

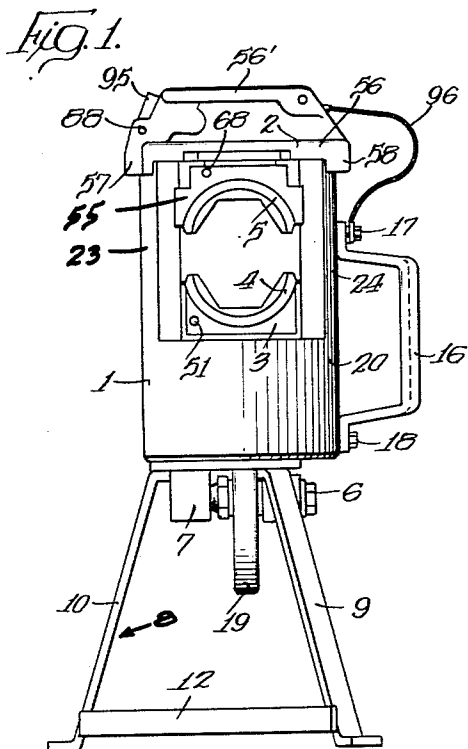
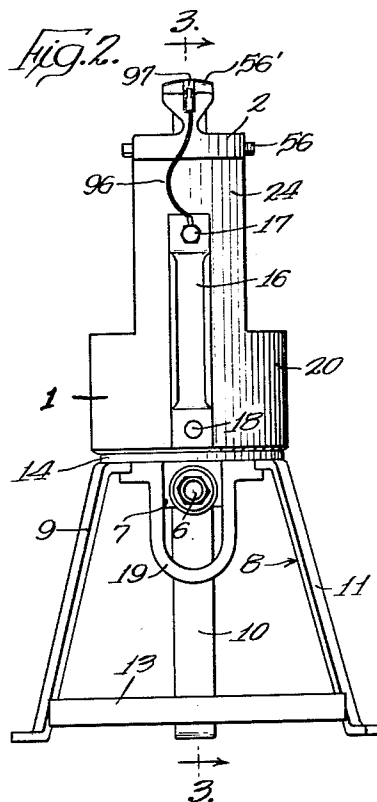
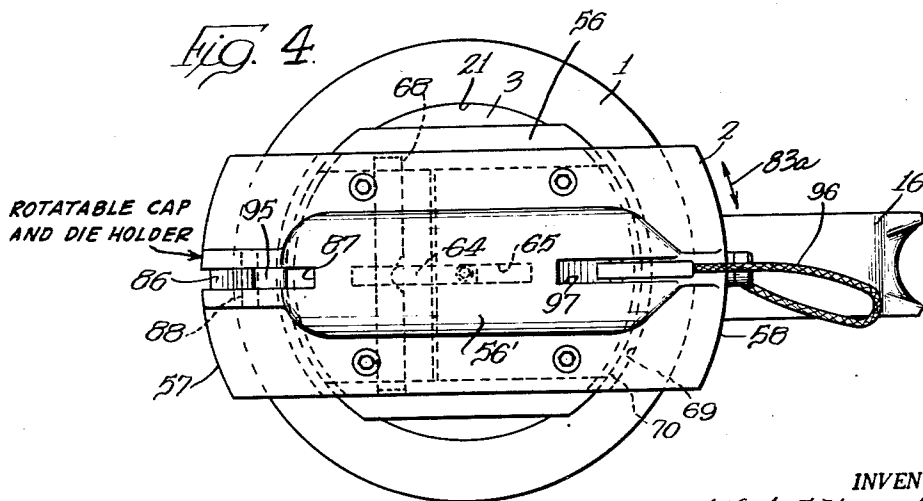
June 14, 1960

