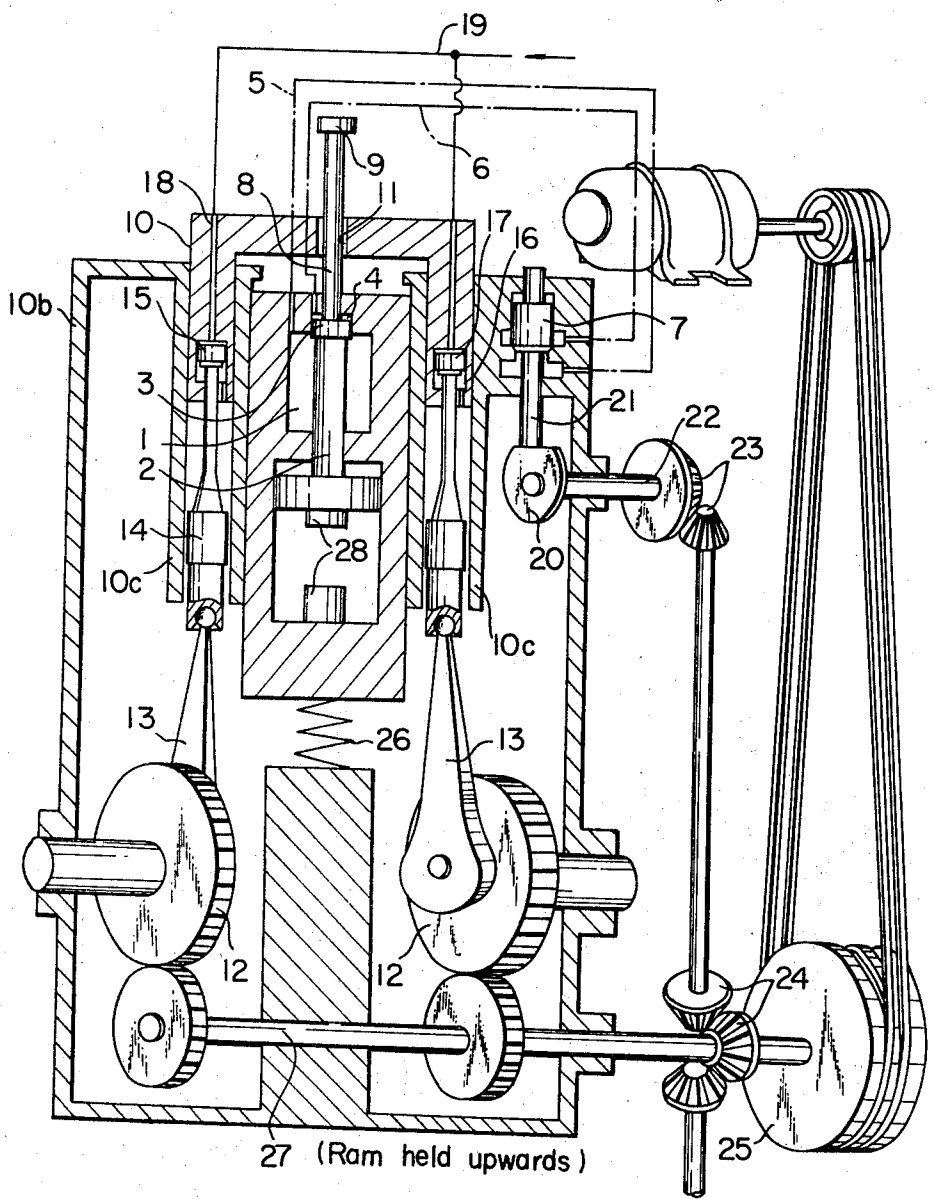
Feb. 4, 1969 AKIRA ASARI 3,425,261

HIGH SPEED RETURNING IMPACT FORMING MACHINE

Filed March 9, 1967 Sheet 1 of 8

Fig. 1



Akira Asari,
INVENTOR.

