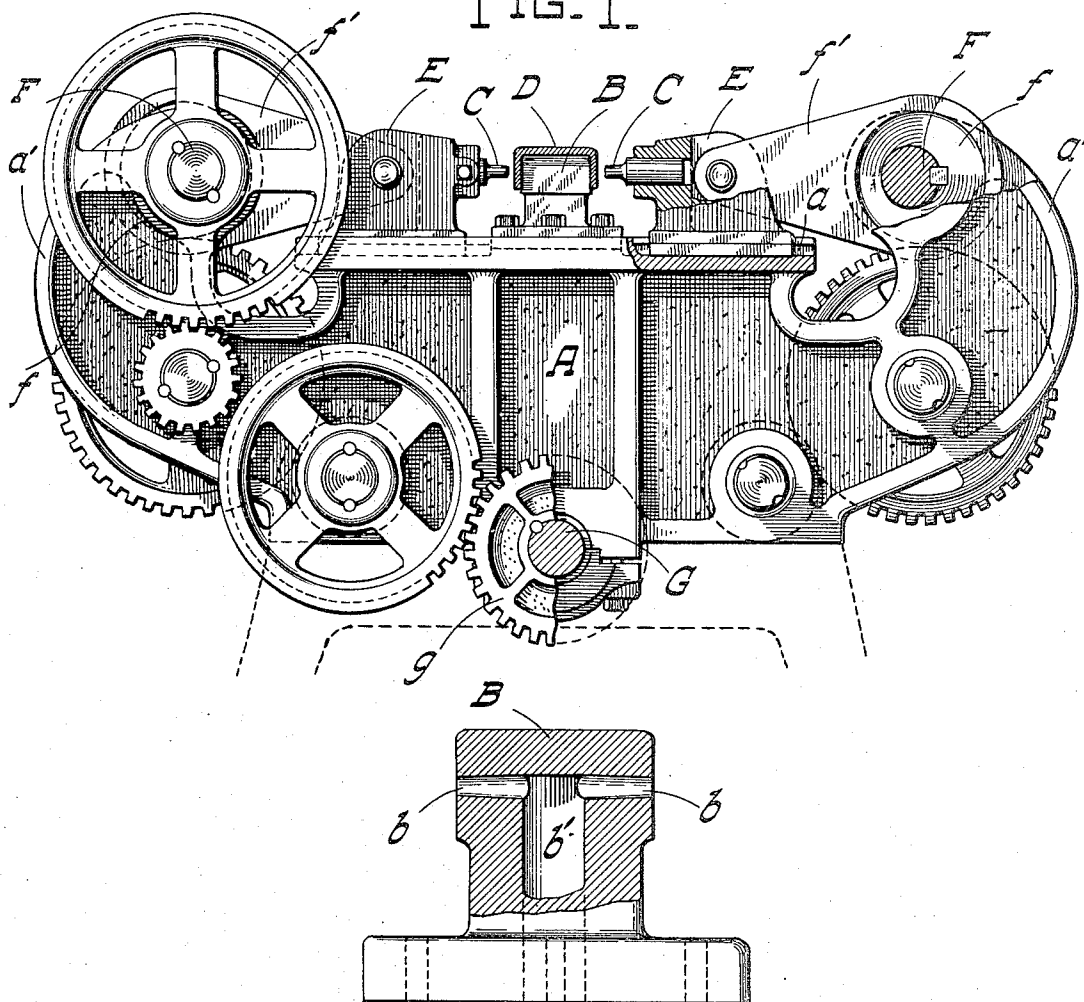
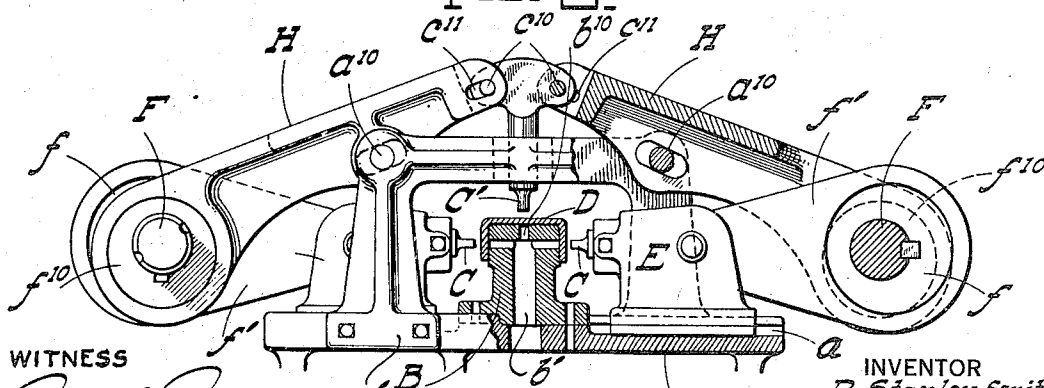


