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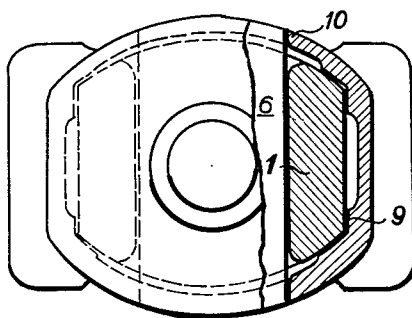
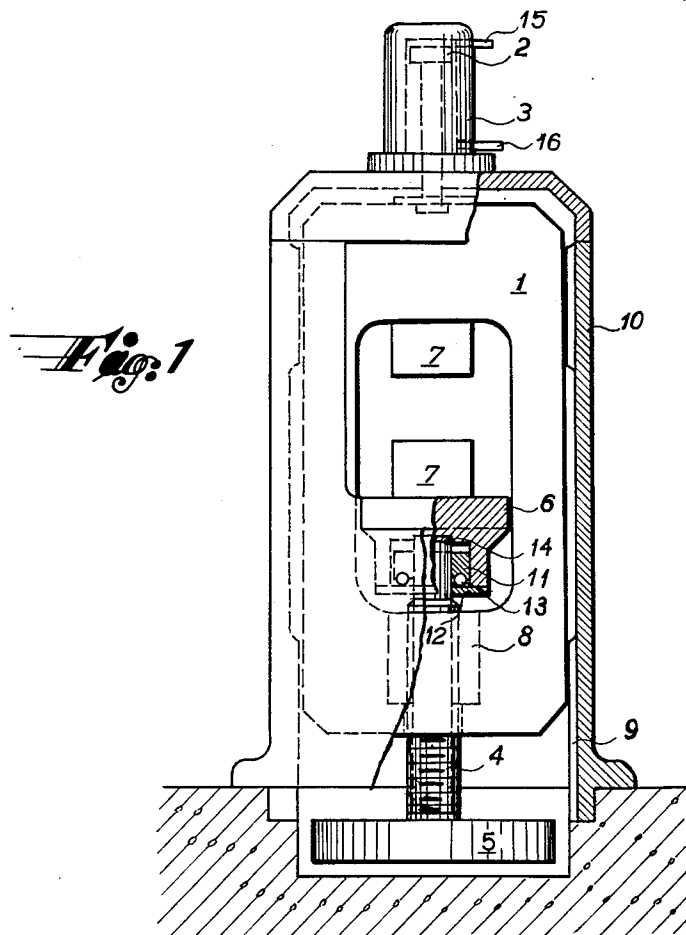


Fig. 2

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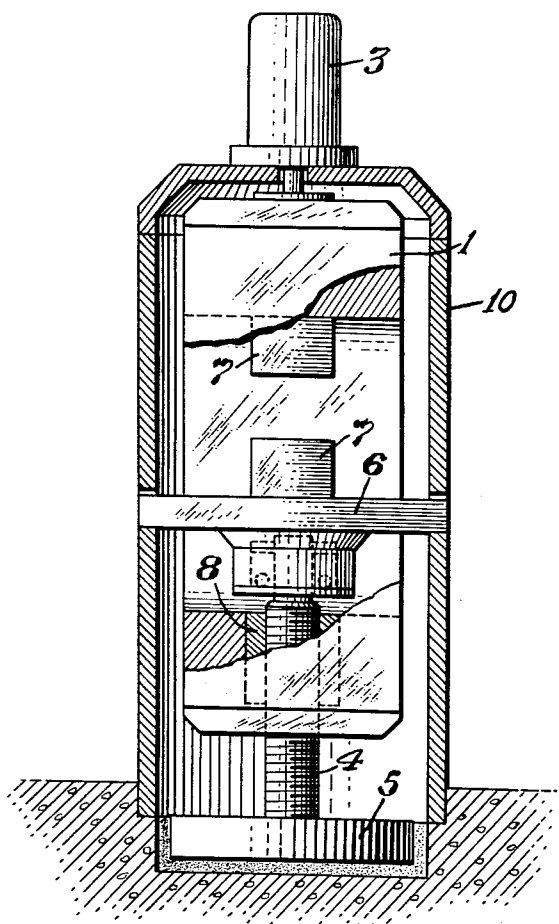
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Fig. 3



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The present invention relates to flywheel presses, and more particularly to presses used for metal working, where the inertia of a flywheel is used to produce an additional pressure on the worked object. Known presses of this type are generally very efficient, but their application has been limited because of the inherent danger of accidents that may be caused by structural failure of the spindle of the flywheel, which is generally arranged above the working table. A further disadvantage of known flywheel presses resides in the fact that the frame is stressed by the torque transmitted to it by the flywheel and that brakes are needed to control the movements of the flywheel.

