

Dec. 27, 1949

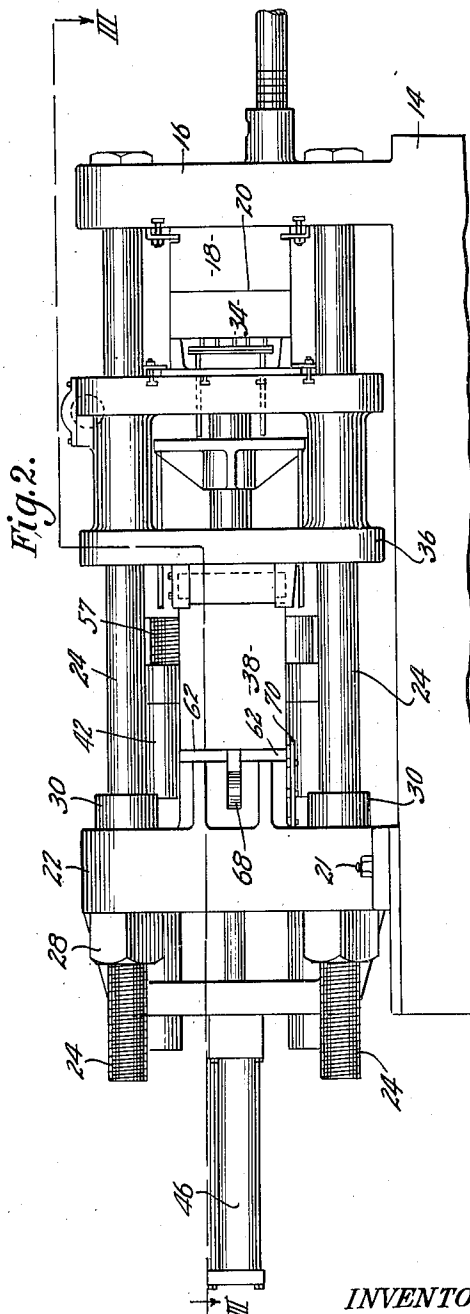
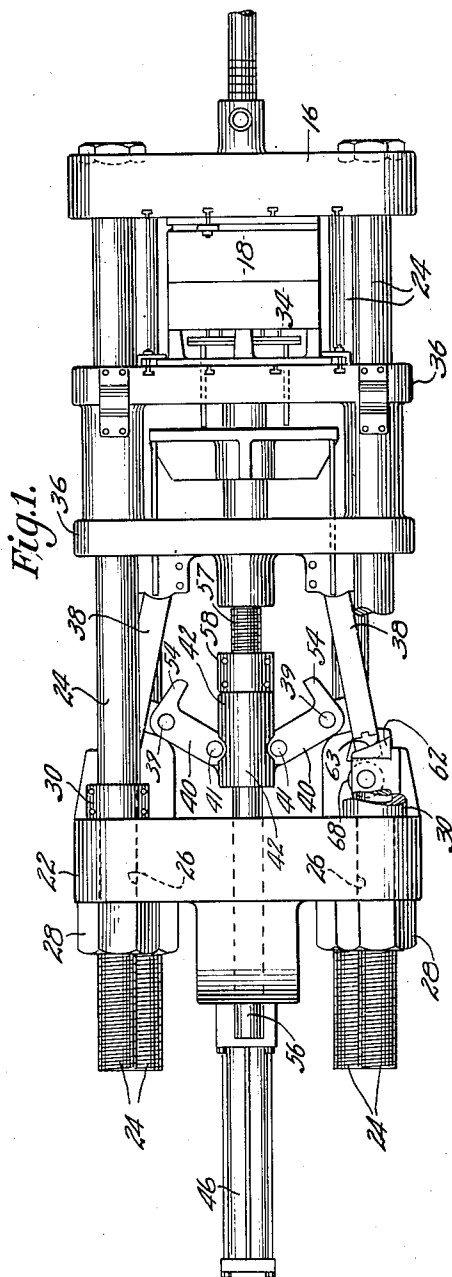
W. B. BEUSCHER

2,492,259

DIE CASTING MACHINE

Filed Oct. 1, 1946

4 Sheets-Sheet 1



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Fig. 3.