FIG. 2



WITNESS

INVENTOR
R. Stanley Smith.

FIG. 2.

BY

BY
Erwin, Wheeler & Woodard.
ATTORNEYS

UNITED STATES PATENT OFFICE.

REUBEN STANLEY SMITH, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO A. O. SMITH CORPORATION, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW YORK.

PUNCHING PRESS AND DIE THEREFOR.

Application filed October 20, 1919, Serial No. 831,995. Renewed January 25, 1923.

To all whom it may concern:

Be it known that I, REUBEN STANLEY SMITH, a citizen of the United States, and residing in the city of Milwaukee, county of Milwaukee, and State of Wisconsin, have invented a new and useful Improvement in Punching Presses and Dies Therefor; and I do declare that the following is a full, clear, and exact description thereof, such as will enable persons skilled in the art to which the invention pertains to make and use the same, reference being had to the drawings hereto attached and forming part of my specification for disclosure as to certain details of construction and operation.

This invention relates to presses for punching rivet holes in the flanged side bars and end and cross bars of automobile and other vehicle frames.

The invention consists of a novel form of multiple punching press and double face hollow die for use therewith, so constructed and arranged that the punches of the press in which the die is employed work in opposition to each other with a concentration of the pressures, whereby the support for the die is freed from the strain incident to the use of the die in the forms heretofore known.

In the former practice, when the flanges are punched separately, the entire punching strain is imposed upon the support for the die. At places in the length of the flanged bars, the flanges are in such proximity that the channel between them is very much restricted, and this has necessitated the use of a die of such corresponding small proportions that an element of weakness in the construction is unavoidable.

But in my invention, the punching strains which are simultaneously applied at opposite sides of the flanged bar, are resisted by the die which is in the channel of the flanged bar at the time. The result of thus equalizing the pressure is that the whole of the crushing strains imposed by the press are borne by the die, and the support for the die is entirely relieved from any such strains.

In some classes of work, it is desirable to perforate the web of the flanged bar upon a line coincident with the perforations in the flanges, and this may be effected by providing the die with a third punch-hole in the top thereof. In such cases, the three

punches of the press are actuated simultaneously. The downward pressure of the third punch does not impose any lateral strain upon the support for the die, but such strain is merely one of compression exerted in the direction of the vertical axis of the die.

My improved anvil or die is provided with suitably arranged punch openings and a central bore connecting therewith through which latter the several slugs punched from the flanged bar are discharged. It is advisable to form the anvil or die as an integral structure, that is, as a solid block.

Having thus outlined the nature of my invention, the latter will now be described with reference to the form in which its novel features have been specifically embodied, and such novel features will be recited in the claims appended to this specification.

In the accompanying drawings,

Figure 1 is a view in front elevation, broken away in parts and sectioned in other parts, showing my improved form of punching press and die.