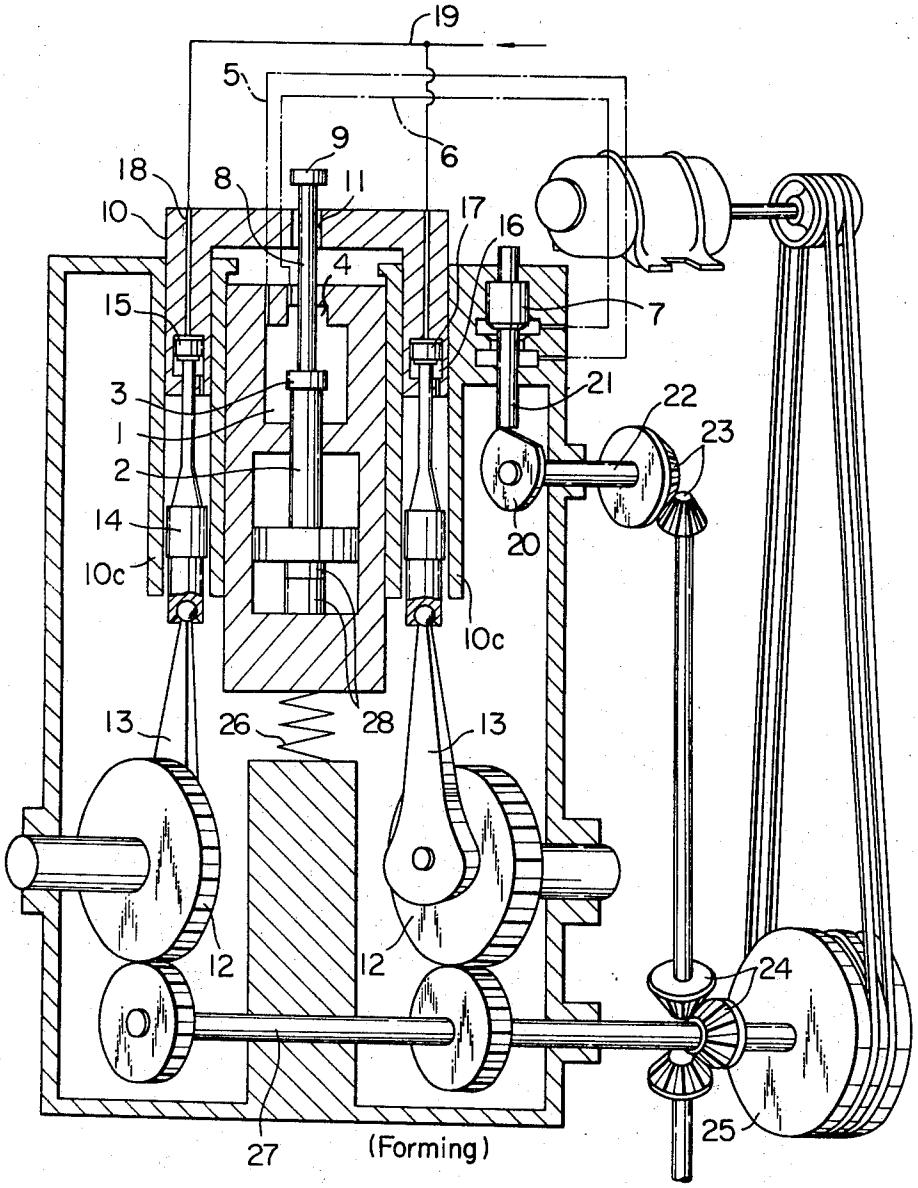
BY Wendroth, Lind and Ponack, Attorneys

Feb. 4, 1969 AKIRA ASARI 3,425,261

HIGH SPEED RETURNING IMPACT FORMING MACHINE

Filed March 9, 1967 Sheet 2 of 8

Fig. 2



Akira Asari
INVENTOR.

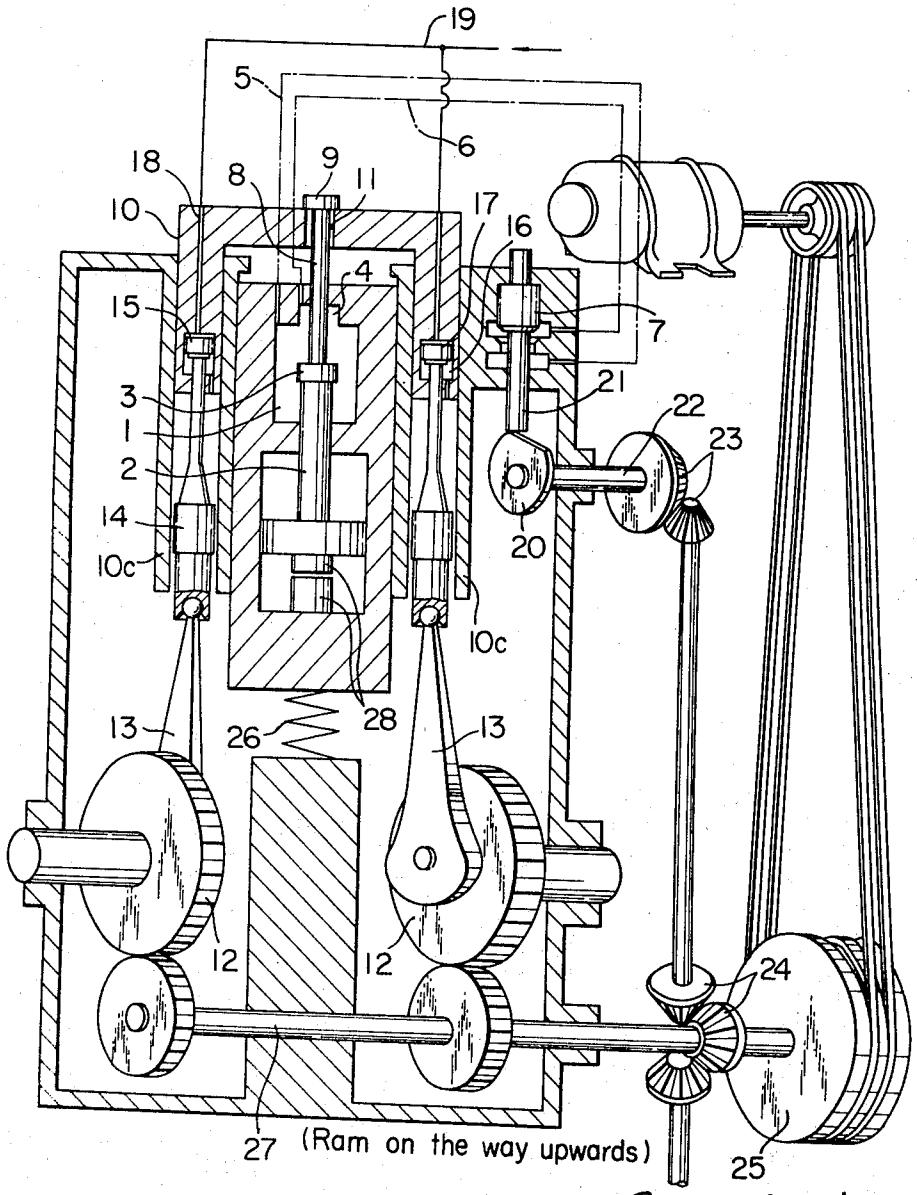
BY Wenderoth, Lind and Ponack, Attorneys

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HIGH SPEED RETURNING IMPACT FORMING MACHINE

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Fig. 3



Akira Asari, INVENTOR.

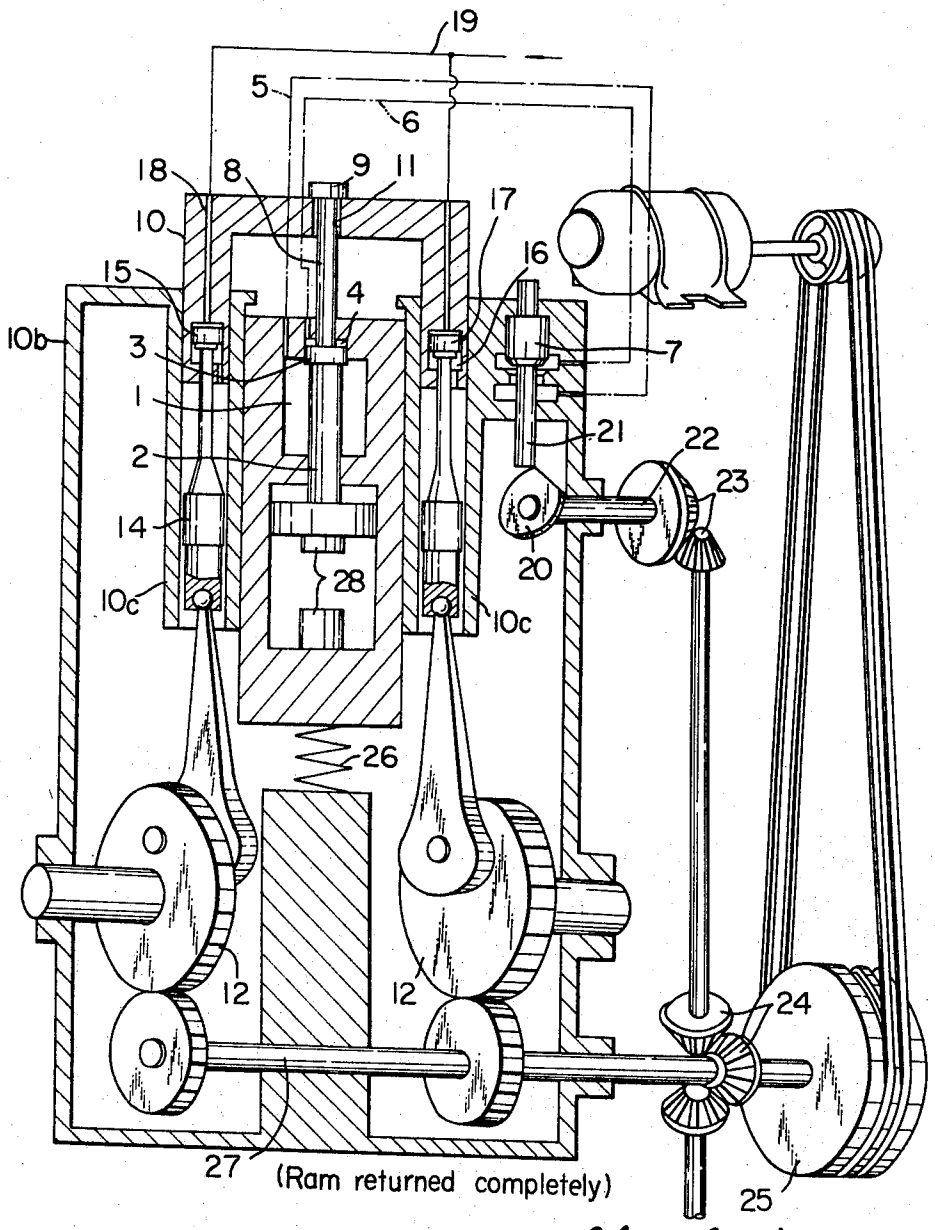
BY Wenderoth, Lind and Ponack, Attorneys