It is an object of this invention to provide a flywheel press, which is safe to operate under all conditions, and in which stresses are distributed in such a manner as to permit a substantial reduction in the weight of the press.

A preferred embodiment of this invention is shown by way of example in the accompanying drawing, in which FIG. 1 shows a press in side elevation, partly in section; FIG. 2 shows the press of FIG. 1 in partly sectional plan view; and FIG. 3 is another partly sectioned elevation of the press.

The press comprises a supporting frame 10 which has an oval annular base part carrying two columns which are joined by a cross beam at the top. A press ram 1 which constitutes a substantially rectangular frame is guided by vertical guiding ribs 9 on the frame 10 for up and down movement in the frame. The ram 1 may be either of one piece or be composed of several firmly connected parts, and defines a substantially rectangular frame opening. The reciprocating movement of the ram 1 is actuated by a hydraulic cylinder 3 arranged on the upper cross beam of the supporting frame 10 coaxially with the vertical axis of the press. A press table 6, the sides of which are supported by the frame 10, extends through the substantially rectangular opening of the ram 1. Dies 7 are fixed on top of the press table 6 and on the ram 1 opposite said table. In the bottom part of the press table there is a recess which encloses a bearing for a vertical flywheel spindle 4. The bearing comprises a ring 11 fixed to the spindle 4 and a plate 12 fixed to the press table 6. The ring 11 and plate 12 respectively constitute the upper and lower race of the bearing. A set of balls 13 is retained between said races. Axial upward movement of the spindle is limited by a thrust plate 14 on the press table 6. The lower end of the spindle 4 is fixedly fastened to a flywheel 5 which is thus suspended from the press table 6, and is coaxial with the axis of the press. The spindle 4 extends through the opening in the base of the frame 10 and the flywheel 5 is thus below floor level.

The axial portion of the spindle 4 outside the antifric-tion bearing 11, 12, 13 is threaded. It passes through the ram 1 and threadedly engages a corresponding nut 8 which is fixedly inserted in the ram 1. The hydraulic cylinder 3 is equipped with conduits 15, 16 which alternately supply pressure fluid to the two working spaces of the cylinder.

When pressure fluid is admitted above the piston 2, the ram 1 is moved downwards. Simultaneously a rotational movement is imparted to the spindle 4 and the flywheel 5, as the nut 8, which is mounted on the ram 1, moves along the spindle 4. The threads of the spindle have an adequate pitch so as not to lock during the downward movement

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of the ram. The energy stored in the flywheel 5 depends on the force acting upon the piston 2. The movement of the ram 1 would come to a halt when both dies 7 abut against the material being formed therebetween and compress the material to an extent corresponding to the force acting upon the piston 2. The energy accumulated in the flywheel 5 causes an additional force to act upon this material and further to compress it. The inertial torque of the flywheel is translated by the inter-engaging threads of the spindle 4 and of the nut 8 into a vertically downward force exerted by the ram 1 on the material between the dies 7. The corresponding counterforce is transmitted by the spindle 4 to the press table 6. After the forming operation is finished when the flywheel stops, the pressure fluid is admitted to the space below the piston 2, and the ram 1 is raised. The spindle 4 with the flywheel 5 now rotates in the opposite direction but retains its axial position which is determined by the press table 6.

The torsional forces generated by the rotation of the flywheel are absorbed by the supporting frame 10 and transmitted directly to the machine foundation. The forces used for pressing are entirely absorbed in the ram 1 which constitutes a frame element closed in itself. The supporting frame 10 serves therefore solely for guiding the ram 1 and for transmitting the torsional forces generated by the rotating flywheel 5 to the foundation. All rotating heavy parts are below floor level so that they cannot cause an accident in the event of mechanical failure. There is no need for a gear transmission nor for a brake. These features make the machine much simpler in design and lower in weight than the known flywheel presses.

What I claim is:

1. In a press, in combination, a support constituting a fixed die carrier; a press ram movable on said support in a predetermined direction and constituting a movable die carrier; flywheel means; a flywheel actuator member having a thread, the axis of said thread being parallel to said direction, said member being axially secured on said support and rotatable thereon about said axis, said member being connected to said flywheel means for joint rotation therewith and threadedly engaging said press ram; and means for moving said press ram on said support in said predetermined direction.

