April 25, 1967 L. PETERS 3,315,596

PRESS

Filed June 28, 1965 2 Sheets-Sheet 1

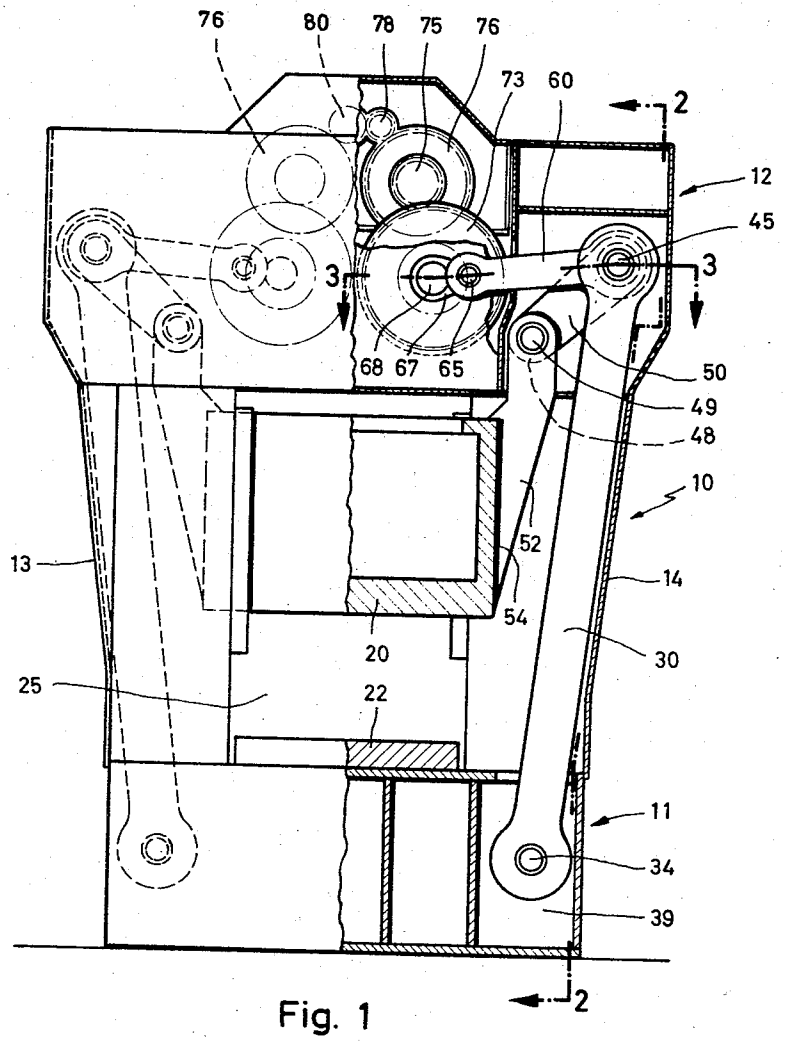


Fig. 1

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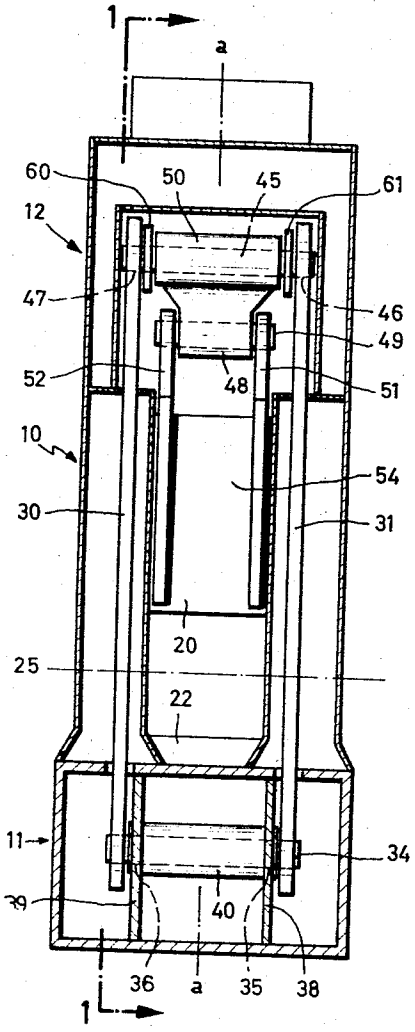


