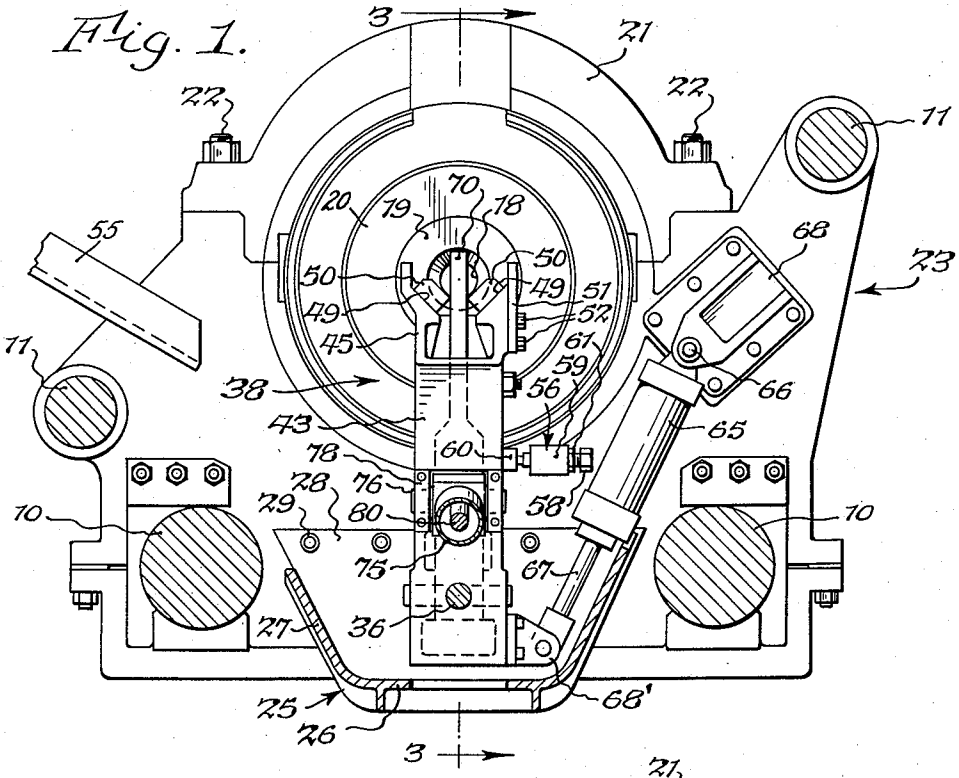
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BILLET LOADER

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Fig. 1.



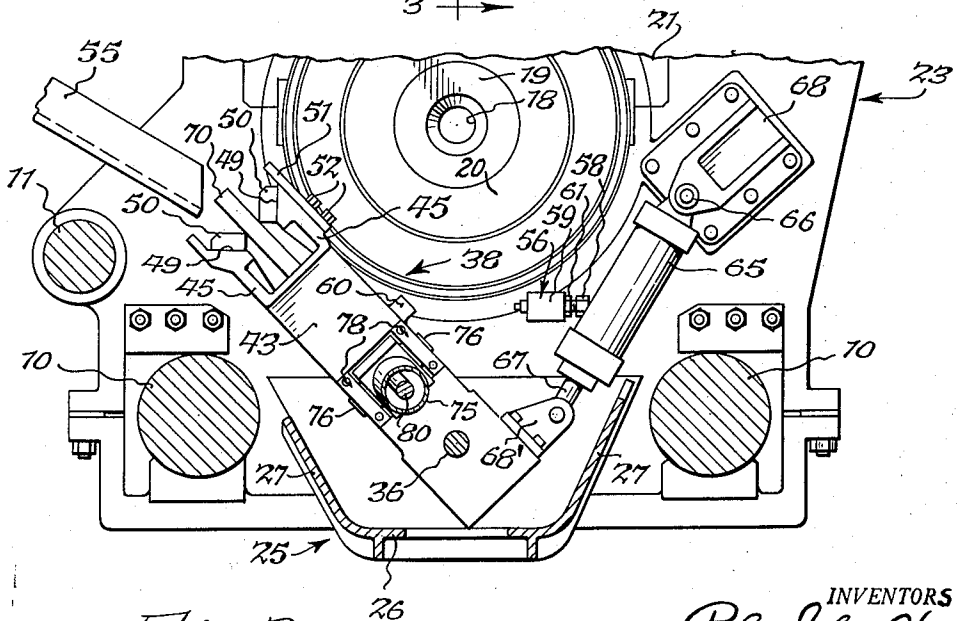




Fig. 2.