R. E. HERRSTRUM
PORTABLE HYDRAULIC PRESS

2,940,497

Filed Jan. 18, 1956

2 Sheets-Sheet 1



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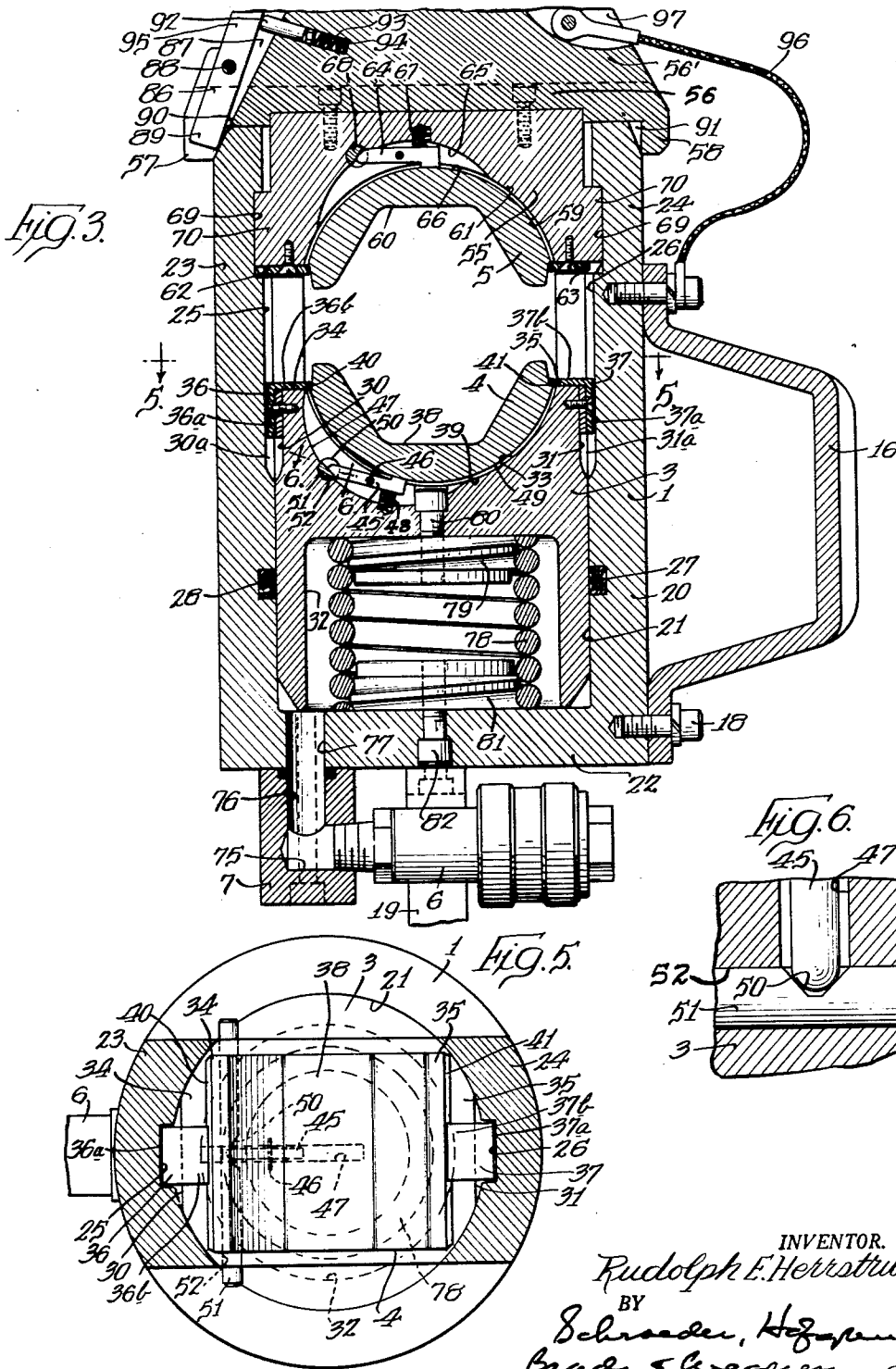
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2 Sheets-Sheet 2



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2,940,497

PORTABLE HYDRAULIC PRESS

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This invention relates to a press and, more particularly, to a hydraulic press particularly useful in a process for splicing cables.

The general object of this invention is to provide a new and improved hydraulic press.

A more specific object of this invention is to provide a new and improved hydraulic press particularly adapted for clamping a splicing sleeve over the ends of cables to be joined together which is so constructed and arranged as to be easily operated in a minimum of space.

