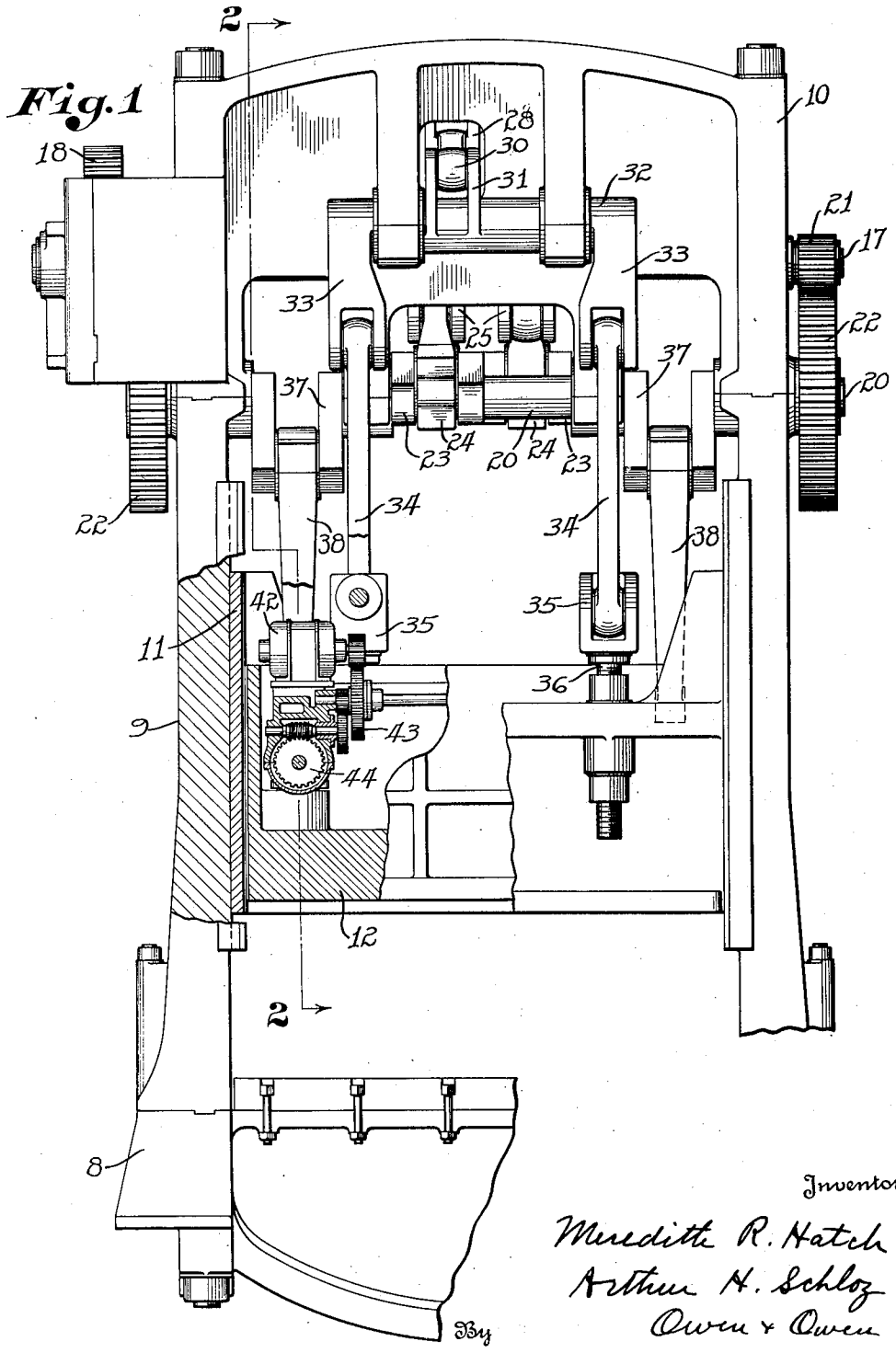
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Fig. 1