Feb. 4, 1969 AKIRA ASARI 3,425,261

HIGH SPEED RETURNING IMPACT FORMING MACHINE

Filed March 9, 1967 Sheet 4 of 8

Fig. 4



Akira Asari, INVENTOR.

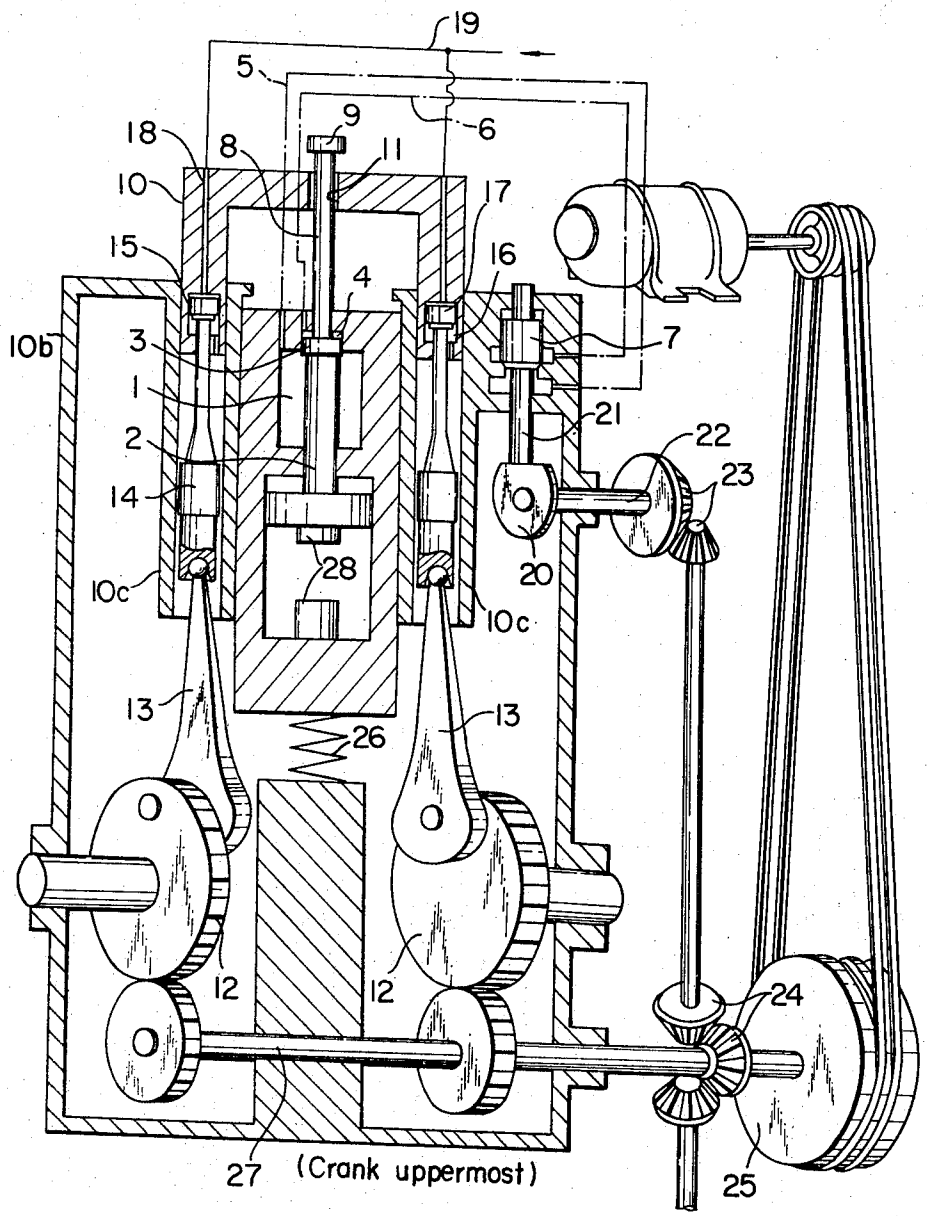
BY Wenderoth, Lind and Ponack, attorneys

Feb. 4, 1969 AKIRA ASARI 3,425,261

HIGH SPEED RETURNING IMPACT FORMING MACHINE

Filed March 9, 1967 Sheet 5 of 8

Fig. 5



Akira Asari, INVENTOR.