Another object of this invention is to provide a new and improved hydraulic press including a body portion, a piston movable in the body portion and carrying a first die and a top portion carrying a second die adapted to be removably mounted on the body portion, the piston being movable by fluid pressure from an external source to move said first die into clamping engagement with said second die.

One method of splicing the ends of two cables consists of placing the ends of the cables in a splicing sleeve and then applying very high squeezing pressure to the sleeve, thereby clamping it securely over the ends of the cables. It has been the practice to use a hydraulic press for this clamping operation wherein the splicing sleeve is disposed between two dies, one die being movable in a first body portion of the press towards and away from the other die fixed to a second body portion. As the finished spliced cable may be relatively endless or rigidly secured at each end, it is necessary that one body portion of the press be removable or separable from the other body portion so that the finished spliced cable may be removed from the press or the press from the cable.

In the past it has been the practice in such a press to hinge one of the body portions to the other body portion to allow removal of the spliced cable. Where the ends of the two cables have to be spliced in a relatively confined area and, more particularly, where a very compact unit is required to produce a tremendous pressure, as, for example, on the order of 60 tons, such a press construction is not suitable. This problem has been solved by this invention wherein a press construction is disclosed in which the removable body portion of the press is so interengaged with integral parts of the other body portion as to afford great strength without excessive size and to permit ready opening of the press in confined or restricted areas and without the need for special or cumbersome tools.

Thus, it is a further object of the present invention to provide a new and improved hydraulic press of compact construction having two relatively movable die supporting portions provided with integral parts of great strength which are directly interengageable to allow full use of the press.

A further object of the invention is to provide a new and improved hydraulic press of the character described wherein the dies are securely positioned in their mountings but which may be readily removed therefrom and replaced by another set of dies.

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Other objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevational view of a press embodying the invention;

Fig. 2 is a right end elevational view of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged vertical sectional view taken generally along the line 3-3 of Fig. 2 with the supporting stand omitted;

Fig. 4 is a top plan view of the apparatus shown in Fig. 3;

Fig. 5 is a horizontal sectional view taken generally along line 5-5 of Fig. 3; and

Fig. 6 is an enlarged sectional view taken generally along the line 6-6 of Fig. 3.

While the invention herein described is in its preferred embodiment, it is not intended to limit the invention to the specific form and arrangement shown, it being contemplated that various changes may be made by those skilled in the art without departing from the spirit and scope of the appended claims.

Referring now to Figs. 1 and 2, there is shown a hydraulic press having a generally cylindrical body portion 1, a removable top portion 2 rotatably interengaged with the body portion 1, a piston 3 slidably movable in the body portion 1, a first or lower clamping die 4 carried by the piston 3, and a second or upper die 5 mounted on the top portion 2. Fluid pressure from an external source is transmitted to a working surface of the piston 3 through a coupling 6 and a fitting 7 to move the lower die 4 into clamping engagement with a splicing sleeve positioned between the dies 4 and 5. When the fluid pressure on the piston 3 is relieved, resilient means moves the piston 3 and the die 4 away from the die 5.

In the embodiment of the invention shown in Figs. 1 and 2, the body portion 1 is mounted on a tripod-like supporting structure 8 including three sloping legs 9, 10 and 11, braces secured therebetween such as braces 12 and 13 and a supporting plate 14 secured to the upper ends of the legs 9, 10 and 11. The body portion 1 is supported on the plate 14 and secured thereto by nut and bolt means (not shown).

The press shown in Figs. 1 and 2 includes a handle 16 secured to the body portion 1 by bolts 17 and 18 for convenience in carrying the press from one location to another and a downwardly extending hook 19 secured to the supporting plate 14 for moving the press by a hoist chain or rope. The press may also be used in an inverted position while being supported by the hook 19 from a hoist chain or rope, a cable to be spliced being inserted into the press from below the press.

