

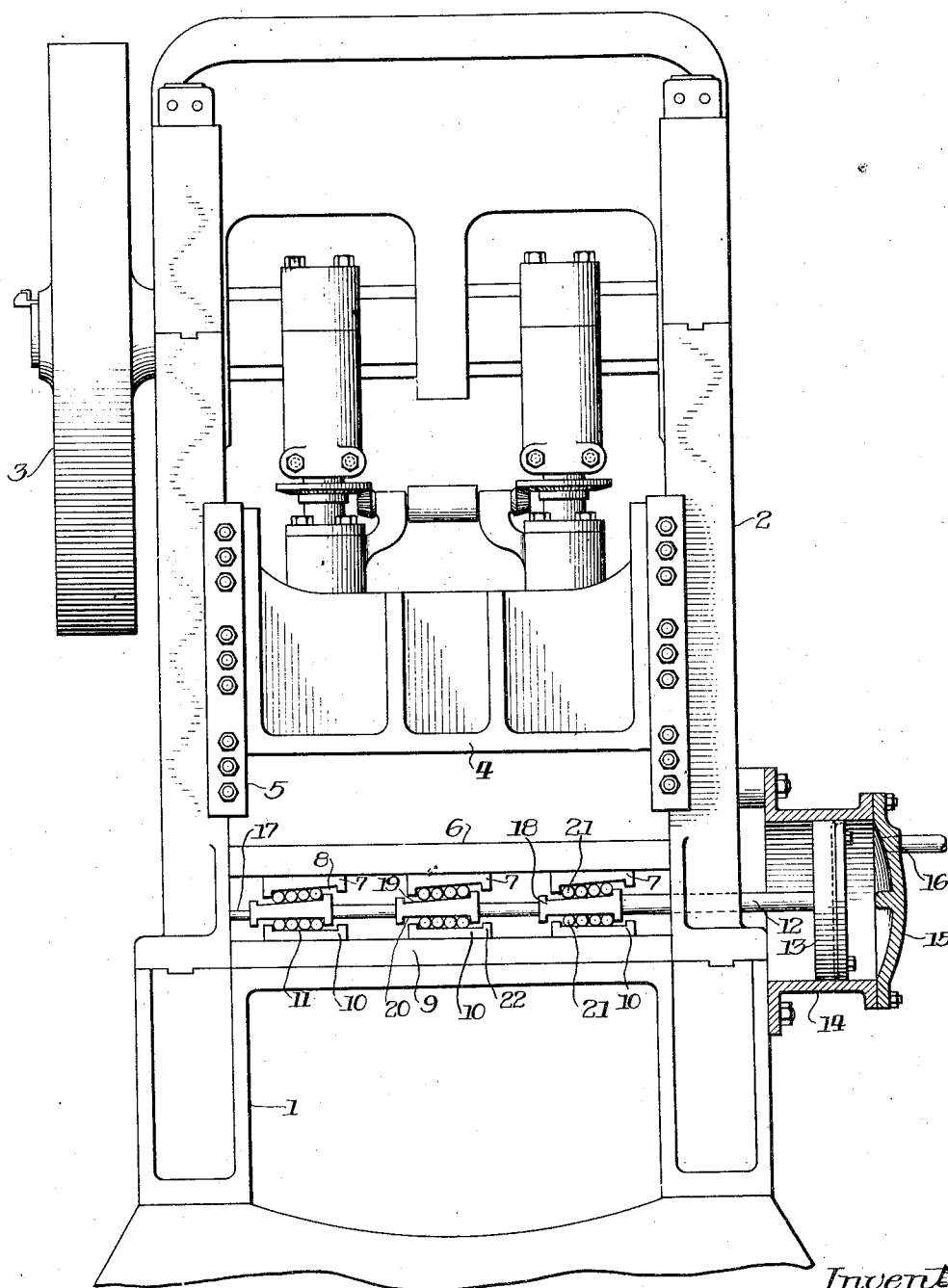
June 24, 1930.