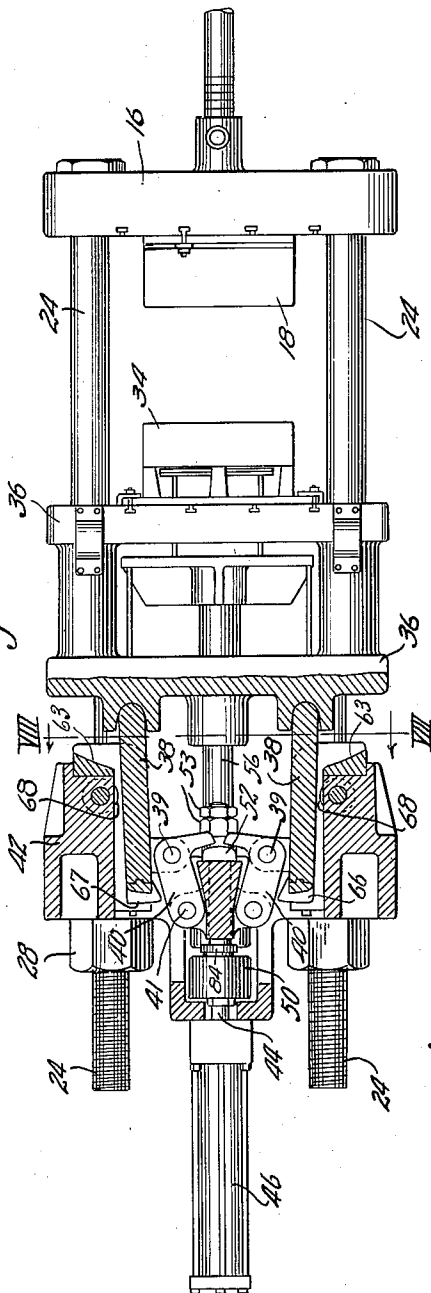


Fig. 5.

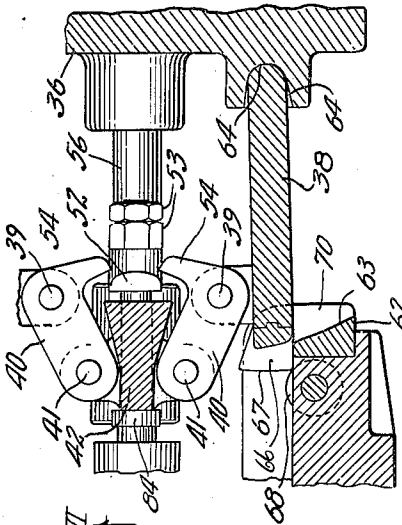
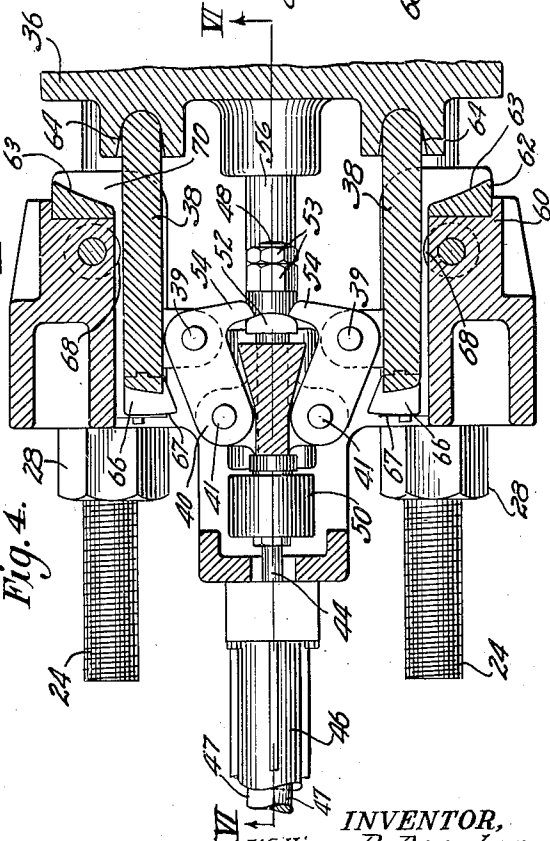


Fig. 4.