As shown in Figs. 3 (with the structure 8 omitted), 4 and 5, the body portion 1 includes a lower cylindrical portion 20 defining a cylinder 21 which is closed at its lower end by an integral end plate 22. The upper portion of the generally cylindrical body portion 1 is formed to define a pair of diametrically opposite elongated guides or support members 23 and 24 extending upwardly from the lower portion 20 and parallel to the axis of the body portion 1. These guides 23 and 24 are preferably formed integrally with the cylindrical body portion 1. The guides 23 and 24 each have formed therein longitudinally extending guide slots 25 and 26.

The piston 3 is slidable in the cylinder 21, annular sealing means 27 being disposed between the piston 3 and the cylinder 21 in an annular groove 28 formed in the cylinder. The piston 3 has a cylindrical bore 32 formed in its lower end and a semi-cylindrical recess 33 formed in its upper end bounded by flat piston end surfaces 34 and 35. A pair of external diametrically opposite slots 30 and 31 are formed in the upper portion

of the piston 3 extending parallel to the axis thereof and intersecting the end surfaces 34 and 35. The piston 3 is disposed in the cylinder 21 with the slots 30 and 31 positioned opposite the guide slots 25 and 26, respectively, so as to define vertically extending recesses 30a and 31a. A pair of right angled members 36 and 37 are secured to the end surfaces 34 and 35 of the piston 3 and each has a depending portion 36a and 37a, respectively, substantially filling the vertically extending recesses 30a and 31a so as to provide guide means for the piston 3 in the guides 23 and 24. The members 36 and 37 each have a laterally extending portion 36b and 37b, respectively, extending over and slightly beyond said piston end surfaces 34 and 35 for a purpose to be further disclosed.

The die 4 has a clamping surface 38 and a semi-cylindrical surface 39 intersecting at its edges a pair of shoulders 40 and 41. With this piston and die construction, the die 4 may be slidably positioned in the semi-cylindrical recess 33 in the piston 3, the laterally extending portions 36b and 37b of said angled members 36 and 37 engaging the die shoulders 40 and 41, respectively, to hold the die 4 in the recess 33.

To prevent lateral movement of the die 4 in the recess 33, a finger 45 is pivotably mounted on a pin 46 secured in an arcuate slot 47 formed in the piston 3 and opening into the semi-cylindrical recess 33. One end of the finger 45 is urged by a spring 48 into a centrally located circumferential groove 49 formed in the semi-cylindrical surface 39 of the die 4. To release the die 4 from the action of the finger 45 so that the die 4 may be slidably removed from the recess 33 and replaced, the other end of the finger 45 is disposed in a beveled groove 50 formed in a laterally shiftable release shaft 51 which is disposed in a bore 52 in the piston 3 and has a portion extending outwardly from the piston 3 so as to be manually shiftable by an operator.

The removable top portion 2 carrying the mating upper clamping die 5 includes an upper die holder 55 and a cap member 56 bolted to the upper surface of the die holder 55. The cap member 56 has arcuate edge portions 57 and 58 adapted to fit over the upper ends of the upstanding portions 23 and 24 and a handle portion 56'. The upper die holder 55 has a downwardly opening semi-cylindrical recess 59 adapted to receive the die 5 which has a clamping surface 60 and a mating semi-cylindrical surface 61. The die 5 is removably mounted on the die holder 55 in the same manner that the die 4 is mounted on the piston 3, including die retainers 62 and 63 engageable with shoulders on the die 5, and a finger 64 pivotably mounted in a slot 65 formed in the die holder 55 and opening into the recess 59, urged into a circumferential groove 66 formed in the semi-cylindrical die surface 61 by a spring 67 and releasable therefrom by a laterally shiftable release shaft 68.

To interengage the top portion 2 to the balance of the press, an internal horizontally extending arcuate recess or groove 69 is formed in each of said upstanding guides 23 and 24. A pair of horizontally extending projections or lugs 70 are formed on the die holder 55 and adapted to slidably fit in the grooves 69. These directly interengaging parts of the top and body portions are integrally formed and designed and constructed to have great strength so as to withstand the tremendous pressure to which they are subjected.