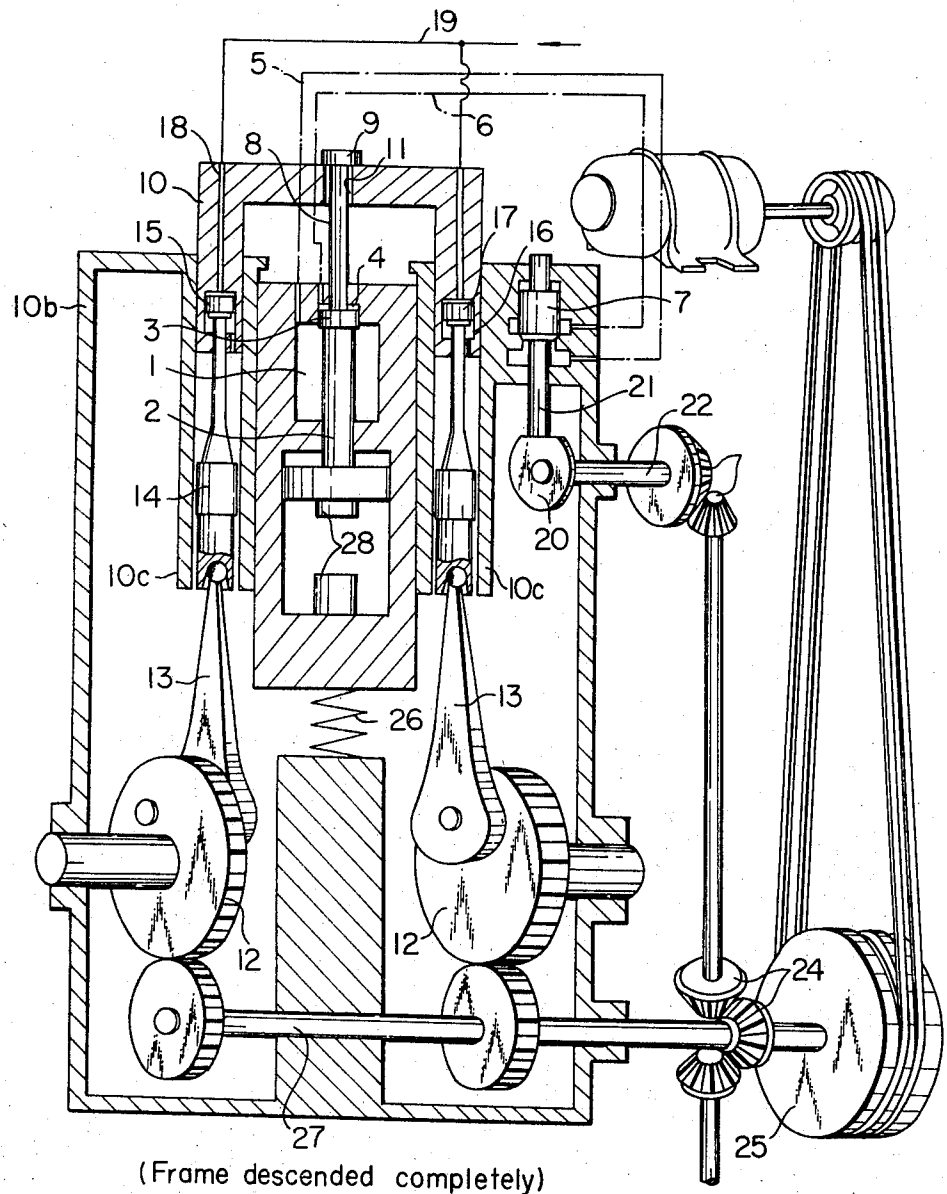
BY Wenderoth, Lind and Ponack. Attorneys

Feb. 4, 1969 AKIRA ASARI 3,425,261

HIGH SPEED RETURNING IMPACT FORMING MACHINE

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Fig. 6

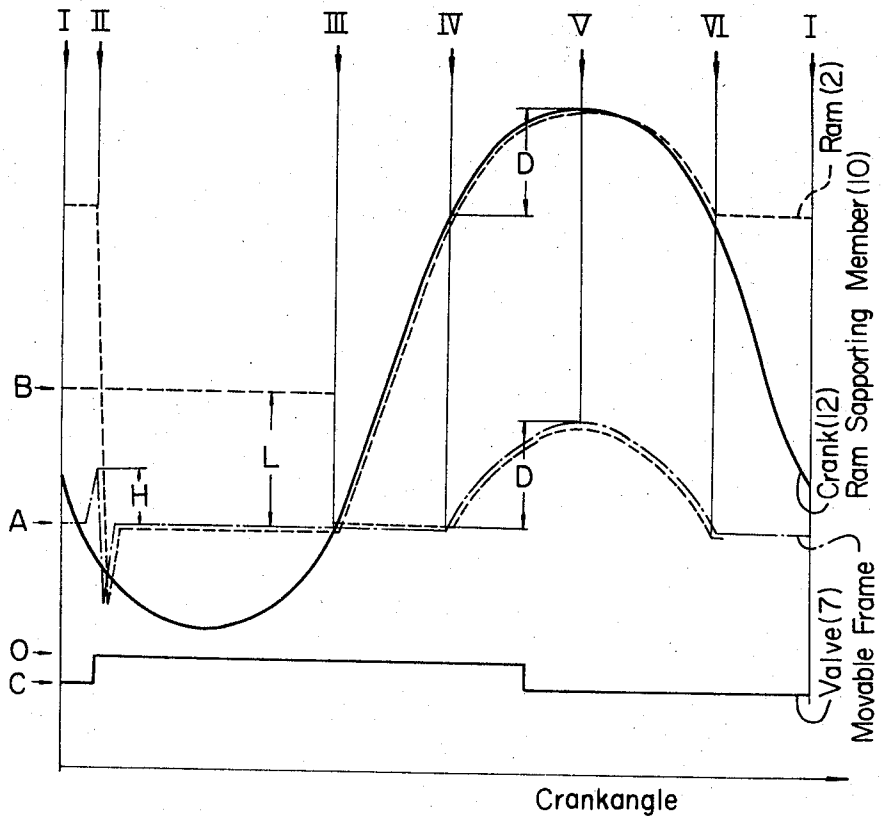


(Frame descended completely)

Akira Asari
INVENTOR.