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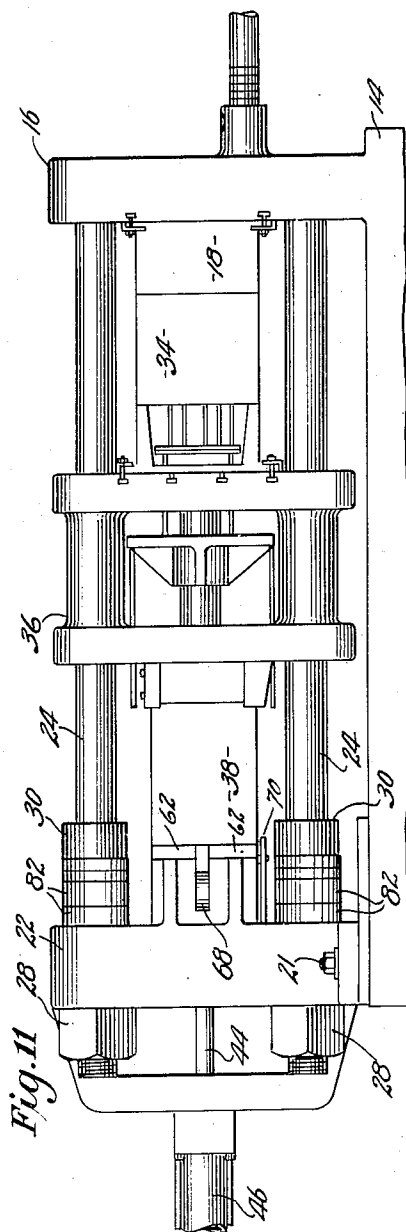
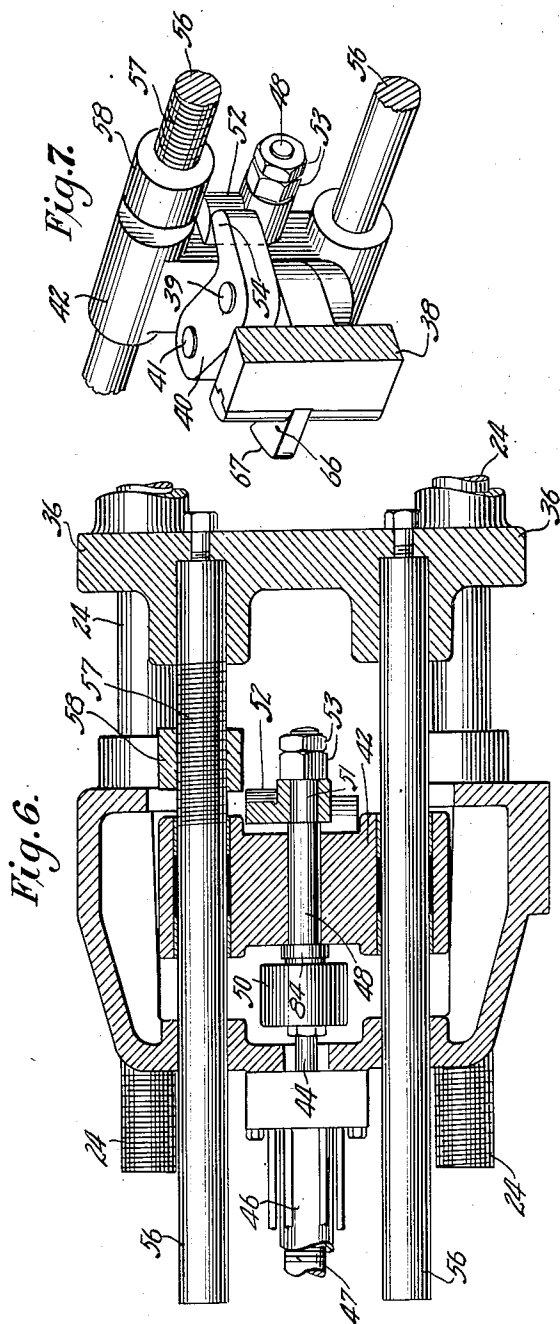
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4 Sheets-Sheet 3