Figure 2 is view in front elevation, partly in section, showing in an enlarged manner the structural features of the die used in the press shown in Figure 1, and which embodies my invention.

Figure 3 is view in elevation, partly in section and similar to Figure 1, showing simple provisions in a press designed to perforate the web and the side flanges of a bar at one operation.

Like reference letters indicate the same parts in the several views.

Referring to the drawings, the main frame of the punching press is indicated by the letter A. Upon the top of this frame and at a central point is mounted an anvil or die B, against which the punches C work in direct opposition to each other when in operation, to pierce rivet holes in the side flanges of the bar D, when laid upon the die B.

The anvil or die B, formed as a solid block, is bored from opposite faces to provide openings *b, b*, into which are passed the slugs punched from the side flanges of the bar D, by the punches C, and is bored also at *b'*, to provide a central or common discharge chute through which such slugs may be carried from the press.

The top of the frame A is grooved as at *a*,

to provide ways in which are guided the reciprocating punch carrying heads E, in which the punches C, are adjustably and removably held. These punch heads E, are actuated from shafts F, journaled in extensions a' , of the frame A, by means of eccentrics f , keyed to the shafts F, and links f' , which latter are pivotally connected to the punch heads E. A power shaft G, journaled in the frame A, carries a pinion g , from which the shafts F are rotated through the medium of a train of reducing gears, as shown, there being a like train of gears between the pinion g , and each of the shafts F. By this arrangement, the punches C are operated in synchronism, and are effective to perform their work of punching a rivet hole in each of the flanges of the bar D, at the same instant.

It follows from the operation described, that the thrust of the punches is equalized, and that the pressure exerted is wholly absorbed by the die B as an intermediary, without imposing any strain upon the support or attaching means for the said die.

In some classes of work, the channelled bar is so narrow at its ends that the opposite flanges thereof are separated only by a slight distance, which is not sufficient to permit the use of an anvil or horn of sufficient strength to withstand the pressure of the punching mechanism, when the latter is exerted. As a result, the strains upon the anvil and its support are so great that fracture frequently results. However, I propose to overcome the objection referred to by forming a double faced anvil or die which corresponds exactly in thickness to the distance separating the flanges of the channelled bar. This improved anvil will stand entirely clear of the other parts so that the field comprising the space defined by the projected parallel lines of the opposite side faces against which the punches operate in synchronism is entirely free from obstruction by any part of the mechanism, and accordingly the channelled bar may be passed over the anvil and seated thereon with the opposite faces of the anvil in engagement with the flanges of the bar without hindrance by said mechanism or parts thereof. In punching, the strains are transmitted directly to the anvil, so that the stresses offset and neutralize each other and relieve the support for the anvil from the breaking strains heretofore encountered. This arrangement of the anvil in free space is desirable to enable the movement of the channelled bar to take place so as to position the latter upon the anvil without encountering obstructions. It is necessary to the successful practice of the invention that the anvil head stand in a plane which is clear and above the mechanism of the press to facilitate the longitudinal movement of the

bar and the seating thereof on the anvil for the performance of the multiple punching operation.

It is also necessary that the anvil or die members be formed as a solid block, so as to withstand the crushing strains imposed thereon by the simultaneously operating punches, in order that the destructive influences due to the heavy pressures may be avoided, such pressures, as before indicated, being sufficient to fracture the anvil or destroy its support. The anvil or die member will be of such proportion that, notwithstanding the presence of the openings and chute therein its solidity will resist the crushing strains exerted by the pressure of the punches upon the heavy material of which the channelled bar is formed.

As hereinbefore indicated, in certain classes of work, it is desirable to perforate the web of the bar upon the line of the holes in the flanges, and this may easily be achieved by the simultaneous operation of a third punch, through the devices shown in Figure 3, the plurality of punches thus employed operating with a centering movement against the flanges and the web of the channel bar.