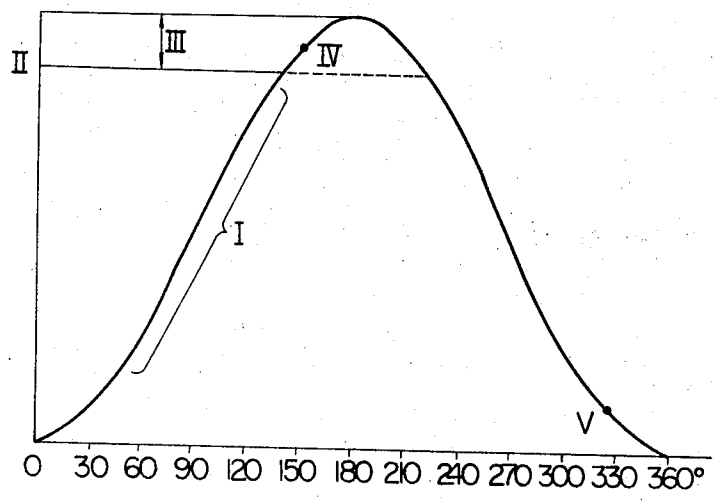
BY Wenderoth, Lind and Ponack, Attorneys

Fig. 7



Akira Asari,
INVENTOR.
BY Wenderoth, Lind and Ponack, Attorneys

Fig. 8



Operational Curve of Crank Shaft

Akira Asari,
INVENTOR.
BY Wenderoth, Lind and Ponack, Attorneys

United States Patent Office 3,425,261 Patented Feb. 4, 1969

3,425,261

HIGH SPEED RETURNING IMPACT FORMING MACHINE

Akira Asari, Osaka-shi, Japan, assignor to Kobe Steel Ltd., Fukiai-ku, Kobe, Japan

Filed Mar. 9, 1967, Ser. No. 621,939
U.S. Cl. 72—450 14 Claims
Int. Cl. B21j 9/18; B30b 1/32, 15/20

ABSTRACT OF THE DISCLOSURE

A high speed returning impact forming machine which has a high pressure gas chamber, a ram actuated at a high speed by the pressure in the chamber, a combined plunger-cylinder assembly, a valve communicated between the chamber and the cylinder, and a ram supporting member for returning the ram by being driven by a mechanical force such as a crank mechanism so as to return it in high speed.

Cross references to related application

Reference is made to U.S. patent applications of Akira Asari entitled High Energy Rate Forming Machine No. 384,103, filed July 21, 1964, now Patent No. 3,354,693; "Method for Operating the Ram in an Impact Processing Machine and a Device for Carrying Out Said Method," Ser. No. 564,681, filed July 12, 1966; and "A Knock-Out Device of Impact Forming Machine," Ser. No. 574,033, filed Aug. 22, 1966.

Background of the invention

This invention relates to a high speed returning impact forming machine in which gas pressure is used as a source of power for operating ram, and more particularly is directed to an impact forming machine in which a mechanical force is utilized for returning a ram in a high speed.

As is well known, an impact forming machine deforms various materials by using the velocity energy by means of a high speed of ram and a very large force can be obtained by this and furthermore, it has the feature of having a very high fabrication speed.

In order to supply high speed energy to a ram, machine for using gas pressure is preferred to machine for utilizing a mechanical force so that the ram is forced in extremely high speed. For driving the ram by utilizing gas pressure, there are various ways for using the gas pressure for driving the ram, but the common manner is such that the ram is driven downwards in a very high speed by receiving gas pressure on the upper surface of the ram, whereby the desired forming work is done in a metal mould provided in the machine.

The ram in the aforementioned impact forming machine is generally so operatively disposed within the body thereof that prior to actuation for one cycle of an impact forming cycle, it is held in its uppermost inoperative or dead position in the machine body, and then it is adapted to rapidly descend downwards toward a mould positioned on an anvil in the lower portion of the machine body so as to perform a desired impact forming operation to the material in the mould. And, thereafter, the ram is raised to its initial uppermost position and held there in a state indicated ready for next cycle of operation. In such a type of impact machine, in order to raise the descended ram to its initial uppermost position after it has performed the desired processing operation to the material, a jacking device is usually employed.

The jacking device may be operated by either hydraulic pressure or mechanical means such as a crank mechanism. In one conventional impact forming machine using gas

pressure as the source of power for driving the ram, fluid pressure or hydraulic pressure is generally utilized for driving the jacking device. When the fluid pressure is used for urging the device, since a large gas pressure apparatus is required for exhausting the gas, hydraulic pressure is usually employed in practice. However, when the hydraulic pressure is employed for driving the jacking device to return it to its initial uppermost position, the returning speed is small, whereas since the impact forming speed of the ram is very high, in consideration with the small speed of its returning ram, it is very inefficient in the impact forming cycle.

Summary of the invention

This invention eliminates the above-mentioned disadvantages of the conventional impact forming machine and provides a novel high speed returning impact forming machine in which an impact forming cycle is shortened by utilizing the mechanism for converting rotational motion to reciprocating movement upon returning the ram to the initial uppermost position after it has performed the impact forming operation.

The principle of the present invention, which will be hereinafter described, is that instead of using a jacking device for returning the descended ram to its initial uppermost position which device utilizes hydraulic pressure for driving back upwards the ram in the impact forming machine causing it slow returning speed, a crank mechanism including a crank shaft driven by a conventional external source of power, a connecting rod for transmitting a rotary motion of the crankshaft with converting to linear movement, and a cross head mounted on one end of the connecting rod to be driven in a linear motion, is utilized so as to return the descended ram to its initial uppermost level by transmitting the mechanical returning force to a ram supporting member which hang the ram by means of a stem extended upwards from top of the ram.

When this mechanical force supplied by the crank mechanism is utilized in returning operation of the ram, since a valve for communicating between a high pressure gas chamber and a cylinder formed on upper wall of the supporting member so as to receive a plunger integral to the ram which plunger is forced downward by means of gas high pressure in the chamber to descend the ram in order to operate to form the material in the mould provided in this machine, is provided in this impact forming machine, it occurs to be difficult to correspond a time for closing the valve to a time for the ram to be returned to its initial uppermost position ready for operating next cycle.

This invention has solved this problem of the above mentioned difficulty to correspond the time of the valve closing to that of the ram returned to its uppermost position by adopting the crank mechanism for returning the ram in high velocity, by the principle that hydraulic pressure means mounted between the crosshead and the ram supporting member are provided such that the crosshead may be raised further by driving advancingly the crank mechanism for a little while after the ram integral to the supporting member has reached its uppermost position by compressing the fluid medium in the hydraulic means, during which the valve operates to close, thereby removing the phenomenon of its drawback or accidental initiation of the ram during ram holding stroke.

Further, the principle of this invention induces also the impact forming machine in which the valve is effected to open after the ram supporting member descends sufficiently by means of cam mechanism so as to operate as mentioned above in order that the ram may not be disturbed to effect its impact forming operation.

Therefore, one object of this invention is to provide an

impact forming machine in which the ram is actuated by means of gas pressure and it is returned to its uppermost position in high speed.

Another object of this invention is to provide a high speed returning impact forming machine in which the ram is easily forced back to its uppermost level.

A still further object of this invention is to provide a high speed returning impact forming machine which removes the drawback of the cylinder for receiving a plunger integral to the ram and the accidental operation of the ram.

Still another object of this invention is to provide an impact forming machine in which a mechanism for converting the rotating power to linear driving movement is provided for returning the ram in a highly velocity.

Still another object is to provide an impact forming machine in which the valve for opening and closing a communication between the gas pressure chamber and the cylinder is preferably and automatically controlled.