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BILLET LOADER

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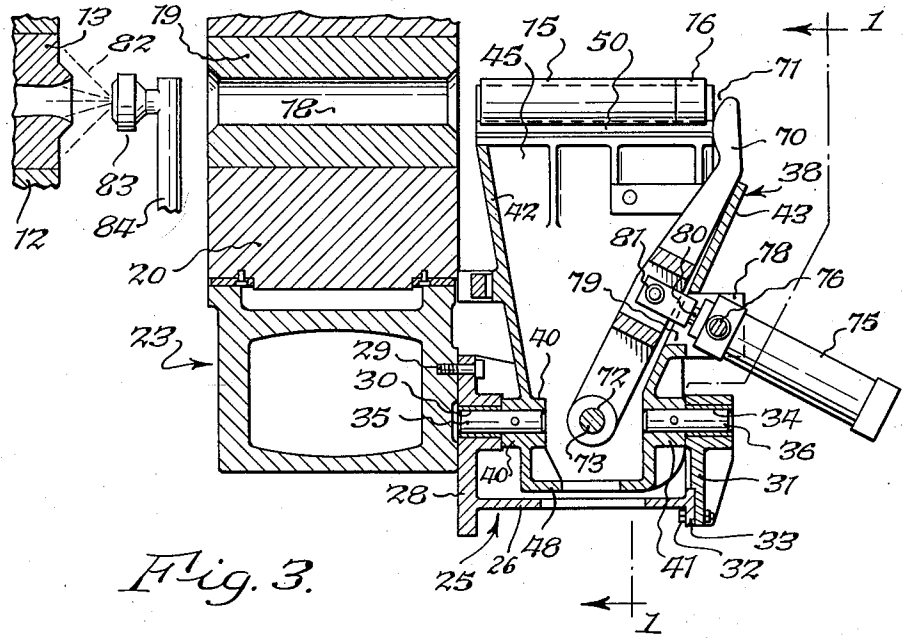



Fig. 3.

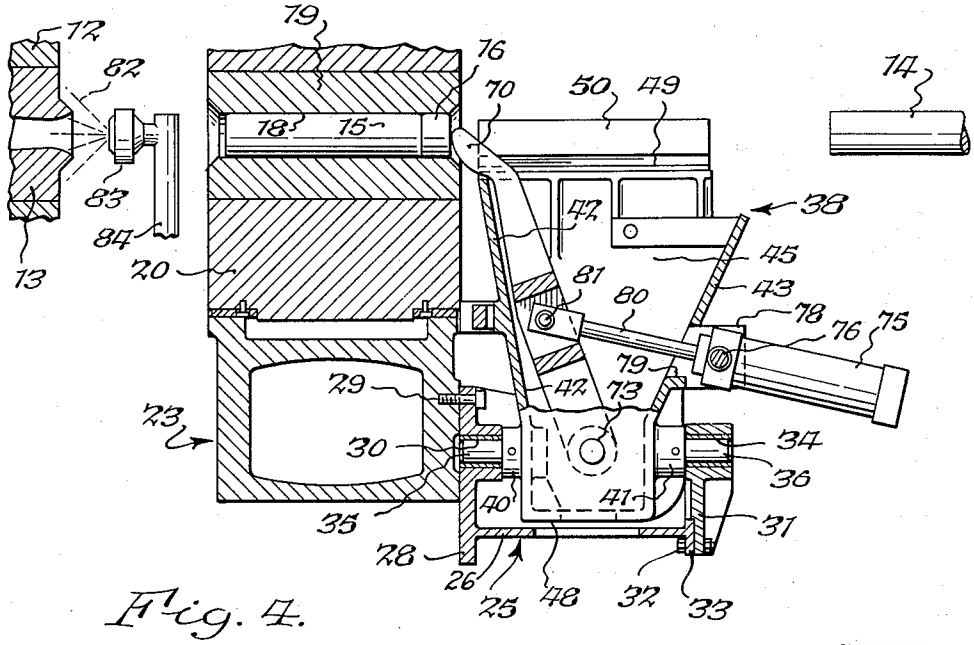



Fig. 4.