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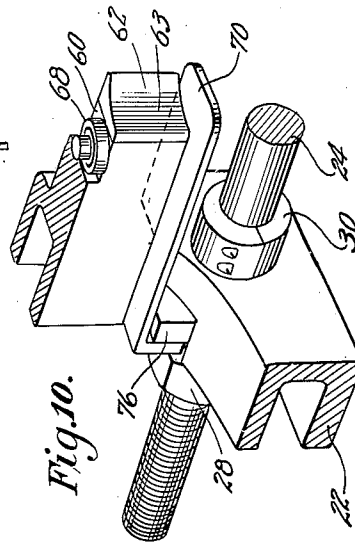
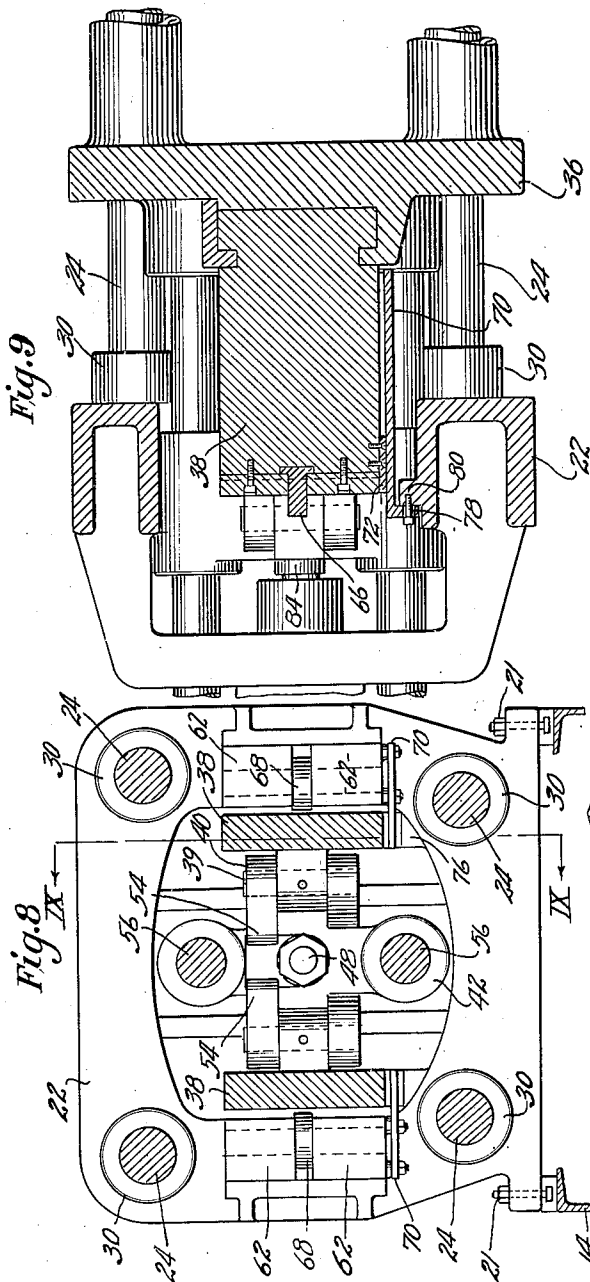
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,492,259

DIE-CASTING MACHINE

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Application October 1, 1946, Serial No. 700,413

12 Claims. (Cl. 18—16)

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This invention relates to improvements in die casting machines and has particular reference to the toggle link mechanism of pressure casting machines.

The principal object of this invention is the provision of a die casting machine having a toggle link mechanism whereby positive, unyielding, locking means is provided to resist heavy casting loads.

Another object is the provision of a light, rigid toggle link structure that will facilitate rapid operation of the die casting machine.

A further object of the present invention is the provision of a toggle link mechanism that is easily and quickly adjustable to accommodate dies of different sizes.

Other objects are rigidity and economy of construction, ease and efficiency of operation, and adaptability for use on the various types of pressure casting machines.

With these objects in view, as well as other objects which will appear during the course of the specification, reference will now be had to the drawings wherein:

Figure 1 is a plan view of a die casting machine embodying my invention and showing the dies in a closed position.

Fig. 2 is a side elevation of the machine as shown in Figure 1.

Fig. 3 is a partial plan and sectional view as indicated by the line III—III of Figure 2, showing the dies in an open position.

Fig. 4 is an enlarged, fragmentary, sectional view similar to Figure 3, showing the position of the parts at the beginning of the closing stroke.

Fig. 5 is a fragmentary sectional view similar to Figures 3 and 4, showing the parts in a further advanced closing stroke.