When the top portion 2 is assembled to the body portion 1 with the dies 4 and 5 in clamping alignment, fluid pressure means are provided to move the die 4 into clamping engagement with the die 5 to clamp a splicing sleeve disposed therebetween over the ends of two cables to be joined together. In the embodiment shown in the drawings, the fluid pressure is transmitted from an external source through the coupling 6, passage means 75 and 76 formed in the fitting 7, a bore 77 formed in the end plate 22 of the body member 1 and into the bore 32 formed in the piston 3. Resilient means

are provided for urging the die 4 away from the die 5 when the fluid pressure acting on the piston 3 is relieved. In the embodiment of the invention shown in Fig. 3, the resilient means comprises a coil spring 78 disposed in the piston bore 32 having one end secured to a spring retaining member 79 secured to the upper end of the piston bore 32 by a bolt 80 and the other end secured to a spring retaining member 81 secured to the end plate 22 of the body portion 1 by a bolt 82.

In the operation of this press, assuming that the top portion 2 is in clamping position on the body portion 1, a splicing sleeve enclosing the ends of two cables to be joined together is disposed between the dies 4 and 5. A control means associated with the external fluid pressure source is actuated, directing fluid under pressure into the cylinder 21, thus causing the die 4 to be moved upwardly towards the die 5 so as to clamp the splicing sleeve over the ends of the cables. When the fluid pressure is relieved the spring 78 moves the die 4 away from the die 5. In such a cable splicing operation it is the usual procedure to clamp the splicing sleeve at several positions along the length of the splicing sleeve. When the cable splicing operation is completed, the top portion 2 must be removed or separated from the body portion 1 so that the spliced cable may be removed from the press. The top portion 2 is removed by rotating it as indicated by arrow 83a with respect to the body portion 1 until the projections 70 thereon disengage the lateral grooves 69 so that the top portion 2 may be raised upwardly between the guides 23 and 24.

To again assemble the top portion 2 on the body portion 1 for another cable splicing operation, the top portion 2 is turned so that the projections 70 are disposed lengthwise of the grooves 69 and the die holder 55 is lowered between the supporting portions 23 and 24. When the upper edges 57 and 58 of the top portion 2 come into contact with the upper ends of the support members 23 and 24 so that the top portion 2 is supported thereon, the top portion 2 is rotated approximately 90° as indicated by arrow 83a to interengage the projections 70 in the grooves 69, thus preparing the press for another clamping operation.

To assure proper clamping alignment of the die 5 with respect to the die 4, releasable catch means are provided to positively locate the top 2 on the body portion 1 with the die 5 in clamping alignment with the die 4. The releasable catch means include a trigger 86 disposed in a downwardly extending groove 87 formed in one end of the cap 56 and pivotably mounted on a pin 88 secured in the cap 56 and intersecting the groove 87. One end 89 of the trigger 86 is adapted to engage an arcuate notch 90 formed in the outer upper edge of the guide 23, a similar notch 91 being formed in the outer upper edge of the guide 24. The end 89 of the trigger 86 is urged into either the notch 90 or the notch 91, depending upon which direction the top 2 is rotatably engaged with the body portion 1, by a plunger 92 slidably mounted in a bore 93 formed in the base of the groove 87 and urged by a spring 94 against the other end 95 of the trigger 86. The end 95 of the trigger 86 has a portion projecting out of the groove 87 so as to be conveniently manipulated by a press operator grasping the handle portion 56' to disengage the trigger 86 from the notch in which it is engaged to permit rotary disengagement of the top 2 from the body portion 1. It is noted that the trigger 86 must also be manipulated when the top 2 is being rotatably engaged with the body portion 1.

To keep the top 2 and the body portion 1 together when the top 2 is disengaged from the body portion 1, a steel cable 96 is connected therebetween, one end being secured to the body portion 1 by the bolt 17 and the other end being secured in a recess 97 formed in the top 2.