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BILLET LOADER

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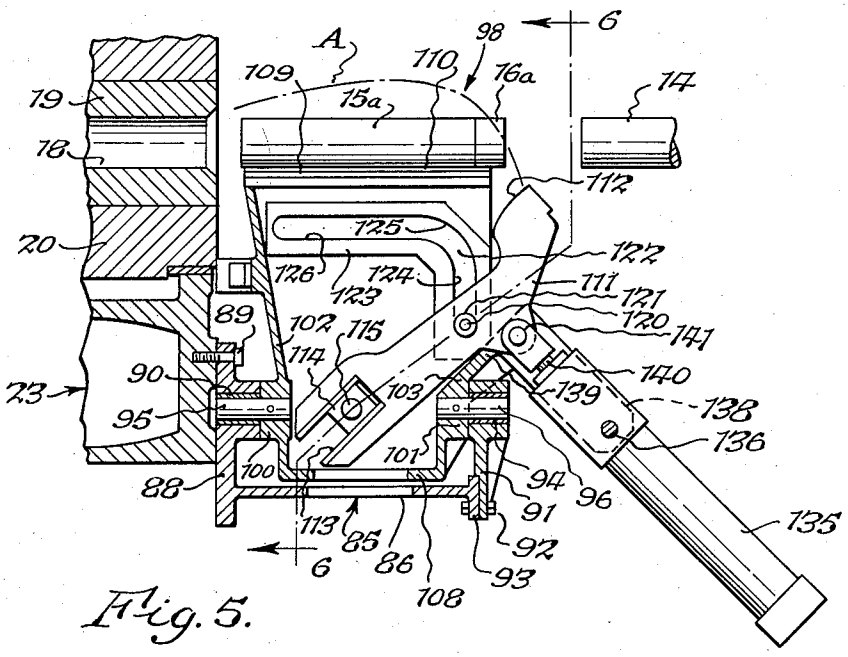



Fig. 5.

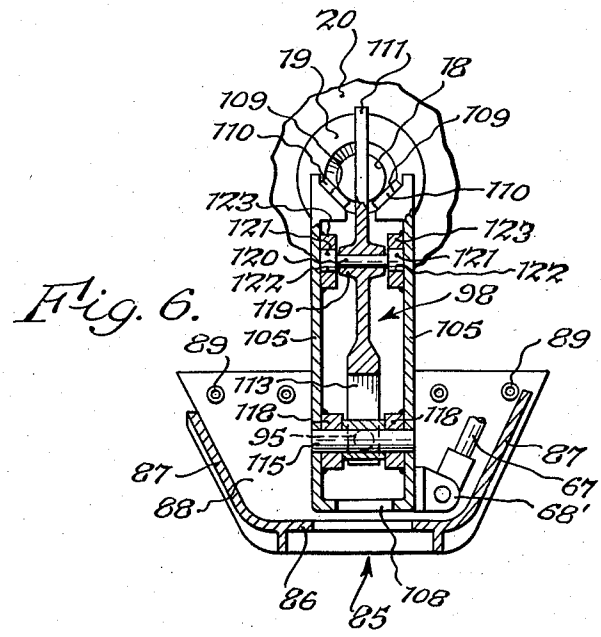



Fig. 6.

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2,919,039

# BILLET LOADER

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Application May 25, 1955, Serial No. 510,921

4 Claims. (Cl. 214—1)

This invention relates to a billet loader for an extrusion press and more particularly to an extrusion press having a movable billet container which is brought into and out of contact with the die and which is provided with a bore communicating with the opening in this die, the billet, together with the usual dummy block, being placed axially in this bore of the billet container which bore is thereafter entered by the main plunger of the press so as to force the billet through the opening in the die.

A feature of the invention is that the billet loader forming the subject of the present invention is mounted on the billet container to move therewith and is adapted to receive the billet, together with any dummy block or the like, at one side of the extrusion press, as from a chute; to swing the billet and the dummy block into axial alinement with the bore through the billet container; to thereafter move the billet and its dummy block axially into the bore; and to then withdraw to its initial position at one side of the extrusion press so that the main plunger can advance and enter the bore without interference from any part of the billet loader.

It is the principal object of the present invention to provide a billet loader which loads the billet into the billet container while other functions of the press are being performed thereby to speed up the extrusion cycle of the press and increase its capacity. More in particular, the billet feeder of the present invention is operative while the die is being sprayed to clean and cool the die.

It is another principal object of the invention to provide such a billet loader which is so operative during the die cleaning and die cooling operations and which moves the billet, together with any dummy block or the like, laterally into alinement with the bore of the billet container and then axially into this bore so that the entire transfer of the billet from a point to one side of the extrusion press into the bore of the billet container is effected exclusively by the billet loader.

Another object of the invention is to provide such a billet loader which is so operative during the die cleaning and die cooling operations of the press and which is of simple construction and composed of few parts having simple bearings so as to function under conditions of severe and constant use without getting out of order or requiring repairs.

Another object of the invention is to provide such a billet loader which functions with two simple hydraulic pistons, the one being used to move the billet laterally to proper alinement with the bore of the billet container and the other being used to move the billet axially into the bore.

Another object of the invention is to provide such a billet loader which is adaptable to conventional extrusion presses.

Another object is to provide a modified form of billet loader which can be used to feed billets of the same size in presses having a shorter stroke and smaller daylight opening than would otherwise be possible or, conversely, can be used with longer billets in the same size press.