Fig. 6 is a central, vertical section of a portion of the machine as indicated by the line VI—VI of Figure 4.

Fig. 7 is a perspective view of a portion of the toggle links, cross head and associated parts.

Fig. 8 is a transverse section of a portion of the machine taken on the line VIII—VIII of Figure 3.

Fig. 9 is an enlarged sectional view of a portion of the machine taken on the line IX—IX of Figure 8.

Fig. 10 is a perspective sectional view of the lower right hand corner of the end plate on the left end of the machine.

Fig. 11 is a plan view of the machine similar to Figure 1 with the left end plate fully extended to accommodate dies of greater thicknesses,

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Throughout the several views like reference characters refer to similar parts, and the numeral 14 designates a machine base provided adjacent its one end with a vertically disposed fixed platen 16 to which the stationary part 18 of the die or mold 20 is rigidly attached.

Adjustably mounted on the other end of base 14 by means of bolts 21 is an end plate 22. Four parallel tie bars 24 are each rigidly secured at their one end to fixed platen 16, and pass through holes 26 formed through adjustable end plate 22 to which they are fixed by means of an outer set nut 28 and an inner split nut 30, which engage the threaded end portion 32 of each of said tie bars.

The movable part 34 of the die or mold is mounted on a movable platen 36 which is slidably mounted on the four tie bars 24.

To effect the desired opening and closing of the dies, a reciprocating motion is imparted to the movable platen by a toggle linkage comprising side bars 38, toggle links 40, cross head 42 and a piston rod 44. Toggle link 40 is pivotally connected to side bar 38 by means of fixed pin 39 and to cross head 42 by a pin 41. A cylinder 46 is provided with means to receive fluid under pressure which serves to drive a piston head 47 to drive piston rod 44.

Slidably mounted in cross head 42 is an extension shaft 48 which is interconnected to piston rod 44 by means of a flexible coupling 50. To the reduced end 51 of the extension shaft 48 is secured by nuts 53 a bumper plate 52, the function of which will be more clearly set forth.

Referring to Figure 6, the upper portion of toggle links 40 have an inwardly extended portion 54 designed to engage bumper plate 52. The cross-head 42 is guided on two parallel shafts 56 which are rigidly secured at their inner ends to movable platen 36 and slidable in end plate 22. It will be noted that the upper shaft 56 is threaded at 57 to receive the split stop collar 58. The end plate 22 is formed with an integral abutment 60 to which is fitted a hardened shoe 62 formed to present a wedged cam face 63 for engagement with side bars 38 when they are in engagement. The inner ends of side bars 38 are seated in sockets 64 formed in the outer end of cross head 42. The outer ends of side bars 38 are formed with projecting tang 66 designed to engage a roller 68 carried by the adjustable end plate 22 at a certain time in the cycle of operation and having an outer cam face 67.

A bearing plate 70 (see Fig. 10) is provided to support the weight of the side bars 38. To reduce

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friction to a minimum, bearing plates 72 are attached to the bottom end portion of side bars 38, as shown in Figure 9.

In the operation of this machine, reference will first be had to Figure 3 wherein the dies are in the fully open position and they are ready to be closed for the casting operation. Fluid under pressure is admitted to cylinder 46 which acts against piston 47 to cause piston rod 44 to move inwardly, thus causing the bumper 52 to engage the extended portions 54 of links 40, thus forcing them outwardly a short distance as shown in Figure 4 to move pin 39 out of alignment with pin 41, and the inner bearing point of the side bar 38. A continued movement of piston rod 44 causes collar 84 to contact cross head 42, which in turn causes the entire toggle link assembly to move inwardly to the position shown in Figure 5. During this inward movement the toggle links, due to off center of the parts just described, are constantly urging side bars 38 transversely against rollers 68. After the side bars have moved beyond said rollers the projecting tangs will engage the respective rollers thus preventing the wedge portions from engaging until the inward stroke is substantially completed. The last slight forward movement of the piston rod causes the cam face 67 of tang 66 to move into engagement with the face of roller 68. This wedge engaging is very rapid due to stopping of the die section 34 as it meets the stationary die section 18 and the action of the cross head in its continued inward movement against toggle links 40. The dies are thus wedged to a closed position, as shown in Figure 1. The pressure casting operation can now be carried on with no fear of any objectional separation of the die parts.