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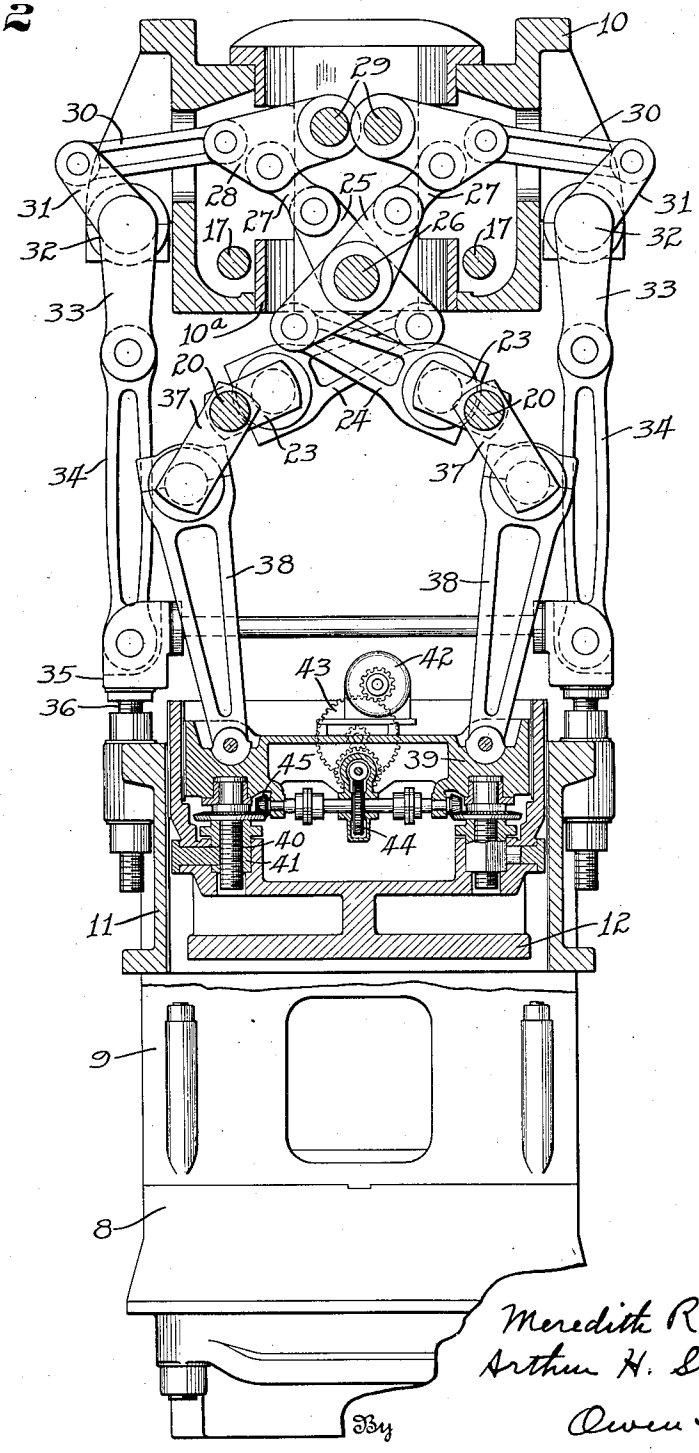
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Fig. 2



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Fig. 3

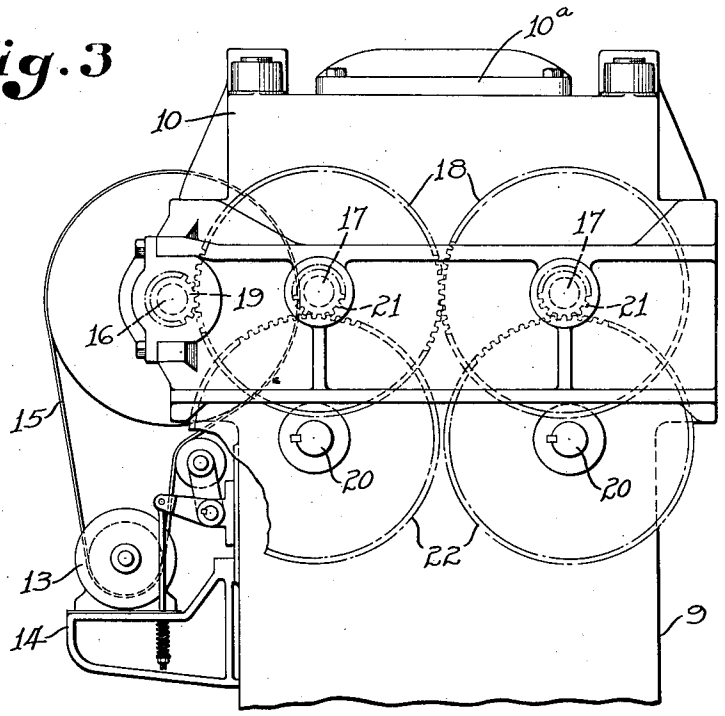
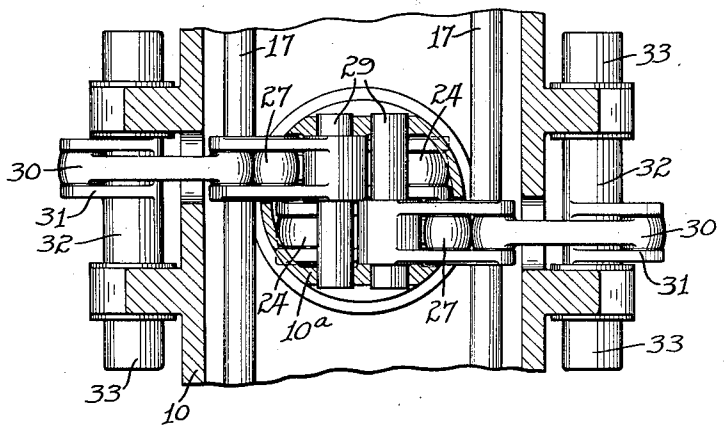