Other objects and advantages of the invention will be apparent from the following description and drawings in which:

Fig. 1 is a vertical, transverse section through an extrusion press and showing, partly in elevation, a billet and dummy block loader embodying the present invention, the loader being shown in position to insert the billet and dummy block into the container for the billet.

Fig. 2 is a fragmentary view similar to Fig. 1 and showing the billet and dummy block loader in position to receive a billet and dummy block from a side chute.

Fig. 3 is a fragmentary vertical section taken generally on line 3—3, Fig. 1, and showing the billet and dummy block injecting arm in position to commence transfer of the billet and dumy block into the billet container of the extrusion press.

Fig. 4 is a view similar to Fig. 3 and showing the position of the parts of the completion of the feeding stroke of the arm which pushes the billet and dummy block into the billet container.

Fig. 5 is a fragmentary view similar to Fig. 3 and showing a modified form of the invention and which is adapted for loading longer billets than can be loaded with the form of the invention shown in Figs. 1–4.

Fig. 6 is a fragmentary section taken generally on line 6—6, Fig. 5.

Both forms of the invention can be used in conjunction with extrusion presses of various forms, the one illustrated in the accompanying drawings being shown as including a pair of large horizontal columns **10** and a pair of upper horizontal columns **11**. At one end these horizontal columns connect with a stationary die platen (not shown) which carries a movable holder **12** for the die **13** of the extrusion press. At their other ends, these horizontal columns **10** and **11** connect with the usual stationary cylinder platen (not shown) which carries the main ram of the extrusion press of which the main plunger **14** is shown. Since the manner of mounting the die **13** on the die platen, and the manner of mounting the main plunger **14** in the cylinder platen form no part of the present invention, these mountings and platens have not been illustrated, the die **13** and main plunger **14** being in axial alinement and the main plunger **14** serving to force the metal from a billet **15** through the die **13** in order to produce the extruded part. In this operation, the billet **15** is shown as backed by the usual dummy block **16**.

In so extending the billet **15** through the die **13**, it is inserted into the through bore **18** of a billet container **19**, this bore being arranged axially in line with both the main plunger **14** and the opening through the die **13**, the main plunger **14** entering the bore **18** to force the metal of the billet **15** through the opening in the die **13**. The billet container **19** is mounted in a billet container holder **20** which is in turn secured by an arching clamp **21** and studs **22** to a cross head **23**. This cross head is movable lengthwise on the horizontal columns **10** and **11** so that the billet container **19** can be moved into and out of engagement with the die **13**, the disengaged position of these parts being shown in Figs. 3 and 4.

Both forms of billet loaders forming the subject of the present invention are mounted on this cross head **23** which carries the billet container **19** and which is movable along the horizontal columns **10** and **11**. This mounting of the billet loader permits the billet loader to operate while other functions of the press are being performed, particularly the cleaning and cooling of the die, thereby to speed up the extrusion cycle of the press and increase its capacity.

The form of billet loader illustrated in Figs. 1–4 is shown as including a base casting 25 which is of U-shaped or trough form in cross section as shown in Figs. 1 and 2 and which has a bottom wall 26 and upwardly divergent side walls 27 and which also has an integral end wall or attaching head 28 which is secured, as by screws 29, to that face of the cross head 23 which faces the main plunger 14. This base 25 for the billet holder is arranged below and in the same vertical plane as the axis of the main plunger 14 and through bore 18 of the billet container 19, and it is provided with a bearing 30 which is arranged in this plane and the axis of which is parallel with the axis of the main plunger 14 and through bore 18 of the billet container 19. The base 25 of the billet loader is provided with a removable end head 31 at its end opposite the attaching end head 28, this removable end head being shown as secured by bolts 32 to a flange 33 provided at the outboard ends of the bottom and side walls 26, 27. The removable end wall 31 carries a bearing 34 which is axially in line with the bearing 30.

The bearings 30 and 34 support the oppositely projecting stub shafts 35 and 36 of the swing billet holder indicated generally at 38. The stub shafts 35 and 36 are shown as projecting from bosses 40 and 41 projecting from end walls 42 and 43 of the billet holder 38, the end wall 43 being shown as inclining upwardly and toward the main plunger 14 as illustrated in Figs. 3 and 4. These end walls 42 and 43 of the billet holder are shown as connected by generally parallel side walls 45 and a bottom wall 48, each of these side walls projecting above the end walls 42, 43 and severally having inclined faces 49 which are shown as arranged at a 90° angle to each other to provide a trough or cradle for receiving the billet 15 and its dummy block 16. These surfaces 49 are each faced with a face block 50 which contacts and supports the billet and the dummy block, and the upper extremity of one side wall 45 is in the form of a plate 51 removably secured by bolts 52.

