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E. HAVERBECK

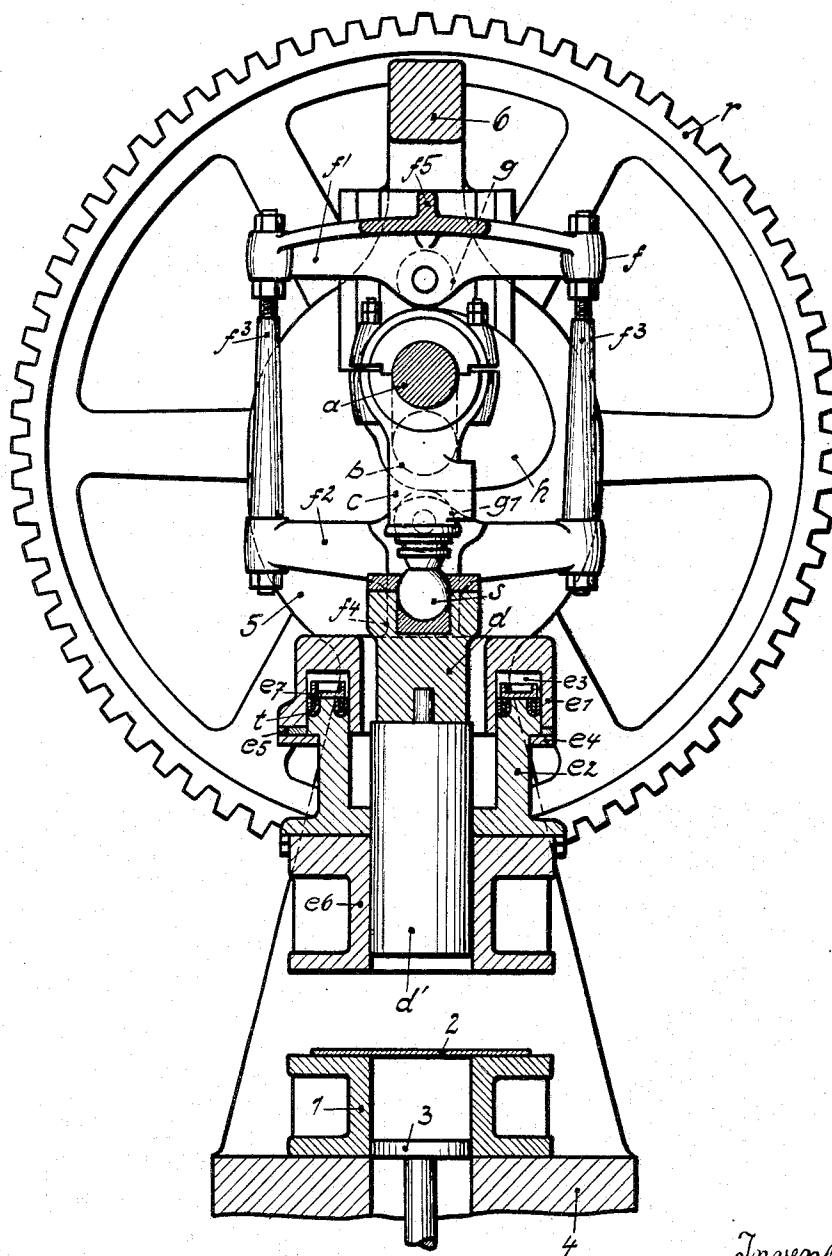
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SHEET METAL PRESS

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3 Sheets-Sheet 1

Fig. 1.



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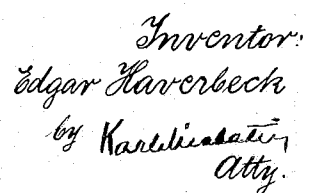
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UNITED STATES PATENT OFFICE

1,966,758

SHEET-METAL PRESS

Edgar Haverbeck, Goppingen, Germany

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In Germany May 10, 1929

1 Claim. (Cl. 113—46)

My invention relates to presses of the die type such as drawing presses, cupping presses, and the like, and more particularly to that type of press which is equipped with cushioning means.

It is an object of my invention to provide improved cushioning means with a view to preventing undesirable increase of the overall height of the press.

To this end I provide, in combination with a movable die member, a divided ram and equip the ram with means for forming an air cushion intermediate the members of the ram.

Normally the air cushion is arranged below the bed or bolster plate of the press and equipped with a piston connected to the pin plate which supports the annular blank holder. The height of the cushion with its piston, piston rod and cylinder increases very considerably the overall height and the initial cost of the press. By dividing the ram according to the present invention this drawback is eliminated and the increment of the height due to the cushion is reduced to a minimum. Sheet metal of various gauges is handled without difficulty, and the divided ram is readily adapted to existing presses.

In the drawings affixed to this specification and forming part thereof my invention is illustrated diagrammatically by way of example as adapted to various types of presses.

In the drawings:

Fig. 1 is a sectional elevation of a press having a drawing slide, a ram with an air cushion, and separate means for operating the ram and the drawing slide,

Fig. 2 is a sectional elevation of a press having a ram combined with the drawing slide so that both members are operated by the same means, and

Fig. 3 is a partly sectional elevation of a press of the type known as "bottom press" or "bottom-slide drawing press".

Referring now to the drawings, and first to Fig. 1, 4 is the table of the press, 5 is one of two uprights extending upwardly from the table 4, and 6 is a transverse brace connecting the two uprights at the top. Mounted to rotate in the uprights, or in one of them, or at any other suitable point, is a shaft *b* with a crank having a crank pin *a* and a spur gear or the like for rotating it. *c* is a pitman rod with its big end seated on the crank pin *a* and its small end, with a spherical knuckle *s*, engaging a seat at the upper end of the drawing slide *d*. *d'* is a punch at the lower end of the drawing slide *d*.