Fig. 4



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UNITED STATES PATENT OFFICE

1,993,839

TOGGLE PRESS

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Application September 29, 1932, Serial No. 635,343

9 Claims. (Cl. 113—38)

This invention relates to toggle presses and has for its object to provide driving connections from two parallel shafts to afford a uniform four point control of the slide or plunger in this type of press. This is especially desirable in operations in which uneven or unsymmetrical distribution of the load may occur. The invention, in its present embodiment, involves the use of two parallel crankshafts operating in opposite directions, each being driven at both ends and having duplicate toggle connections for application of power to the work. The shafts which drive the two crankshafts are geared together and symmetrically arranged so that the torque and stress will normally be distributed uniformly and there is no tendency for one end or side to move in advance of the other. The principal features of the invention are adaptable either to double action or triple action multiple crank presses.

In the accompanying drawings, Fig. 1 is a front elevation of a press constructed according to the invention, with parts broken away;

Fig. 2 is a section taken on the line 2—2 of Fig. 1, and showing particularly the toggle mechanism;

Fig. 3 is an end elevation of the press;

Fig. 4 is a plan view of the toggle mechanism.

As illustrated in the drawings, the invention is associated with a power press having a base 8 and side frame pieces 9 surmounted by an upper casting 10. Within this frame a blank holder 11 and a plunger 12 are guided for vertical reciprocatory movement. The mechanism for operating the press is driven by a motor 13 supported on a seat 14 secured to the rear side of the frame 9 and having a suitable driving connection, as indicated at 15, with the main drive shaft 16 which is mounted in the upper casting 10.

Two parallel countershafts 17 are mounted in the casting 10 in front of the shaft 16 and have intermeshing gears 18 secured thereto. One of the gears 18 meshes with a pinion 19 secured to the shaft 16, so that both shafts 17 are uniformly driven. Two parallel crankshafts 20 are mounted in the upper ends of the frame pieces 9 beneath the respective shafts 17, and each crankshaft is driven at each end by a pinion 21 and gear 22, secured to the countershaft 17 and crankshaft 20 respectively.

Two toggle shafts are mounted in the casting 10. There are two connections from each crankshaft 20 to the plunger and two connections from each toggle shaft 32 to the blank holder, making in all four sets of connections, symmetrically arranged. Thus, the principle of the four point suspension is embodied in a double crank toggle press.

In a press of this type, it is desirable to carry out the symmetry of arrangement so that all stresses incident to operation of one side of the press remain on that side to be damped out if possible by a corresponding stress on the opposite side. For this reason it is found necessary to connect a side of the blank holder to the crankshaft on the same side of the press, which of course involves reversing the motion of the driving elements. Such an arrangement possesses obvious advantages, but, to applicants' knowledge, has never been satisfactorily accomplished. Each crankshaft 20 has near its center a crank 23 which is connected by a link 24 to one end of a bell crank 25 journalled on a fixed central shaft 26, mounted in a well 10^a secured in the casting 10. The other end of the bell crank 25 is connected by a link 27 to an arm 28 mounted on a shaft 29 in the casting 10^a. The arm 28 is connected by a link 30 to one end of a crank 31 formed on the toggle shaft 32. The toggle shaft 32 is formed at each end with an arm 33 which is connected by a link or pitman 34 to a hanger 35 which has a screw-threaded adjustable connection 36 with one of the four corners of the blank holder 11. It will be seen that by disconnecting the links 30 from the cranks 31 and by removing the pins which hold the cranks 23 and links 24 together, the entire internal blank holder operating mechanism may be removed as a unit with the well 10^a. The advantage of this in a very large press will be appreciated, as it is possible to assemble the mechanism on the floor and then position it in the press as a unit by means of a crane lowering all of it through the top of the press. It is therefore unnecessary to position and connect each element individually within the confined area of the press.

Each connection to the plunger is from a crank 37 through a pitman 38 having an extension 39 which has a threaded shank 40 with a head 41 mounted thereon and seated in the slide for adjusting the latter up or down. The heads 41 on all of the threaded shanks 40 are rotated simultaneously and equally by a motor 42, the drive to each head 41 being through spur gearing 43, worm gearing 44 and bevel gearing 45.