2. In a press, in combination, a support constituting a fixed die carrier; a press ram movable on said support in a predetermined direction and constituting a movable die carrier; first die means on said support; second die means on said ram and engageable with said first die means by movement of said ram in said predetermined direction; fly-wheel means; a flywheel actuator member having a thread, the axis of said thread being parallel to said direction, said member being axially secured on said support and rotatable thereon about said axis, said member being axially secured to said flywheel means for joint rotation and threadedly engaging said press ram; and means for moving said press ram on said support in said predetermined direction.

3. In a press, in combination, a support; a press ram movable on said support in a predetermined direction and being formed with a recess therein extending in said direction; a die carrier fixedly mounted on said support and extending into said recess; first die means on said die carrier in said recess; second die means on said press ram and engageable with said first die means by movement of said press ram in said predetermined direction; a fly-wheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel

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means mounted on said member for joint rotation therewith about said axis; and means for moving said press ram on said support in said predetermined direction.

4. In a press, in combination, a support; a press ram reciprocally movable on said support in a predetermined direction and being formed with a recess therein extending in said direction; a die carrier fixedly mounted on said support and extending into said recess; first die means on said die carrier in said recess; second die means on said press ram and engageable with said first die means by movement of said press ram in said predetermined direction; a flywheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel means mounted on said member for joint rotation therewith about said axis; and means for moving said press ram on said support in said predetermined direction.

5. In a press, in combination, a support; a press ram movable on said support in a predetermined longitudinal direction and being formed with an opening passing through said ram in a direction transverse of said predetermined direction and defining two transverse and two longitudinal portions of said ram; a die carrier fixedly mounted on said support and extending into said opening; first die means on said die carrier in said opening; second die means on one of said transverse portions of said press ram and engageable with said first die means by movement of said press ram in said predetermined direction; a flywheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on the other one of said transverse portions of said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel means mounted on said member for joint rotation therewith about said axis; and means for moving said press ram on said support in said predetermined direction.

6. In a press, in combination, a support; a press ram movable on said support in a predetermined longitudinal direction and being formed with an opening passing through said ram in a direction transverse of said predetermined direction and defining two transverse and two longitudinal portions of said ram; guide means on said support and movably engaging said longitudinal portions for guiding said movement of said press ram; a die carrier fixedly mounted on said support, said die carrier extending into said opening and being movable therein in said direction; first die means on said die carrier in said opening; second die means on one of said transverse portions of said press ram and engageable with said first die means by movement of said press ram in said predetermined direction; a flywheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on the other one of said transverse portions of said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel means mounted on said member for joint rotation therewith about said axis; and means for moving said press ram on said support in said predetermined direction.

7. In a press, in combination, a support; a press ram movable on said support in a predetermined direction and being formed with a recess therein extending in said direction; a die carrier fixedly mounted on said support, said die carrier extending into said recess and being mov-

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able therein in said direction; first die means on said die carrier in said recess; second die means on said press ram and engageable with said first die means by movement of said press ram in said predetermined direction; a flywheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel means mounted on said member for joint rotation therewith about said axis; and a pressure fluid operated actuator mounted on said support and engaging said one transverse portion for moving said press ram on said support in said predetermined direction.

8. In a press, in combination, a support; a press ram movable on said support in a predetermined longitudinal direction and being formed with an opening passing through said ram in a direction transverse of said predetermined direction and defining two transverse and two longitudinal portions of said ram; a die carrier fixedly mounted on said support and extending into said opening; first die means on said die carrier in said opening; second die means on one of said transverse portions of said press ram and engageable with said first die means by movement of said press ram in said predetermined direction; a flywheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on the other one of said transverse portions of said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel means mounted on said member for joint rotation therewith about said axis; and a pressure fluid operated actuator mounted on said support and engaging said one transverse portion for moving said press ram on said support in said predetermined direction.

9. In a press, in combination, a support; a press ram movable on said support in a predetermined longitudinal direction and being formed with an opening passing through said ram in a direction transverse of said predetermined direction and defining two transverse and two longitudinal portions of said ram; a die carrier fixedly mounted on said support and extending into said opening; first die means on said die carrier in said opening; second die means on one of said transverse portions of said press ram engageable with said first die means by movement of said press ram in said predetermined direction; a flywheel actuator member mounted on said die carrier for rotation about an axis parallel to said predetermined direction; means for axially securing said member on said die carrier; engaging thread means on said member and on the other one of said transverse portions of said press ram respectively and coaxial with said axis for actuating rotary movement of said member when said press ram moves in said predetermined direction; flywheel means mounted on said member for joint rotation therewith about said axis; a hydraulic cylinder mounted on said support; and piston means in said cylinder substantially coaxial with said thread means and connected to said one transverse portion for moving said press ram on said support in said predetermined direction.

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