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1,765,762

MECHANO PNEUMATIC CUSHION FOR POWER PRESSES

Filed Dec. 3, 1928



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UNITED STATES PATENT OFFICE

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MECHANO-PNEUMATIC CUSHION FOR POWER PRESSES

Application filed December 3, 1928. Serial No. 323,548.

This invention relates to die presses or drawing presses which may be used for embossing, coining, shallow drawing, etc.

In the common form of die press there is an upper platen carrying the upper die which is given a uniform up and down stroke by a crank and fly wheel and presses the material upon a fixed lower platen supporting the lower die. There is usually some form of adjusting means for varying the approach of the upper die to the lower die. For if the upper platen is given a uniform stroke and if the thickness of the material inserted in the press varies there will be a corresponding variation in maximum pressure exerted upon the material, therefore, it is customary to change the normal relation between the upper platen and lower platen in accordance with the thickness of the material inserted in the press. But if the thickness of the material continually varies, it is objectionable to mechanically adjust the press each time, therefore, it is proposed in this invention to provide a lower platen having supporting means consisting of yieldable and adjustable means resisting movement of the lower platen until the desired pressure on the material has been reached. Thus as the upper platen moves to press the material the lower platen remains stationary until the maximum desired pressure is reached and then moves to prevent an increased pressure.

It is further an object of this invention to provide fluid pressure constituting the cushioning support for the lower platen, preferably the fluid used is air.

It is further an object of this invention to so support the lower platen that a relatively low air pressure may act through mechanical leverage action to develop an increased resistance to the movement of the lower platen.

An additional object of the invention is to provide simple and compact leverage means that will cause a uniform pressure to be distributed over the lower surface of the platen

by causing the resisting means to act at a plurality of spaced points.

Another additional object of this invention is to provide a transverse element acting through inclined surfaces to resist movement of the lower platen and having rolling elements between the inclined surfaces to reduce the friction.

Additional objects and advantages will clearly be apparent as the description proceeds.

In the drawings a single figure shows the side elevation of the press, partially in section.

The figure shows an ordinary crank and fly wheel press but it will be apparent that the improvement may be adapted to other form of presses.

The press shown consists of a lower frame 1 supporting the upper frame portion 2 which carries the driving means of usual form designed at 3. The driving means 3 gives a uniform up and down stroke to an upper platen 4 which carries an upper die (not shown). Adjusting means for the upper die are generally shown for varying the normal approach of the upper die to the lower die. The upper platen 4 is guided for a vertical movement by means comprising side strips 5 secured to the supporting frame 2. Beneath the upper platen 4 is a lower platen 6 guided at its ends by the supporting frame 2 and adapted to move vertically in response to the pressure exerted by the upper side on the material held in the lower die secured to the lower platen 6. The lower platen 6 is supported by means yieldably resisting movement of the lower platen 6 until a desired maximum pressure is reached in the press. Hardened steel blocks are secured at spaced points in accordance with the width of the press to the lower surface of the platen 6. These blocks 7 have lower inclined bearing surfaces 8. The lower part of the supporting frame 1 supports a fixed press bol-

ster 9 to which is secured, at spaced points corresponding to the blocks 7, hardened steel blocks 10 having horizontal upper bearing surfaces 11. Supported to move transversely between the blocks 7 and 10 is a piston rod 12 guided in the bearing at one side of the frame 2 and carrying at one end a piston head 13 which slides in a piston cylinder 14 secured to the side frame portions 1 and 2. A cylinder head 15 is secured to the cylinder head 14 and is provided with an opening 16 for the introduction of fluid pressure urging the piston rod 12 longitudinally. At the end of the piston rod opposite the piston head is a stop 17 which abuts against the frame 2 and limits the initial movement of the piston rod 12 in one direction. To the piston rod 12 are secured at spaced points corresponding to the blocks 7 and 10, hardened steel blocks 18. These blocks 18 are constructed to have upper inclined bearing surfaces 19 corresponding to the inclines 8 of the block 7 on the lower platen 6 and have horizontal lower bearing surfaces 20 corresponding to the bearing surfaces 11 on the lower blocks 10. Supported between the bearing surfaces 8, 19, 11 and 20 of the blocks 7, 10 and 18 are supported rolling elements 21 which may, in a preferred form, be rollers. The blocks 7, 10 and 18 have at each end stop means 22 holding the rollers 21 in place.