I claim:

1. A hydraulic press comprising; a cylindrical body

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member having a cylinder formed therein, a piston slidably mounted in said cylinder, a first clamping die mounted on one end of the piston, a pair of elongated arcuate supporting portions extending longitudinally from one end of said body member in diametrically opposite relationship and having end surfaces, said supporting portions having a pair of aligned arcuate transverse slots formed one each on the inner surfaces of said portions and extending the width thereof, guide surfaces on said inner surfaces extending lengthwise of said supporting portions for guiding the movement of the piston and terminating adjacent said arcuate slots, a die holder adapted to be removably supported on said supporting portions, a second clamping die rigidly mounted in said die holder, said die holder having a generally elongated top portion including a pair of extending arcuate edge portions adapted to overlie said end surfaces of said supporting portions, the width of said holder being slightly less than the distance between said supporting portions and substantially equal to the width of said supporting portions, a pair of elongated arcuate projections on said die holder extending for the width of said holder and spaced from said arcuate edge portions so as to be in alignment with said arcuate slots in said supporting portions when said edge portions engage said end surfaces, said die holder being rotatable to a first position to engage said arcuate projections in said slots with a maximum area of contact to assemble said die holder to said body member with the second die in clamping alignment with said first die, and with the die holder being rotatable to a second position to disengage said arcuate projections from said slots to allow removal of the die holder from said body member, manually releasable cooperating means on said holder and said supporting portions for locking said holder on said supporting portions with said second die in clamping alignment with said first die comprising a notch formed on the outer edge of the end of a supporting portion adapted to be engaged when the dies are in alignment by a spring urged releasable trigger carried on said die holder in a position to be manually moved away from said notch, and means for connecting the cylinder to a source of fluid under pressure to move the piston-mounted first die toward said second die for a clamping operation.

2. A hydraulic press comprising; a member having a cylinder formed therein, a piston slidably mounted in the cylinder, a die holder supported above the piston, supporting means for releasably holding said die holder, recess means on said die holder and the end of the piston, a pair of mating clamping dies slidably fitted and confined one in each of said recess means and having a groove on the inner surface adjacent said recesses extending normal to the sliding movement of said dies, means defining a slot in said die holder and a slot in said piston, each of said slots opening into one of said recesses, a finger pivotably mounted in each of said slots, one end of each of said fingers being spring-urged into said die grooves to lock said dies in said recesses, and a pair of release shafts, one of said shafts being movably mounted in a bore formed in said piston normal to and intersecting one of said recess slots, the other of said shafts being movably mounted in a bore formed in said die holder normal to and intersecting the other of said recess slots, both of said shafts having ends extending

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to the ends of said bores for manual manipulation, the other end of each of said fingers being disposed in a beveled notch formed in each of said release shafts, said shafts being manually shiftable in said bores to pivot said fingers out of said notches to permit said dies to be removed from said recesses.

3. A portable hydraulic press for compressing a sleeve on a long cable comprising, in combination, a two-part body detachably connected together for supporting opposed dies for movement relative to each other to compress a sleeve about the cable extended within the body and separable to permit removal of the body from the cable, one part of said body being generally U-shaped and formed at its bottom with a cylinder, a piston slidable in said cylinder with an end having means adapted to carry a first outwardly facing die, a pair of relatively wide integral support members extending upwardly from the bottom of said one part in diametrically opposed relation to form the legs of said U-shaped body part and spaced apart a distance to permit insertion of a sleeve therebetween and to extend adjacent thereto, the other part of said body having a generally rectangular shape and of a length to span said support members and of a width substantially equal to the distance between the support members, said other body part having means adapted to removably hold a second downwardly facing die between said support members in opposing relation to said first die, whereby the piston may travel upwardly to move the first die toward the second die to compress a sleeve therebetween, means for detachably connecting said parts of the body together including interengaging elongated arcuate grooves and elongated arcuate projections formed one on the inner face of each support member adjacent the free end thereof and the other on each end of said other part of the body, whereby the other body part may be inserted between the support members lengthwise thereof to align the projections and grooves and the parts turned relative to each other to interengage the grooves and projections with a large area of contact therebetween, with the dies aligned for compressing operation and with the second die aligned for removal between the legs of said U-shaped body part and coacting means outwardly of the cylinder on said piston and support members terminating at a distance from the free ends of the support members for confining the piston against rotation to maintain the first die in alignment, and coacting means on one of the support members and the other body part for indicating proper rotational alignment of the second die with the first die and for releasably holding said body parts against rotation relative to each other.

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