The billet holder 38 is swung about its bearings 30, 34 from the inclined receiving position shown in Fig. 2. In this receiving position the cradle formed by its face blocks 49 is in line with a chute 55, down which the billet 15 and its dummy block 16 is supplied to this trough. After being so supplied with the billet 15 and its dummy block 16, the billet holder 38 is swung in its bearings 30 and 34 to the vertical position shown in Figs. 1, 3 and 4 which position is determined by an adjustable stop 56. This stop is shown as comprising a stop screw 58 working in a boss 59 which is fast to the cross head 23 and the screw being horizontally disposed and having one end projecting toward the billet holder and engaging a stop boss 60 in the upright position of the billet holder as shown in Fig. 1. A locknut 61 can fix the adjustment of the stop screw 58.

The mechanism for so swinging the billet holder from the angular billet receiving position shown in Fig. 2 to the upright billet position shown in Figs. 1, 3 and 4 is preferably constructed as follows:

The numeral 65 represents a cylinder pivoted at 66 to an anchoring plate 68 which is suitably secured to the cross head 23 so that the axis of the pivot 66 is parallel with the axis of the bearings 30 and 34. The cylinder contains a piston the rod 67 of which is pivotally connected to a pair of ears 68′ projecting from the corresponding side of the billet holder 38 and arranged to one side and below the axis of the bearings 30 and 34. It will be seen that by introducing fluid pressure in the upper end of the cylinder 65, the billet holder 38 is swung about its bearings 30 and 34 from the position shown in Fig. 2 to the position shown in Fig. 1 and that by introducing fluid pressure in the bottom of the cylinder 65 this billet holder 38 is swung from the vertical position shown in Fig. 1 to the angular position shown in Fig. 2.

After the billet 15 and its dummy block 16 have been fed to the cradle provided by the blocks 50 and after the billet holder 38 has been swung to the erect position shown in Figs. 1, 3 and 4 so that the billet 15 and its dummy block 16 aline with the through bore 18 of the billet container 19, means are provided for moving the billet 15 and its dummy block 16 axially from its cradle in the upper part of the billet holder 38 into the bore 18. These means are preferably constructed as follows:



The numeral 70 represents a transfer arm or finger, the upper end of which is adapted to pass between and be guided by the face blocks 50 which form the cradle for the billet 15 and its dummy block 16. The edge of the arm 70 which opposes and engages the cradled dummy block 16 is also preferably rounded, as indicated at 71 so as to have no tendency to displace this dummy block from its cradle. The lower end of the arm or finger is formed to provide a bearing 72 which is journalled on a cross pin 73. The axis of this cross pin 73 is shown as intersecting the axis of the bearings 30, 34 but arranged horizontally and at right angles thereto.

The numeral 75 represents a cylinder which is journalled, as indicated at 76, between a pair of ears 78 projecting horizontally from the end wall 43 of the billet holder 38 on opposite sides of an opening 79 through this end wall. The axis of the journal 76 is parallel with the cross pin 73 and the cylinder 75 contains a piston the rod 80 of which pivotally connects, as indicated at 81, with the central part of the transfer finger or arm 70. The axis of the pivot 81 is parallel with the axes of the pivots 73 and 76 and it will therefore be seen that upon introducing fluid under pressure to the outboard end of the cylinder 75, the piston rod 80 will be driven out of this cylinder so as to move the transfer finger or arm 70 from the position shown in Fig. 3 to the position shown in Fig. 4. Conversely, upon introducing pressure into the pivoted end of the cylinder 75, the piston rod 80 will be retracted to move the transfer finger or arm 70 from the position shown in Fig. 4 to the position shown in Fig. 3.

A feature of the invention is that the billet loader is operative while the container 19 is withdrawn and spaced from the die 13 and while this die is being sprayed from the space between the container and die to clean and cool the same. This cleaning and cooling spray, indicated at 82, Figs. 3 and 4, is shown as issuing from a nozzle 83 at the end of a swinging arm 84, this arm being mounted to swing the nozzle 83 into and out of operative position between the die 13 and container 19 as the cross head 23 is moving away from and toward the die 13 and to play the spray 82 against the die 13 while the container 19 and die 13 are spaced apart. During this die cleaning and cooling interval the billet loader is loading the billet 15 into the bore 18 of the container 19.