A sub-frame A' will be mounted on the main frame A, for guiding the punch C', and supporting short shafts a'' , which latter form journals for the oscillating levers H. The shafts F carry additional eccentrics f'' , which vibrate the pivoted levers H, and impart reciprocatory motion to the punch C', the adjacent ends of the levers H, being suitably connected to the shank of the punch C', so as to produce the desired movements of the latter. In Figure 3, I have shown such connection as comprising pins c'' , in the shank of the punch C', as working in slots c'' , in the forked ends of the oscillating levers H. The punch C' cooperates with the punch hole b'' , in the die B.

I am aware that it has been attempted heretofore to punch opposite holes in the flanges of a channel bar, but in such previous efforts no attempt has been made to use a double face hollow die or its equivalent, as in my invention.

I am also aware that it has been attempted heretofore to punch opposite holes in pipes composed of thin sheets, a circular skeleton die member over which the pipe is passed being employed to receive the thrust of the punches; but the construction is such that obstruction exists to the longitudinal movement of the work, and it is not therefore available for piercing the flanges of channel bars.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a piercing press for punching holes in the opposite flanges of a channelled bar,

a frame, and a plurality of punches therein working simultaneously toward each other to offset and neutralize the opposed strains in punching, in combination with an anvil or die member fixed in the frame between the punches, the said anvil or die member being formed as a solid block upon which the channeled bar is placed with the opposite flanges of the said channeled bar engaging the side faces of the anvil, the said anvil having a bore for each punch and a common discharge chute connected with and leading from the bores, whereby the slugs produced in punching are guided away from the press.

2. In a piercing press for simultaneously punching holes in the opposite flanges of a channeled bar, an anvil or die member formed as a solid block, provided with a discharge chute for the slugs, two opposite sides of which anvil are adapted to bear against the flanges when the channeled bar is seated thereon to resist and neutralize the strains imposed upon the anvil in the punching operation, the said anvil standing in clear space to enable the channeled bar to be passed thereover without obstruction.

3. In a piercing press for punching holes in the opposite side flanges of a channeled bar, an anvil or die over which the channeled bar may be passed longitudinally and upon which it may be positioned with its flanges embracing the side faces of the anvil, whereby the anvil receives the thrusts and is relieved from the opposed strains in punching, the said anvil being formed as a solid block with bores in its side faces cooperating with the punches and a common discharge chute connected with and leading from the said bores to guide the punched slugs away from the press.

4. In a piercing press for punching holes in a flanged bar, a plurality of punches arranged for centering movement against the flanges and the web of the said bar to

simultaneously perforate such flanges and web, and means for actuating the said punches, in combination with an anvil or die to receive the thrust of the punches, the said anvil being provided with bores co-operating with the punches and through which the punched slugs are discharged.

5. In a press for simultaneously punching holes in the flanges of a channeled bar, a frame, a double faced hollow anvil or punching die fixed thereon and standing in open space to permit the channeled bar to be passed thereover and laid thereon with its flanges engaging the opposite faces of the anvil, punches and actuating means therefor supported by the frame at each side of the anvil or die, whereby the strains exerted by the opposing forces of the punches upon the support for the fixed anvil or die are equalized, the said anvil or die being provided with openings in which the punches work and a discharge chute for the punched slugs leading from the several openings.

6. In a piercing press for punching holes in the opposite flanges of a channeled bar, a frame, punches therein, and means for actuating the punches simultaneously toward each other to neutralize the opposed strains in punching, in combination with an anvil or die member arranged between the punches, the said anvil or die member being formed as a solid block upon which the channeled bar is adapted to be placed with the opposite flanges thereof in engagement with the sides of the anvil, and provided with means for conducting away the slugs punched from the said flanges.

In testimony whereof, I have signed my name at Milwaukee, this 9th day of October, 1919.

R. STANLEY SMITH.

Witnesses:

W. F. WOOLARD,
C. THEO. OSTERBERG.