Still another object is to provide an impact forming machine in which the ram is held safely upwards during the time the valve closes.

Still another object is to provide an impact forming machine in which the ram is returned upwards automatically by mechanical force in high speed.

Still another object is to provide an impact forming machine in which the ram is easily and automatically initiated to force downwards.

Still another object is to provide an impact forming machine in which the valve for communicating between the gas chamber and the cylinder is easily and automatically controlled.

A further object of this invention is to provide an impact forming machine in which the valve is adapted to close automatically while the plunger and cylinder of the combined plunger-cylinder assembly are contacting each so as to remove the accidental descent of the ram.

Still another object of this invention is to provide an impact forming machine in which the valve is adapted to open automatically after the ram is ready to descend safely.

This invention provides a high speed returning impact forming machine employing gas pressure means in which machine a mechanism for converting the rotary motion to linear reciprocating movement is provided, by which mechanism the linear motion converted from the rotating movement is adapted to correspond to the driving direction of the ram, and the reciprocating motion thereof is transmitted to the returning member or the ram supporting member, thereby the ram is returned to its initial uppermost position through the member to which the extended portion upwards integrally from the top of the ram or a stem is hung. Thus, the impact forming machine in accordance with this invention is provided such that the ram is returned to its initial uppermost position by means of linear motion of the aforementioned mechanism such as a crank mechanism in high velocity after the impact forming operation has done, accordingly, the impact forming cycle is shortened in great degree. In addition, the cycle is made continuous operation and the efficiency of the operation is extremely improved in impact formation of the machine relative to this invention.

Moreover, this invention provides a novel and improved impact forming machine wherein part of the mechanical force, by which the ram is returned to its initial uppermost position is utilized in the operation for opening or closing a control valve of a ram driving gas pressure, thereby enabling the cooperation with the actuation of the ram and the further rationalization of the operational program in the impact forming machine according to this invention. The aforementioned control valve controls the flow of high pressure gas upon initiation of the ram on one hand, and it operates to shut off that in order to hold the ram in non-operation on the other.

In order to hold the ram returned to its initial uppermost position safe because of its importance so as to avoid the accidental operation of the ram in improper time when the ram is raised to its uppermost level caused by the adoption of the mechanical force to return the ram to its initial uppermost position, this invention also provides a high speed returning impact forming machine in which hydraulic pressure means is provided and which comprises a piston provided on the top of means for driving the ram supporting member, a cylinder for receiving the piston provided on the lowermost portion of the member, communications bored longitudinally alongwith the member, and conduits for connecting the ends of the communication and source of the hydraulic pressure, and is disposed between the top of the crank mechanism and the lowermost portion of the supporting member, thereby operating so that the crank mechanism for driving the supporting member move further upwards to the top during a little while after the ram integral to the supporting member has reached. Thus, this invention eliminates the drawback in the cylinder received by the plunger integral to the ram and the accidental descent of the ram.

Further, this invention also provides the impact forming machine in which the valve for controlling the flow of the high pressure gas between the gas pressure chamber and the cylinder for receiving the plunger, is effected to open after the ram supporting member descend sufficiently by means of the cam mechanism so as not to be disturbed to effect its impact forming operation.

Other objects and advantages of this invention will further become apparent hereinafter, and from the drawings.

Brief description of the drawings

FIGS. 1 through 6 are sectional side elevations of a high speed returning impact forming machine. In accordance with a preferred embodiment of the present invention showing explanatory in its operational order;

FIGS. 7 and 8 are graphs of operational curve of respective parts in impact forming operation.

Description of the preferred embodiment

Although specific forms of the invention have been selected for illustration in the drawings, and the following description is drawn in specific terms for the purpose of describing those forms of the invention, this description is not intended to limit the scope of the invention, which is defined in the claims.

Referring now to the drawings, and particularly to FIGS. 1, 2, 3, 4, 5 and 6, a high speed returning impact forming machine comprises a gas pressure chamber **1** containing high pressure gas charged therein, a ram **2** adapted to pass into the interior of the chamber from the bottom wall thereof, a plunger **3** formed on the uppermost end of the ram **2**, a cylinder **4** constructed inside the uppermost wall of the chamber **1** so as to receive the plunger **3**, conduits **5** and **6** connected between the upper portion of the chamber **1** and the uppermost portion of the cylinder **4** through a valve **7**, a rod **8** projecting vertically upwards from the plunger **3** integrally for supporting the ram **2** by hanging a head **9** formed on the top of the rod or stem **8** through a ram supporting member or moving frame **10** so that the rod **8** communicates through an opening **11** for the head **9** so as to be through above the opening **11**, the diameter of the head **9** being larger than that of the opening **11** so as to hang the ram **2** integral with the rod **8**, a crankshaft **12** driven by any conventional source of power (not shown), in the embodiment shown in the drawings two crankshafts **12** being disposed so as to drive the ram supporting member **10** from opposite sides, respectively, two connecting rods **13** connected to the crankshafts **12** at respective ends, two crossheads **14** connected to the rod **13** at respective ends, thereby when the crankshafts are driven the supporting member **10** moves reciprocally upwards and downwards in response to the

rotation of the shafts **12** through the connecting rods **13** and crossheads **14**, respectively, hydraulic pressure means **15** comprising hydraulic pressure cylinders **16** constructed at the respective lowermost portions of the supporting member **10** bored thereinside, hydraulic pressure pistons **17** adapted to mount on the tops of the crossheads **14**, passages **18** provided inside through the member **10** from the tops of the hydraulic cylinders **17** to the tops of the member from which conduits **19** are connected to the hydraulic pressure source (not shown) so as to provide the hydraulic pressure inside the hydraulic cylinders **17** to support the ram supporting member **10** when the supporting member is returned by means of the crankshafts **12**.

In operation of the above mentioned machine, since high pressure gas is enclosed inside the gas pressure chamber **1**, the plunger **3** is pressed to the uppermost position of the cylinder **4** when the ram **2** is disposed in the upper position so that the ram **2** is held in upper level by the effect of the pressure in the chamber **1** to the lower surface thereof. Furthermore, when the ram **2** is initiated to lower downwards by flowing the high pressure gas in the chamber **1** through the conduits **5** and **6**, and the valve **7** into the upper portion of the cylinder **4** so that the upper surface of the plunger **3** falls downwards lower than the lower surface of the cylinder **4**, the pressure of the chamber **1** effects immediately upon the upper surface of the plunger **3** so as to descend the ram **2** in very high speed, thereby forming the material in the mould in the impact forming machine. And, the ram **2** once lowered as mentioned above is forced back so as to be lifted back upwards when the crank **12** is revolved further so as to raise the ram **2** through the connecting rods **13**, the crossheads **14** and the stem **8** integral to the head **9** thereupon, the ram supporting member **10**, and the hydraulic pressure means **15** so that the supporting member hangs up the head **9** through the opening **11** of the supporting member **10**. Since compression is produced in the cylinder **4** when the ram **2** is returned upwards, immediately after the plunger **3** is inserted into the cylinder **4**, this compressed gas must be flown back to the pressure chamber **1** through the conduits **6** and **5** and the valve **7**.