The operation of the extrusion press having a billet loader made in accordance with the form of the invention shown in Figs. 1–4 is as follows:

In preparation for receiving the billet 15 and dummy block 16, pressure has been introduced into the pivoted end of the cylinder 75 so that the piston rod 80 is withdrawn into the cylinder and so that the transfer finger or arm 70 is retracted against the wall 43, this position of this arm or finger being illustrated in Fig. 3. Pressure has also been introduced into the free end of the cylinder 65 so that its piston rod 66 is withdrawn into the cylinder 65 and the billet holder swung about its bearings 30, 34 to the angular position shown in Fig. 2. The arm 84 carrying the spray nozzle 83 has also been moved in line with the die 13 and fluid introduced into the arm 84 to form the spray 82 against the die 13. It is a feature of the invention that this spray 82 is operative to clean and cool the die 13 during the billet loading operation so that both these operations are performed at the same time thereby to shorten the extrusion cycle of the press.

In this angular position of the billet holder 38 shown in Fig. 2, the cradle formed by the blocks 50 at the upper end of the billet holder 38 are in line with the bottom of

the chute 55. A billet 15 and a dummy block 16 are then rolled down the chute and consequently into the cradle provided by these blocks 50. Fluid pressure is then introduced into the pivoted end of the cylinder 65. This drives the piston rod 67 outwardly and hence rotates the billet holder clockwise in its bearings 30, 34 from the position shown in Fig. 2 to the position shown in Fig. 1. This latter position is determined by engagement of the stop boss 60 with the adjustable stop screw 58. This screw has been set so that the billet holder 38 is stopped when the billet 15 carried by the cradle blocks 50 is in axial alinement with the bore 18 of the billet container 19.

Fluid pressure is then introduced into the free end of the cylinder 75. This projects the piston rod 80 from the cylinder thereby to swing the billet transfer finger or arm 70 about the axis of the pivot pin 73 from the position shown in Fig. 3 counter-clockwise to the position shown in Fig. 4. In this movement, the rounding end 71 of the billet transfer arm engages the end face of the dummy block 16 and hence slides both the dummy block and also the billet 15 axially along the cradle formed by the blocks 50 into the bore 18.

Before the main plunger 14 can advance, it is essential that the parts of the billet loader forming the subject of the present invention be out of the way. Accordingly, the next step is to introduce fluid pressure into the pivoted end of the cylinder 75 and the outer or free end of the cylinder 65. This fluid introduced into the cylinder 65 serves to retract the piston rod 80 and bring the transfer arm 70 to the retracted position shown in Fig. 3. Fluid so introduced into the piston 65 serves to retract its piston rod 67 and hence swing the entire billet holder 38 counterclockwise from the position shown in Fig. 1 to the position shown in Fig. 2.

While the billet holder is so swinging to the position shown in Fig. 2, the supply of liquid forming the spray 82 is cut off and the arm 84 carrying the spray nozzle 83 is swung away from between the die 13 and container 19. The cross head 23 then moves to the left as viewed in Figs. 3 and 4 so as to bring the container 19 into engagement with the die 13.

The main plunger 14 of the extrusion press then advances, engages the dummy block 16 and applies extrusion pressure to the end of the billet 15 so as to force it through the opening of the die 13 thereby to produce an extruded form of the desired cross sectional shape. Following this, the main plunger 14 is withdrawn, the extruded form cut off and the cross head 23 moved along the horizontal columns 10 and 11 to the right as viewed in Figs. 3 and 4 so as to space the die 13 from the container 19 as shown in Figs. 3 and 4. While this cross head 23 is so being moved to establish the space between the die 13 and container 19, the arm 84 is moving to bring the spray nozzle 83 between the die 13 and container 19 following which pressurized fluid is introduced into the arm 84 to create the cleaning and cooling spray 82 which is directed against the die 13. The parts are now in the position assumed at the start of the description of operation and the cycle is repeated.

The form of billet loader shown in Figs. 5 and 6 is particularly designed for use, with billets of equal size, in a press having a shorter stroke and smaller daylight opening than is possible with the form of the invention shown in Figs. 1–4. Conversely, the form of billet loader shown in Figs. 5 and 6 can be used, with the same press, to load longer billets into the press.

The parts of the extrusion press shown in Figs. 5 and 6 are identical with the extrusion press shown in Figs. 1–4 and hence the same reference numerals have been applied. As with the billet loader shown in Figs. 1–4, an important feature of the invention is that it is mounted on the cross head 23 which carries the billet container 19 and which is moved horizonatlly lengthwise of the bore 18 in this billet container.



The billet loader is shown as including a base casting 85 which is of U-shaped or trough form in cross section as shown in Fig. 6 and which has a bottom wall 86 and upwardly divergent side walls 87 and which also has an integral end wall or attaching head 88 secured, as by screws 89, to that face of the cross head 83 which faces the main plunger. This base 85 for the billet holder is arranged below and in the same vertical plane as the axis of the bore 18 of the billet container 19, and it is provided with a bearing 90 which is arranged in this plane and the axis of which is parallel with the axis of the through bore 18 of the billet container 19. The base 85 of the billet loader is provided with a removable end head 91 opposite the attaching end head 88 and this removable end head is shown as secured by bolts 92 to a flange 93 provided at the outboard ends of the bottom and side walls 86, 87. The removable end wall 91 carries a bearing 94 which is axially in line with the bearing 90.