A preferred operation of the construction so far described is as follows: The fluid pressure preferably used to resist movement of the piston head 15 comprises air pressure because of the ease by which air pressure may be varied and because of the compressibility of the air. The air pressure in the cylinder 14 is regulated in accordance with the maximum pressure desired in the press and initially moves the piston rod 12 until the stop 17 abuts against the frame. As the upper platen 4 moves to press the material, the lower platen remains stationary until the desired pressure is reached and then a further increased pressure will transmit through the inclined surfaces 8 and 19 a horizontal component of force in a transverse direction on the piston 12 which will be greater than the air pressure resisting movement, and, therefore, cause a movement of the piston rod and a corresponding vertical movement of the lower platen 6.

It is apparent that the pressure in the cylinder 14 will vary in accordance with the relative incline of the inclined bearing surfaces 8, 19. Because it is commercially not practicable to attain a high air pressure, the horizontal component of the inclines is usually relatively high in relation to the vertical component and may be substantially 100 to 1. Thus a relatively low air pressure exerted upon the piston rod will result in a greatly increased pressure or resistance

to the movement of the lower platen 6 in a downward direction.

If the inclined surfaces 8, 19 abut directly against each other, the great amount of friction between the surfaces would prevent relative movement and the piston rod 12 would not be moved in response to the pressure on the lower platen 6, therefore, it is necessary to use some means between the bearing surfaces to diminish the friction, and, as shown in the preferred construction, rolling elements, which may be rollers or ball bearings, are supported between the bearing surfaces.

In the use of sliding surfaces the friction increases substantially in proportion to the pressure upon the surfaces but in the use of rolling elements serving to transmit pressure, the friction remains in a substantially constant quantity regardless of pressure, therefore, a relatively greater pressure exerted in the press will be transmitted through the incline bearing surfaces and the rolling elements and cause a relatively low horizontal component of pressure upon the piston rod, and, due to the use of the rolling elements, the movement of the piston rod will take place as desired.

By the use of a press having the improvements described, it is possible to develop a uniform pressure upon material in the press regardless of thickness thus insuring a uniform product, as adjusted to a drawing press there will be a uniform gripping force upon the material. The presses are not so liable to leakage due to excessive pressures and the cushioning action of the air makes for a quieter operation. The distribution of the pressure over a plurality of spaced rollers and a plurality of bearing surfaces permits low bearing pressure upon individual elements. Due to the movement of all wedges in unison there will be a uniform pressure distributed over the lower surface of the lower platen thus causing perfect parallelism of movement.

I claim:

1. Supporting mechanism for the lower platen of a die press, comprising a transversely movable element, blocks having lower inclined bearing surfaces secured to the lower surface of the platen, blocks secured to the transverse movable element having upper inclined bearing surfaces, and bearing means comprising rollers held between the inclined bearing surfaces.

2. Supporting mechanism for the lower platen of a die press, comprising a transversely movable element, blocks having lower inclined bearing surfaces secured to the lower face of the platen, blocks secured to the transversely movable element having upper inclined bearing surfaces and lower horizontal bearing surfaces, means having upper horizontal bearing surfaces beneath the

blocks on the transverse element, and rollers held between the respective bearing surfaces.

3. In a press, a lower platen vertically movable, an inclined surface on the lower face of the platen having a small vertical component relative to its horizontal component, a member having a correspondingly inclined surface adapted to move transversely relative to the platen, and rolling elements supported between the inclined surfaces serving to transmit to the transversely movable element a relatively small component of horizontal pressure.