In FIG. 1, illustrates the state immediately before the impact forming machine initiate to form its operation in which state a movable frame **10***a* is balanced at the normal position (designated by line A in FIG. 7) between the weight itself and a cushion **26**. The ram **2** is held at the uppermost position by the high pressure of the gas in the chamber **1** which pressure is acted on the lower surface of the plunger **3** (ram held upwards in FIG. 1, and designated by numeral I in FIG. 7). At this time, by the crank **12** the ram supporting member **10** is just on the way to fall downwards. The valve **7** is, of course, close (illustrated by line C in FIG. 7). At that time, a cam **20** is adapted to push upwards a valve stem **21** of the valve **7** so as to open the valve **7** (designated by numeral **0** in position in FIG. 7), thereby the high pressure gas in the chamber **1** is introduced to the upper portion of the cylinder **4** through the conduits **5** and **6** and the valve **7**, which initiate to start to lower the ram **2** downwards. When the upper surface of the plunger **3** falls to separate from the lower surface of the cylinder **4**, the high pressure gas immediately operate to push on the upper surface of the plunger **3** so that the ram **2** is forced to fall downwards in very high speed to operate its impact forming (forming in FIG. 2, and designated by numeral II in FIG. 7). At this time, simultaneously with the fall of the ram **2** by its reaction the movable frame **10***a* moves upwards in height H from the normal position or level A, thereafter immediately descends, and further falls down proper amount from the normal level A. Thereafter, it returns immediately to the normal level A. This bound of the movable frame **10***a* is effected because it is supported by the cushion **26** in a movable state.

FIG. 3 illustrates the state that the ram **2** initiates to return (ram on the way upwards in FIG. 3 and designated by numeral III in FIG. 7).

While the ram **2** returns, the valve **7** maintains to open, thereby the high pressure gas enclosed in the cylinder **4** of the pressure chamber **1** is flown back through the conduits **5** and **6** and the valve **7** to the chamber **1**. When the plunger **3** of the ram **2** is inserted fully upwards inside the cylinder **4** so as to complete the return of the ram **2**, the ram **2** is in a state that it is integral to the movable frame **10***a* (ram returned completely in FIG. 4, and designated by numeral IV). At this point the crank **12** is not yet reached to the initial uppermost position, and the ram **2** continue to raise further in the rested stroke D. Therebetween, the cam **20** is adapted to close so as to shut off the conduits **5** and **6** in order to keep its safe state (crank in its uppermost position in FIG. 5, and illustrated by numeral V in FIG. 7).

Thus, during the stroke D until the crank **12** reaches its uppermost position, the cranks **12** are allowed to raise further in a state that the ram **2** holds in its uppermost position. Therebetween, the closing operation of the valve **7** is positively done. Thereafter, the cranks **12** initiate its down stroke. Thus, even if the ram **2** is not held in its uppermost position, the high pressure gas in the chamber **1** is not permitted to flow back through the conduits **5** and **6** and the valve **7** so as to effect upon the upper surface of the plunger **3** so that the ram **2** may not be operated accidentally to descend downwards.

Assuming that the valve **7** is open or is not closed completely immediately after the ram **2** reaches its initial uppermost position so as to lower the supporting member **10**, the high pressure of the chamber **1** flown back through the conduits **5** and **6** and the valve **7** effects to actuate upon the upper surface of the plunger **3** so that it initiates to descend the ram **2** accidentally causing its dangerous operation.

However, as was described hereinbefore, when the supporting member **10** of the ram **2** reciprocates up and down by means of a mechanical force such as the crank **12**, it moves downwards or in such a direction that it separates from the ram **2** immediately after it reaches its initial uppermost position so that it removes the supporting operation of the ram **2**. Accordingly, the valve **7** must be closed immediately after the supporting member **10** reaches its uppermost position. If the valve **7** closes before the ram reaches its uppermost position, the gas enclosed in the cylinder **4** cannot return through the conduits **5** and **6** and the valve **7** to the chamber **1**. Furthermore, the plunger **3** of the ram **2** is not yet reached to its uppermost position or its inner uppermost position, accordingly the compression occurs in the cylinder **4** by the plunger **3**. Also, if the valve **7** closes in some delay after the ram **2** arrives at its uppermost position, the gas flown back through the conduits **5** and **6** and the valve **7** initiate to operate accidentally the ram **2**, since the supporting member **10** initiate to descend before the valve **7** closes. From the reason described hereinbefore, it will be understood by those skilled in the art that it is very important to adapt for the crank **12** to be able to further raise its stroke D even after the ram **2** reaches to its uppermost position relative to the movable frame **10***a*.

When the crank **12** initiates to descend after it reaches its uppermost position, the movable frame **10***a* falls down together with the ram **2** by its weight so as to balance with the cushion **26** to stop at the normal position A (frame descended completely in FIG. 6, and illustrated by numeral VI in FIG. 7), since the supporting member **10** initiates to descend in a state that the ram **2** integral to the stem **8** is left from the member **10** without any further support. The cranks **12** will further descend, accordingly the supporting member **10** continues to de-

scend so as to return to its initial state shown in FIG. 1.

As was described hereinbefore, in the system that is operated by the supporting member **10** for reciprocating the ram **2** by means of the mechanical force such as the cranks **12**, since the supporting member **10** initiate to remove its supporting operation immediately after it reaches the uppermost position of the ram **2**, special attention must be paid so as to close the valve **12** at its moment. If its timing does not correspond, the ram **2** is not held stably, causing this machine which operates by means of great amount of energy to incorporate extreme danger.