The bearings 90 and 94 support the oppositely projecting stub shafts 95 and 96 of a swinging billet loader indicated generally at 98. The stub shafts 95 and 96 are shown as projecting from bosses 100 and 101 projecting from end walls 102 and 103 of the billet loader 98, the end wall 103 being shown as inclining upwardly and toward the main plunger 14. These end walls 102, 103 of the billet loader are shown as connected by generally parallel side walls 105 and a bottom wall 108, each of these side walls projecting above the end walls 102, 103 and severally having inclined faces 109 which are shown as arranged at a 90° angle to each other for receiving the longer billet 15*a* and its dummy block 16*a*. These surfaces 109 are faced with a face block 110 which contacts and supports the billet and the dummy block.

The billet holder 98 is swung about its bearings 90, 94 by the same mechanism as with the form of the invention shown in Figs. 1–4 and of which the piston rod 67 and pair of ears 68' are shown.

The numeral 111 represents a transfer arm or finger, the upper end of which is adapted to pass between and be guided by the face blocks 110 which form the cradle for the billet 15*a* and its dummy block 16*a*. The edge 112 of the arm 111 which engages the cradled dummy block 16*a* is also preferably rounded so as to have no tendency to displace the dummy block from its cradle. The lower end of the arm or finger 111 is bifurcated to provide a parallel sided slideway 113, these parallel sides being arranged longitudinally of the arm or finger 111 and slidably engaging the opposite exterior faces of a bearing block 114. This block is journalled on a cross pin 115, the axis of this cross pin intersecting the axis of the bearings 90, 94 but arranged horizontally at right angles thereto. The bearing pin 115 is shown as being mounted in opposing bosses 118 welded to the inner faces of the side walls 105 as best shown in Fig. 6.

Near its center the arm or finger 111 is enlarged to provide a pair of opposite bosses 119 which support a cross pin 120 extending therethrough. A roller 121 is mounted at each end of this cross pin 120. Each roller 121 rides in a slot 122 provided in an L-shaped plate 123, this plate being welded to the inner face of the corresponding side wall 105 as best shown in Fig. 6. The slot 122 includes a vertical part 124 arranged above the stub shaft 96, a curving part 125 which curves from the upper end of the vertical part 124 toward the billet container holder 20 and a horizontal part 126 which forms a horizontal continuation of the curved part 125 and hence projects toward the container holder 20.

The numeral 135 represents a cylinder which is journalled, as indicated at 136, between a pair of ears 138 projecting from the end wall 103 of the billet holder 98 on opposite sides of a slot 139 in this end wall. The axis of the pin 136 is parallel with the cross pins 115 and 120 and the cylinder 135 contains a piston, the rod 140 of which pivotally connects, as indicated at 141, with the

central part of the transfer arm or finger **111**. The axis of the pivot **141** is parallel with the axes of the pivots **115**, **120** and **136** and it will therefore be seen that upon introducing fluid under pressure to the outboard end of the cylinder **135**, the piston rod **140** will be driven out of the cylinder so as to move the upper end transfer arm or finger **111** upwardly and to the left as viewed in Fig. 5. In such movement the rollers **121** ride successively along the vertical, curving and horizontal parts **124**, **125** and **126** of the groove **122**, this being permitted by the sliding connection between the arm or finger **111** and the bearing block **114** as well as by the pivotally mounting of this block upon the cross pin **115**. The line of movement of the upper end of the transfer arm or finger **111** is indicated by the dot-dash line A in Fig. 5.

As with the form of the invention shown in Figs. 1–4, in the operation of the form of the invention shown in Figs. 5 and 6, the loading of the billet **15***a* and dummy block **16***a* can take place while the container **19** is separated from the die **13** and while this die is being cleaned and cooled by the spray **82** of cleaning and cooling liquid issuing from the nozzle **83** on the swinging arm **84**.

In preparation for receiving the longer billet **15***a* and dummy block **16***a*, pressure has been introduced into the pivoted end of the cylinder **135** so that the piston rod **140** is withdrawn into the cylinder and so that the transfer arm or finger **111** is retracted against the wall **103**, this position of this transfer arm or finger being illustrated in Fig. 5. Also at this time the billet holder **98** has been swung about the axis of its stub shafts **95** and **96** to an angular position to one side of the billet container **19** and in which position a longer billet **15***a* and dummy block **16***a* can be placed in the cradle formed by the face blocks **50**, as by the chute **55** shown in Figs. 1 and 2.