On the return stroke or outward movement of the piston rod 44, the bumper plate 52 engages the cross head with a hammer blow due to the lost motion in the cross head bearing, thus quickly operating toggle links 40 to move the side bars engagement with cam faced shoes 62. On the outward stroke of the piston rod the tangs will ride the rollers 68 thereby preventing friction between the wedge plates. Further outward movement of the piston rod will return the entire assembly back to the position shown in Figure 3, thus completing a full cycle.

It will be noted that when the toggle parts are in the position shown in Figure 3 the pins 39, 41 and the inner bearing point of side bar 38 will be in substantially linear alignment. When the toggle parts are in the position shown in Figure 1, with the die parts secured together it will be noted that a line passing through rivets 39 and 41 is disposed at substantially right angles to the major plane of side bar 38 thus insuring a rigid securing of the toggle parts in fixed position until the reversal of the piston rod is obtained.

It is apparent that minor changes may be made in the arrangement and construction of the parts without departing from the spirit of the invention.

What I claim as new and desire to protect by Letters Patent is:

1. In a die casting machine a frame, a die member fixed to said frame, a die member mounted on a platen for reciprocating movement relative to said fixed die member, a cross-head reciprocally carried by said frame, a toggle link mechanism interconnecting said platen and cross-head, power means operable to reciprocate said cross-head, wedging shoes fixed to said frame adapted to be engaged by said toggle

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link mechanism whereby said die members are unyieldingly secured together during the casting operation, and a lost-motion connection between said power means and said cross-head whereby a hammer blow is delivered to said cross-head to release said wedged members when said power means is operated to retract said cross-head.

2. In a die casting machine a frame, a die member fixed to said frame, a die member mounted on a platen for reciprocating movement relative to said fixed die member, a cross-head reciprocally carried by said frame, a toggle link mechanism interconnecting said platen and cross-head, and wedging means engageable by said toggle link mechanism whereby said die members are wedged together during the casting operation, and a bumper plate movable relative to said cross-head and operable by said power means to strike said cross head and release said wedging means prior to the separation of said die members.

3. In a die casting machine a frame, a die member fixed to said frame, a die member mounted on a platen reciprocally carried by said frame whereby said die member is movable to and from said fixed die member, a cross-head movable in parallel relation with the movement of said platen, a toggle link mechanism interconnecting said platen and cross-head, means to reciprocate said cross-head, said toggle link mechanism including a side bar pivoted to said platen, and a toggle link pivoted to said side bar and to said cross-head said toggle link mechanism being adapted to buckle during the die-closing stroke, and the pivots of said link and side bar being in alignment during the retracting stroke, and a member movable relative to said cross-head and operable by said reciprocating means to buckle said toggle link mechanism at the beginning of the die-closing stroke.

4. In a die casting machine a frame, a die member fixed to said frame, a platen mounted for reciprocation on said frame, a die member fixed to said platen for movement to and from said fixed die member, a cross-head reciprocally carried by said platen, two toggle links pivotally connected to each other and joining said cross-head and platen, one of said links having a major cam face member inclined to the direction of movement thereof, a wedge cam face fixed to said frame and positioned to receive the cam face of the link member whereby said movable die member is urged against said fixed die member, an auxiliary cam carried by said link, and a roller carried by said frame, said roller and auxiliary cam being adapted to cooperate to maintain said major cam members in spaced apart relation until the wedging movement is substantially complete.

5. In a die casting machine a frame, a die member fixed to said frame, a platen mounted for reciprocation on said frame, a die member fixed to said platen for movement to and from said fixed die member, a cross-head reciprocally carried by said platen to move in parallel relation with said platen movement, two toggle links pivotally connected to each other and joining said cross-head and platen together, the toggle link joining with said platen having a cam member positioned at its outer end, and a wedge cam member fixed to said frame and positioned to receive cam member whereby said movable die member is urged tightly against said fixed die member means for reciprocating said cross-head having a lost-motion connection with said cross-

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head, said reciprocating means being operable to deliver a hammer blow to said cross-head to disengage said cam members.

6. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member carried by said platen, a cross-head reciprocally carried by said platen, means for reciprocating said cross-head having a lost-motion connection with said cross-head, two toggle members pivotally connected to each other and joining said cross-head and platen, a wedge shoe carried by said frame, means including said toggle members whereby the toggle member contacting said platen is forced against said wedge shoe to urge said movable die member against said fixed die member, said reciprocating means being operable to deliver a hammer blow to said cross-head to disengage said toggle member from said wedge shoe.

7. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member carried by said platen, a cross-head reciprocally carried by said platen, means for reciprocating said cross-head having a lost-motion connection with said cross-head, two toggle members pivotally connected to each other and joining said cross-head and platen, a wedge shoe stationary with said frame, means including said toggle members whereby the toggle member adjacent said platen is directed and forced against said wedge shoe to urge said movable die member against said fixed die member said reciprocating means being adapted to deliver an outward hammer blow against said cross-head as said cross-head is retracted, thereby disengaging said toggle member from said wedge shoe.

8. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member carried by said platen, a cross-head reciprocally carried by said platen, two toggle members pivotally connected to each other and joining said cross-head and platen, a wedge shoe stationary with said frame and so positioned that when the outer end of the toggle member adjacent said platen is forced transversely to its direction of reciprocation it will engage said wedge shoe to force said movable die member tightly against said stationary die member, a power driven member for reciprocating said cross-head having a lost motion connection with said cross-head, and a member carried by said reciprocating member and operable by the relative movement of said cross-head and reciprocating member to buckle said toggle members as movement toward said fixed die is started, and operable to deliver a hammer blow to said cross-head as movement away from said fixed die is started.

9. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member fixed to said platen, a cross-head reciprocally carried by said platen, an extension shaft slidably mounted in said cross-head for limited movement in the direction of travel of reciprocation, power means for reciprocating said extension shaft whereby said cross-head is reciprocated through a less distance than the distance of travel of said extension shaft, two toggle members pivot-

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ally connected to each other and joining said cross-head and platen, a wedge shoe stationary with said frame, and means including said toggle members operable by said power means to move the outer end of the toggle member adjacent said platen transversely of its direction of reciprocation to engage said wedge shoe when the die members are in contacted relation.

10. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member fixed to said platen, a cross-head reciprocally carried by said platen, an extension shaft slidably mounted in said cross-head for limited movement therein in the direction of travel of reciprocation, power means for reciprocating said extension shaft whereby said cross-head is reciprocated through a less distance than the distance of travel of said extension shaft, two toggle members pivotally connected to each other and joining said cross-head and platen, a wedge shoe stationary with said frame, means including said toggle members operable by said power means to move the outer end of the toggle member adjacent said platen transversely of its direction of reciprocation to engage said wedge shoe when the die members are in contacted relation, and a bumper plate carried by said extension shaft movable to strike said cross-head to release said toggle member from engagement with said wedge shoe as the power means is retracted.

11. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member fixed to said platen, a cross-head reciprocally carried by said platen, an extension shaft slidably mounted in said cross-head for limited movement in the direction of travel of reciprocation, power means for reciprocating said extension shaft whereby said cross-head is reciprocated through a less distance than the distance of travel of said extension shaft, two toggle members pivotally connected to each other and joining said cross-head and platen, a tang secured to the outer and inner toggle member, a wedge shoe stationary with said frame, a roller carried by said frame for limiting transverse movement of the toggle member adjacent said platen during the major portion of its inward stroke and means including said roller and tang for guiding the outer end of said inner toggle member transversely to operatively engage said wedge shoe whereby said die members are urged together.

12. In a die casting machine a frame, a die member fixed to said frame, a platen reciprocally carried by said frame for movement toward and from said fixed die member, a die member fixed to said platen, a cross-head reciprocally carried by said platen, an extension shaft slidably mounted in said cross-head for limited movement therein in the direction of travel of reciprocation, power means for reciprocating said extension shaft whereby said cross-head is reciprocated through a less distance than the distance of travel of said extension shaft, two toggle members pivotally connected to each other and joining said cross-head and platen, an inwardly projecting portion integral with said toggle member adjacent said cross-head, a wedge shoe stationary with said frame, means including said toggle members operable by said power means to move the outer end of the toggle member adjacent said platen transversely of its direction of reciprocation

tion to engage said wedge shoe when the die members are in contacted relation, and a bumper plate carried by said extension shaft movable to strike the projecting portion of said toggle member to force the hinged portions of said toggle member out of linear alignment. 5

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