The ram is built up from two annular mem-

bers *e'* and *e''* which surround the drawing slide *d* and the punch *d'*, *e''* is a cushioning compartment formed by the channel-sectioned upper ram member *e'* and the annular lower member *e''*, *t* is a packing which may consist of a pair of leather collars or any other suitable packing elements, and *e''* is an annulus of channel section which is placed on top of the member *e'* in the cushioning compartment *e''* for limiting the relative movement of the members *e'* and *e''*. The member *e''* reciprocates in the member *e'* like a piston sliding in a cylinder. If desired, an air vessel, not shown, may be connected to the cushioning compartment *e''* so that leakage loss is made up for from the vessel. *e''* is a blank holder at the lower end of the piston member *e''*, 1 is a die on the table 4, 2 is a blank which is placed on top of the die and upon the descent of the drawing punch *d'* is drawn or cupped into the die, and 3 is an ejector which is mounted to reciprocate in the die 1 for removing the finished articles.

Relative displacement of the cylinder ram member *e'* and the piston ram member *e''* is limited by the annulus *e''* in the descending direction of the cylinder member *e'*. Relative displacement of the two members in the opposite direction is limited by an annular check *e''* at the lower end of the cylinder member *e'* which engages below a shoulder on the cylinder member *e''*, and *e''* is a jib which is preferably inserted between the lower end of the cylinder member *e'* and the check *e''* for regulating the distance of the check from the lower end of the cylinder. It is also possible to operate the two members as a rigid unit by removing the jib *e''* and permitting the annulus *e''* to seat on the bottom of the cylinder member *e'*.

Mechanism is provided for reciprocating the ram, with its member *e'*, *e''* and the blank holder *e''*, independently of the reciprocation of the drawing slide *d* and its punch *d'*. This mechanism in the example illustrated is duplicated at opposite sides of the crank pin *a*. The section in Fig. 1 shows only the rear half of the mechanism but its front half is quite similar. The mechanism comprises two substantially rectangular frames *f* each with a horizontal upper bar *f'*, a horizontal lower bar *f''* and vertical stays *f'''*. The two upper bars *f'* are connected by a transverse brace *f'''* which may be cast or forged integral with the two bars. The lower bars *f''* are connected to the cylinder ram member *e'* by two short ribs *f'''* which extend into the vicinity of the recess for the drawing slide *d* in the cylinder

member e^1 . h are cams on the shaft a at opposite sides of its crank pin b , g are rollers in each of the upper bars f' and g' are rollers in each of the lower bars f^2 for cooperation with the cams h . It will appear that while the drawing slide d with the punch d' is reciprocated by the crank pin b the cylinder member e^1 of the ram is reciprocated independently of the reciprocation of the drawing slide by the cams h and the frames f .

The ram is lowered onto the blank 2 by the mechanism described and thereupon the drawing slide d with its punch d' descends and performs the drawing or cupping operation on the blank which is finally ejected as a finished article by the ejector 3.

Referring now to Fig. 2, this press has a divided ram with a cylinder member e^1 and a piston member e^2 as described but in this instance the drawing slide d is not designed as an independent unit but is combined with the cylinder ram member e^1 , being a central rod u in the cylinder e^1 , with a check v for limiting the relative movement of the two members at its lower end. The function of the annular check e^4 at the lower end of the piston member is performed by the check v . In this case obviously the mechanism including the cams h , the rollers g , g' and the frames f is dispensed with, as the drawing slide u moves in conformity with the cylinder member e^1 . In this manner the press becomes a very simple, single-acting machine, and the resiliency of the ram is obtained as before.

Referring now to Fig. 3, this shows a press of the bottom-press type with a fixed ram and a movable table. w is a frame extending upwards from the base plate x of the machine, i are rods which are secured in a transverse bar at the upper end of the frame w , and e^1 , e^2 is a ram of the type referred to which is held in a fixed position by the rods i , i . The two members e^1 , e^2 of the ram form an air cushion e^3 and a packing t and an annulus e^7 are provided, as and for the purpose described. The check e^4 and the

jib e^5 are provided on the cylinder ram member e^1 , as also described. k is a cross head which is fitted to slide on the frame w and d is the drawing slide which is secured at the centre of the cross head and provided with a punch, d' . n are gear wheels to which rotation is imparted by any suitable means, for instance, by gearing which is operatively connected with a pulley or fly-wheel y , and m are connecting rods which extend from such gearing or other mechanism to the cross head k so that the cross head with the drawing slide d is reciprocated upon rotation of the gear. o is the bottom slide of the machine which is equipped with the die 1, is fitted to slide in the frame w and is equipped with rollers p . q are cams on a shaft of the gearing through the medium of which the bottom slide o is reciprocated.

I wish it to be understood that I do not desire to be limited to the exact details shown and described for obvious modifications will occur to a person skilled in the art.

In the claim affixed to this specification no selection of any particular modification of the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by the claim is expressly reserved.

I claim:—

A die press comprising a movable drawing slide, a punch on said slide, means for reciprocating said drawing slide, a ram surrounding said drawing slide and composed of two members, namely, an annular cylinder in said ram, an annular piston inserted in said cylinder, said cylinder and said piston making up an air cushion, means for packing said piston in said cylinder, a blank holder on the outer end of said piston, a check on said ram, and a detachable spacing member adapted to be inserted between said check and said ram.

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