4. A press, comprising one platen having a uniform working stroke, a second platen supported to move in response to the movement of the first platen when the desired working pressure has been reached, means for supporting the second platen comprising a transversely movable element, inclined surfaces on the second platen and on the transversely movable element, roller bearing elements supported between the inclined surfaces, and means for resisting movement of the transverse element until the desired pressure is reached in the press.

5. A press comprising one platen having a uniform working stroke, a second platen supported to move in response to the movement of the first platen when the desired working pressure has been reached, means for supporting the second platen comprising a transversely movable element, inclined surfaces on the second platen and on the transversely movable element, stop means limiting the normal position of the transverse element and means for resisting movement of the transverse element until the desired pressure is reached in the press.

6. A press comprising one platen having a uniform working stroke, a second platen supported to move in response to the movement of the first platen when the desired working pressure has been reached, means for supporting the second platen comprising a transversely movable element, inclined surfaces on the second platen and on the transversely movable element, rollers supported between the inclined surfaces, means holding the rollers in place on the inclined surfaces and means for resisting movement of the transverse element until the desired pressure is reached in the press.

7. A press comprising one platen having a uniform working stroke, a second platen supported to move in response to the movement of the first platen when the desired working pressure has been reached, means for supporting the second platen comprising a transversely movable element, inclined surfaces on the second platen and on the transversely movable element, roller bearing elements supported between the inclined surfaces and means comprising fluid pressure for resisting movement of the transverse

element until the desired pressure is reached in the press.

8. A press comprising one platen having a uniform working stroke, a second platen supported to move in response to the movement of the first platen when the desired working pressure has been reached, means for supporting the second platen comprising a transversely movable element, inclined surfaces on the second platen and on the transversely movable element, rollers supported between the inclined bearing surfaces, means for holding the rollers in place on the inclined surfaces, means limiting the normal position of the transverse element and means comprising air pressure for resisting movement of the transverse element until the desired pressure is reached in the press.

9. In a press, a supporting frame, guiding means on the frame, an upper platen vertically movable in the guiding means, means for giving the upper platen a uniform working stroke, a lower platen guided by the frame and free to have a vertical motion, means to resist the movement of the lower platen in a downward direction comprising a rod transversely slidable relative to the lower platen, inclined wedges secured to the lower platen and rod and rollers supported between the inclined surfaces.

10. In a press, a press bolster, a lower platen supported above the press bolster and vertically movable, blocks secured to the press bolster, blocks secured to the lower platen having inclined surfaces, a piston rod supported to move between the lower platen and the press bolster, blocks secured to the piston rods having inclined surfaces, rollers forming bearing means between the inclined surfaces of the blocks on the platen and the piston rod and between the blocks on the press bolster and the blocks on the piston rod, a piston head on the piston rod, a piston cylinder receiving the piston head and air pressure means for resisting movement of the piston.

11. A press comprising one platen having a uniform working stroke, a second platen movable in response to the movement of the first platen, supporting mechanism for said second platen comprising a transversely movable element, blocks having lower inclined bearing surfaces secured to the lower face of the platen, blocks secured to the transversely movable element having upper inclined bearing surfaces, and anti-friction means held between the inclined surfaces.

12. A press comprising one platen having a uniform working stroke, a second platen movable in response to the movement of the first platen, supporting mechanism for said second platen comprising a transversely movable element, blocks having low-

er inclined bearing surfaces secured to the lower face of the platen, blocks secured to the transversely movable element having upper inclined bearing surfaces and lower horizontal bearing surfaces, means having upper
5 horizontal bearing surfaces beneath the blocks on the transverse element, and anti-friction means held between the respective bearing surfaces.

10 Signed at Chicago, Illinois, this 26th day of November, 1928.

JOHN C. HANNA.

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