Fig. 2

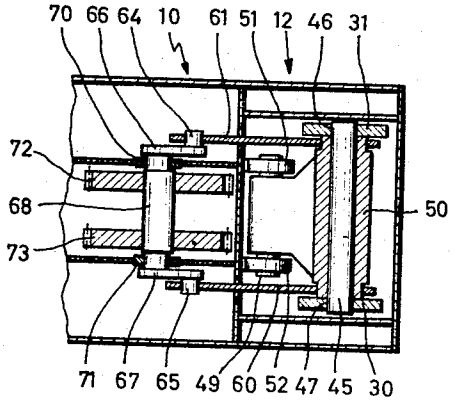


Fig. 3

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PRESS

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5 Claims. (Cl. 100—282)

This invention relates to a press of the type having a frame and a plunger moving in a straight line pivotally connected to a lever system. The lever system comprises a short and a long lever which form an acute angle during a stroke of the press.

These known presses are arranged in such a manner that the short lever is fixedly mounted on a support, which may be the base plate of the frame. This fixed point is characteristic for a given press, because each change of the fixed point substantially influences the angle between the levers during a stroke of the press. Due to this fact, the designer is rather limited in the arrangement of the remaining machine parts with respect to each other and is unable to change the arrangement as might be required in view of some other requirements.

It is an object of the invention to provide a machine in which the aforementioned shortcomings are eliminated. This is accomplished, according to the present invention, by having a free end of the long lever mounted at a fixed location on the frame and the free end of the short lever mounted on the plunger. This arrangement permits a substantial change in the fixed location, without changing the characteristics of the press. It is also possible, in contradistinction to known devices, to arrange the levers at the side of the plunger in such a manner that the opening through the press between the support and the plunger remains open. This arrangement permits the use of the machine for conveyor type work. Aside from this fact, an opening like this is required in many cases because in this way a continuous supply of material can be fed to the machine which permits an automatization of the machine. It should be noted that a single lever system could actuate the plunger. However, for a better and more effective power transmission at least one lever system is arranged on both sides of the plunger.

The arrangement of the lever system on either side of the plunger permits the system to be symmetrically arranged with respect to a central transverse plane, that is, at a right angle of the plane of the press opening. This results in a very favorable construction. An especially advantageous construction is achieved by arranging a single short lever symmetrically to the central transverse plane, and two long levers, likewise arranged symmetrically with respect to said plane for cooperation with the single short lever, with which they form a pair of bell crank lever systems. The long levers are pivotally mounted about common center axes, one of which is secured to fixed parts of the frame and the other of which passes through a common pivot axis. When the short lever is mounted as aforementioned, the whole system can again be symmetrically mounted with respect to the central transverse plane of the machine whereby a symmetrical drive is attained. This arrangement not only reduces the wear of the machine, but also simplifies and improves the construction thereof.

According to the invention, both of the long levers are connected at one end with each other at the pivot axis by means of a pivotal member which can be a shaft on which the short lever is mounted. The opposite end of the long levers can be secured each by itself on a fixed part to the machine frame, or commonly pivoted by means of a single shaft.

The power transmission to the plunger is further improved in that the single short lever can be substantially wide, due to the two long levers. This arrangement permits to increase the width of the short bell crank to the width of the plunger. This also enhances the power transmission and improves the mounting of the short lever.

The drive of the machine is mounted in the upper portion of the machine frame, the fixed pivot of the long levers is arranged at the lower portion of the frame, and this would result in a very favorable construction since the base of the machine would require only a minimum of space and a pit for accommodating of any machine parts would be dispensable.

The various features of the novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of the specification. For a better understanding of the invention, its operating advantages and the specific objects attained by its use, reference should be made to the accompanying drawings and descriptive matter in which:

FIG. 1 shows a press according to the invention in front view with some parts broken away;

FIG. 2 shows a section along line 2—2 of FIG. 1; and

FIG. 3 shows a section along lines 3—3 of FIG. 1.

Referring now to the drawings, FIG. 1 shows a press generally indicated by **10** having a lower frame **11** and an upper frame **12**. These two frame parts are connected by two side frames **13** and **14**, respectively, comprising guides for a vertically movable plunger **20**. A support table **22** is mounted on the upper face of frame **11** opposite the plunger. Between the plunger **20** and the supporting table **22** is a lateral opening **25** which is at a right angle to a central plane *a—a* shown in FIG. 2. Since the left hand and the right hand levers are constructed in the same way, it is sufficient only to refer to one of them. In the following the right hand lever pair will be described as shown in FIG. 1.

A pair of long levers **30** and **31** are pivotally mounted at one end on a fixed shaft **34** secured to the frame at **35** and **36** (FIG. 2). A spacer **40** is mounted on the shaft **34** between frame parts **38** and **39**.