In the operation of the press, the two shafts 17 are driven simultaneously from the main drive shaft 16. The two crankshafts 20 are driven from both ends simultaneously and equally in opposite directions, and the cranks 23 are in balanced relation between the planes in which the

pitmans 34 move. Each crank 23, through the toggle connections above described, is connected to two corners of the blank holder 11 at one side thereof, and each crank 37 through the connection 33 is connected to one of the four corners of the plunger 12. Thus, there are in all four connections to the blank holder and four connections to the plunger and the forces are symmetrically distributed.

We wish it understood that our invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

What we claim is:—

1. In a power press, the combination of a frame including a base, side pieces and an upper casting secured rigidly in assembled relation, a well removably secured centrally of said upper casting, a work engaging member, two crankshafts driven in opposite directions, and connections individual to the respective crankshafts and mounted in said well and having parts removable therewith and transmitting power from the crankshafts to said work engaging member.

2. In a power press, the combination of a frame including a base, side pieces and an upper casting secured rigidly in assembled relation, a well removably secured centrally of said upper casting, a blank holder and a plunger mounted in said frame, a power shaft, two central crankshafts mounted in said side pieces and driven in opposite directions at both ends by said power shaft, separate toggle connections having parts mounted in said well and removable therewith and connecting each crankshaft to both ends of said blank holder, and connections between each crankshaft and each end of the plunger, whereby power is delivered to all four corners of the blank holder and the slide.

3. In a power press, a pair of parallel crankshafts driven in unison in opposite directions, a plunger, cranks on each of the crankshafts connected to two points of the plunger, a second crank on each of said crankshafts disposed between the cranks connected to the plunger, a blank holder, a pair of toggle shafts connected to said blank holder, and separate means including a toggle and lever mechanism to operate each of said toggle shafts from the second crank more closely adjacent thereto.

4. In a power press, a pair of crankshafts driven in unison in opposite directions, each crankshaft having three cranks, a plunger, pitmans connecting four points on said plunger to two cranks on each crankshaft, a blank holder, a pair of toggle shafts parallel to said crankshafts one on each side of the press, toggle joints connecting said blank holder and each of said toggle shafts, and separate means to operate each of said toggle shafts from the crankshaft on the same side of the press, said means including a plurality of toggles.

5. In a power press, a frame, a plunger and a blank holder each mounted for reciprocating movements in said frame, two parallel crankshafts driven in unison and in opposite directions, one at each side of the vertical center line of the frame, connections between each crankshaft and said plunger whereby to reciprocate the latter from rotation of the shafts, and separate operating connections between each crankshaft and the adjacent side of the blank holder whereby to impart predetermined reciprocatory movements to said blank holder, said means including at least two toggle sets.

6. In a power press, a frame, a plunger and a blank holder each mounted for reciprocating movements in said frame, two parallel crankshafts driven in unison and in opposite directions, connections between each crankshaft and said plunger whereby to reciprocate the latter from rotation of the shafts, and independent operating connections between each crankshaft and the portion of the blank holder on the same side of the press as the crankshaft, each of said latter connections comprising a toggle joint and a member pivoted in the frame on a common shaft.

7. In a power press, a frame, a member removably mounted in said frame forming a well, a plunger and a blank holder mounted for differential reciprocating movements in said frame, a pair of parallel crankshafts, connections between each of said crankshafts and said plunger whereby to reciprocate the latter from rotation of the crankshafts, and independent operating connections from each of said crankshafts to the blank holder whereby to impart predetermined reciprocatory movements to said blank holder, said latter connections including levers pivoted on a common shaft carried in said well whereby parts of said connections are adapted to be removed from said frame as a unit with said member.

8. In a power press, a frame, a member removably mounted in said frame forming a well, a plunger and a blank holder mounted for reciprocating movements in said frame, two parallel crankshafts driven in unison and in opposite directions, operating connections between each crankshaft and said plunger, a pair of toggle shafts journalled in said frame parallel to said crankshafts, connections between said toggle shafts and said blank holder, and independent means to operate each of said toggle shafts from the crankshaft on the same side of the press, said means including levers having a common fulcrum in said well whereby part of said means is removable from the frame as a unit with said member.

9. In a power press, a frame, a member removably mounted in said frame forming a well, a plunger and a blank holder mounted for reciprocating movements in said frame, two parallel crankshafts, connections between each of said crankshafts and said plunger, a pair of toggle shafts parallel to said crankshafts, one on each side of the press, connections between said toggle shafts and said blank holder, and independent means to drive the respective toggle shafts from the crankshaft adjacent thereto, each of said means including a link and a bell crank lever, both of said bell crank levers being pivoted on a common shaft in said well member.

MEREDITH R. HATCH.
ARTHUR H. SCHLOZ.

CERTIFICATE OF CORRECTION.

Patent No. 1,993,839. March 12, 1935.

MEREDITH R. HATCH, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 40, claim 2, for "slide" read plunger; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of April, A. D. 1935.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)