This invention eliminates the aforementioned danger and provides the impact forming machine which has no dangerous state. As mentioned hereinbefore, when the supporting member **10** for returning the ram **2** is driven reciprocally by the cranks **12**, by interposing the hydraulic pressure means **15** for operating so as to push away each other between the supporting member **10** and the crosshead **14** without direct connection therebetween, in the stroke until the cranks **12** raise the supporting member with the ram **2** through the connecting rods **13** and the crosshead **14** upto its uppermost position, the crank **12** pushes upwards the supporting member **10** through the hydraulic pressure of the hydraulic pressure means, whereas for a little while after the supporting member **10** reaches its uppermost position together with the ram **2** the cranks **12** compresses the hydraulic pressure in the hydraulic pressure means **15** so as to further advance so that the supporting member **10** is held at its uppermost position, and on the way of the holding stroke the valve **7** is adapted to close therebetween. In accordance with this means as an embodiment of this invention, since the valve **7** is adapted to close for a little while that the supporting member **10** is held stationary at the uppermost position of the ram **2**, the ram **2** is held to be stable at its uppermost position without any fear of happening drawback inside the cylinder **4** adapted to receive the plunger **3** mounted on the top of the ram **2** or initiating the ram **2** accidentally immediately after the supporting member **10** is returned to its uppermost position. That is, if the hydraulic pressure is applied to the top of the cylinder **16** from the source of the hydraulic pressure enough to overcome the force required to return the ram **2**, the pressure effects to push upwards the supporting member **10** so as to return the ram **2** to the uppermost position without reducing its volume of the fluids in a state as compressed, when the crankshaft **24** is driven to rotate so as to push upwards the connecting rods **13** and the crosshead **14** (illustrated by numeral I in FIG. 7). At this time, the valve **12** is still open, and the pressure inclined to enclose in the cylinder **4** is returned through the conduits **5** and **6** and the valve **7** into the chamber **1**. Thus, when theram **2** reaches its uppermost position (designated by numeral II in FIG. 7), the supporting member **10** also reaches its uppermost position. However, the connecting rod **13** and crosshead **14** with the crank **12** still have a little amount of its raising stroke (illustrated by numeral III in FIG. 7), from this time the hydraulic pressure in the hydraulic pressure means flows back through the hydraulic pressure conduit **19** by compression so as to reduce its volume, accordingly only the crosshead **14** and the hydraulic pressure piston **17** with connecting rods **13** driven by the cranks **12** raise in the stroke III illustrated in FIG. 7 in a state that the supporting member **10** is held its uppermost position. Therefore, the connecting rods **13** with the crank and crosshead moves along with the solid line illustrated in FIG. 7, whereas the supporting member **10** temporarily stops at its uppermost position illustrated by numeral II such as shown by the dotted line in FIG. 7, therebetween the ram **2** is held its uppermost position. Accordingly, if the valve **7** is adapted to close at any point during this holding stroke III (illustrated by IV in FIG. 7) by means of the cam **20**, the drawback of the high pressure gas caused by the early closing of the valve **7** in the cylinder **4** or accidental initiation of the operation of the ram **2** caused by the delayed closing of the valve **7** by flowing into the cylinder **4** of the high pressure gas in the chamber **1** is completely removed. Therefore, the valve **7** is adapted to close smoothly without any impact with the sufficient time in no harry during the holding stroke III.

Further, the valve **7** opens at the point that the supporting member **10** descends sufficiently (illustrated by numeral V in FIG. 7), and the high pressure gas effects to operate upon the upper surface of the plunger **3** so as to initiate to start to descend the ram **2**. In order that the opening and closing of the valve **7** is effected to operate accurately and positively at a predetermined point in periodic time, a rotating shaft **21** of the cam **20** is adapted to be driven by a driving shaft **27** of the cranks **12** through sets of gears **23** and **24** by any conventional source of power as shown in the drawings. The driving mechanism of the ram **2** by the high pressure gas is not limited by that shown in the drawings, any preferable mechanism can be used by those skilled in the art.

What is claimed is:

1. High speed returning impact forming machine comprising a gas pressure chamber containing high pressure gas, a ram adapted to be actuated at a high speed by gas pressure in said chamber, a plunger provided on said ram, a cylinder for receiving said plunger provided on the top wall of said chamber, a valve for communicating the flow of said gas pressure between said chamber and said cylinder of each other, conduits for connecting between the upper portion of said cylinder and said chamber, a stem longitudinally extended upwards from the top of said ram having a head on the top. A ram supporting member driven laterally for raising and releasing said ram, means for driving laterally up and down said member, hydraulic pressure means disposed between on the top of said means for driving said member and the lowermost portion of said member, and means for driving said valve open or close, said means for driving said valve being operated so that it closes immediately after said plunger contacts said cylinder, said hydraulic means being so operated that said means for driving said member further move upwards to the top during a predetermined time after said ram integral to said member has reached its uppermost position.

2. High speed returning impact forming machine as set forth in claim **1**, in which said stem is interposed through a hole provided with the top wall of said member, thereby said member are capable of supporting said ram through said stem hang with the head mounted thereon.

3. High speed returning impact forming machine as set forth in claim **1**, in which said hydraulic pressure means comprises a piston provided on the top of said means for driving said member, a cylinder for receiving said piston provided on the lowermost portion of said member, passages bored longitudinally along with said member and conduits for connecting the ends of said passages and hydraulic pressure source.

4. High speed returning impact forming machine as set forth in claim **1**, in which said means for driving said member comprises a crankshaft, a connecting rod rotatably secured to said shaft at its one end, a crosshead pivotally connected at its one end to the uppermost end of said rod and provided with said piston on the top thereof.

5. High speed returning impact forming machine as set forth in claim **1**, in which said means for driving said valve comprises a cam for moving a valve stem open or close, sets of gears disposed between said cam and power source.

6. High speed returning impact forming machine as set forth in claim **1**, in which when the ram is disposed in its uppermost position, said plunger is disposed so deep in the cylinder that the pressure of said chamber

urges on the lower surfaces thereof to maintain it in the upper position.

7. High speed returning impact forming machine as set forth in claim 1, in which said crank driven by a predetermined power source is so disposed to raise back said supporting member from its bottom dead point through said stem extended integrally from the top of said ram.

8. High speed returning impact forming machine as set forth in claim 1, in which said cylinder and gas pressure chamber are communicated with each other by means of a valve which opens only to said gas pressure chamber, thereby forcing down said ram.

9. High speed returning impact forming machine as set forth in claim 1, in which said cylinder and gas chamber are communicated with each other by means of a valve and in which the gas pressure of said gas pressure is introduced into said cylinder for actuating said ram.

10. High speed returning impact forming machine as set forth in claim 1, in which said valves are provided to open until said plunger contacts said cylinder, thereafter to close.

11. High speed returning impact forming machine as set forth in claim 1, in which said hydraulic means are disposed between said crosshead and said supporting member.

12. High speed returning impact forming machine as set forth in claim 1, in which said hydraulic means are

adapted to be filled with fluid whereby said crank further moves upwards to the top during a predetermined time after said ram reaches its uppermost dead point.

13. High speed returning impact forming machine as set forth in claim 1, in which said valve is adapted to close for a period that said ram is held at its uppermost dead point.

14. High speed returning impact forming machine as set forth in claim 1, in which said valve is adapted to open when said supporting member descends to a predetermined lower position.

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