Both long levers **30** and **31** are connected by a shaft **45** forming a pivot and a short lever **50** is mounted on the shaft **45** symmetrically with the plane *a—a* between the ends **46** and **47** of the shaft **45**. The short lever **50** is pivotally connected at its free end **48** to a plunger pin **49**. The plunger pin **49** is secured to a pair of arms **51** and **52** which are mounted on a bracket **54** of the plunger **20**.

Connecting rods **60** and **61** are pivotally connected at one end to the shaft **45** between the levers **30** and **31**, and are pivotally connected with their other ends to crank pins **64** and **65** (FIG. 3). The crank pins **64** and **65** are secured to cranks **66** and **67** which are mounted on a crank shaft **68**. Crank shaft **68** is journalled in the frame at **70** and **71**, and carries two gears **72** and **73**, respectively, which are spaced from each other. All aforementioned parts are symmetrically arranged with respect to the plane *a—a*. The drive of both drive gears **72** and **73** will be described schematically with respect to FIG. 1 since the drive is known and does not form a part of this invention.

Gears **72** and **73** are in engagement each with a reduction gear **75**, shown in FIG. 1. This reduction gear is mounted on a shaft (not shown) on which a further gear **76** is mounted. A gear **78** is in engagement with the gear **76**. The drive of the left hand levers in FIG. 1 operates in a similar manner with the only modification that a gear **80** is in engagement with left gear **76** of FIG. 1, and the gear **80** is in engagement with the gear **78**.

From FIG. 1, it can be seen that it is now possible to arrange the stationary shafts **34**, respectively, on the frame in a manner that corresponds to the characteristics of the

press without changing the operating angle and without influencing the characteristic of the press. The lever systems can also be arranged in a very favorable manner, namely laterally away from the machine opening **25** so that the space between the plunger and the table support remains open. The lateral arrangement of the lever systems with respect to the plunger permits the drive mechanism to be arranged in such a manner that it is symmetrical with the lateral central plane *a—a*, resulting in a very favorable design and drive construction.

This invention should not be limited to the specific embodiments shown by the accompanying drawings but should rather be defined by the scope of the appended claims.

What I claim is:

1. In a press, a plunger, frame means guiding said plunger for vertical movement, a stationary pivot carried by said frame means at an elevation lower than said plunger, a long lever pivotally carried by said pivot and extending upwardly therefrom to an elevation higher than said plunger, said lever having an upper free end, a second pivot carried by said lever at its upper free end, a short lever pivotally connected to said plunger and said second pivot, a connecting rod pivotally connected to said second pivot and situated at an upper part of said frame means, and a rotary crank situated at said upper part of said frame means and operatively connected to said connecting rod for reciprocating the latter to swing said long lever about said stationary pivot while moving said second pivot along part of a circle whose center is in said stationary pivot, the swinging movement of said second pivot being transmitted through said short lever to said plunger for moving the latter vertically with respect to said frame means.

2. The combination of claim **1** and wherein a pair of said long levers are carried by said stationary pivot spaced from each other, said short lever being situated on said second pivot between said pair of long levers and having a width substantially equal to that of said plunger.

3. The combination of claim **2** and wherein a pair of said connecting rods are respectively connected to said rotary crank and situated at opposite sides of said short lever.

4. The combination of claim **3** and wherein said frame means is formed with an opening situated beneath said plunger, said long levers and said short lever being situated at one side of said opening, and a second stationary pivot as well as a second pair of said long levers being situated at an opposite side of said opening, said second pair of long levers having upper free ends distant from said second stationary pivot, an additional pivot extending between and carried by said upper free ends of said second pair of long levers, a second short lever carried by said additional pivot between said second pair of long levers, said second short lever being pivotally connected with said plunger at a side thereof opposite from said first-mentioned short lever, a second pair of connecting rods connected to said additional pivot, said second short lever situated between said second pair of connecting rods, and a second rotary crank operatively connected with said second pair of connecting rods for reciprocating the latter.

5. The combination of claim **1** and wherein a second stationary pivot is carried by said frame at the same elevation as said first stationary pivot, a second long lever connected to said second stationary pivot and extending upwardly therefrom, said second long lever having a free end distant from said second stationary pivot, an additional pivot carried by said free end of said second long lever, a second short lever pivotally connected to said additional pivot and to said plunger at a side thereof opposite from the connection of said plunger to said first-mentioned short lever, a second connecting rod connected to said additional pivot, and a second rotary crank connected to said second connecting rod for reciprocating the latter.

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