As with the form of the invention shown in Figs. 1–4, an important feature of the invention is that while the billet loader is receiving the longer billet **15***a* and its dummy block **16***a* and while the billet loader is loading the billet and dummy block into the container **19**, this container **19** can be separated from the die **13** so that the die **13** can be cleaned as by the spray **82** issuing from the nozzle **83** on the swinging arm **84**. By this arrangement the billet loading and die cleaning can take place at the same time thereby very materially reducing the time required for each extrusion cycle and hence materially increasing the capacity of the press.

Accordingly, while the die **13** is so being cleaned, fluid pressure is applied to force the piston rod **68** longitudinally in the direction to swing the billet holder **98** about its bearings **90**, **94** into the vertical position illustrated in Figs. 5 and 6. In this position the longer billet **15***a* carried by the cradled blocks **110** is in axial alinement with the bore **18** of the billet container **19**.

Fluid pressure is then introduced into the free end of the cylinder **135**. This projects the piston rod **140** from the cylinder thereby to swing the billet transfer arm or finger **111** about the axis of the pivot pin **115**. However, in the form of the invention shown in Figs. 5 and 6 this swinging movement of the billet transfer arm or finger **111** is not in an arc of a circle as with the form of the invention shown in Figs. 1–4. Instead as pressure is applied to the free end of the billet transfer arm or finger **111** by the piston rod **140**, the cross pin **120** first moves vertically upwardly in the vertical parts **124** of the slots **122** because the rollers **121** on this pin **120** ride in these slots. As this pin **120** moves vertically upwardly it moves away, of course, from the cross pin **115**, this being permitted by the sliding connection between the exterior of the block **114** and the slideway **113** at the lower end of the billet transfer arm or finger **111**. The rounded outer end **112** of the billet transfer arm or finger **111** is guided by both the rollers **121** and also the cross pin **115** during this initial movement of the transfer arm or finger **111** so as to have the steeply sloped initial movement shown at the right of the dot-dash line curve illustrated in Fig. 5.

When the rounding face **112** of the billet transfer arm or finger **111** encounters the end of the dummy block **16***a*, the rollers **121** at the center of the billet transfer arm or finger **111** also ride into the curved parts **125** of the slots **123**. Accordingly, a greater degree of horizontal movement is imparted to the rounding face **112** at the outer end of the billet transfer arm or finger **111** and the movement of this curved surface is predominantly in a horizontal direction and toward the billet holder **19** so as to move the longer billet **15***a* and its dummy block **16***a* toward the bore **18** of the billet holder. When the rollers **121** ride into the horizontal parts **126** of the slots **122** the movement of the rounding face **112** of the billet transfer arm or finger **111** is essentially in a horizontal direction and is, in fact, in a slightly downwardly sloping direction as shown at the left hand end of the dot-dash line A, Fig. 5. During this movement of the billet transfer arm or finger **111** the longer billet **15***a* and its dummy block **16***a* are inserted into the bore **18** of the billet container **19**.

During the final movement of the billet **15***a* and dummy block **16***a* into the billet container **19**, the spray nozzle **83** can have been withdrawn so that the cross head **23** can immediately be moved to the left so as to bring the loaded billet container **19** into contact with the die **13**. During this forward movement of the cross head **23** toward the die, pressure can be applied to move the piston rods **68** longitudinally in the direction to swing the billet loader **98** from the vertical position shown in Fig. 6 to its angular loading position as illustrated in Fig. 2 in connection with the form of the invention shown in Figs. 1–4. Also during this forward movement of the cross head **23** toward the die **13**, pressure can be applied to the pivoted end of the cylinder **135** to retract the finger or arm **111** to the position shown in Fig. 5.

The main plunger **14** of the extrusion press then advances, engages the dummy block **16***a* and applies extrusion pressure to the end of the billet **15***a* so as to force it through the die **13** thereby to produce an extruded form of the desired cross sectional shape. Following this, the main plunger **14** is withdrawn and the cross head **23** moved to the right as viewed in Fig. 5 so as to permit the discard to be severed and extracted and so as to free the die **13**. The cycle of operation can then be repeated, the die being cleaned by the spray from the nozzle **83** while the billet loader forming the subject of the present invention is operative to load the billet into the container.

It will be seen that the essential difference between the billet loader shown in Figs. 5 and 6 as compared with the billet loader shown in Figs. 1–4 is that the guide slots **122** and the slide block **114** constrain the dummy block engaging face **112** of the finger or arm **111** to first move abruptly upwardly into engagement with the dummy block **16***a* and then horizontally to feed the dummy block and its billet **15***a* into the billet container **19**. By this abrupt initial upward movement of the face **112** as compared with the circular arcuate movement of the face **71** in the form of the invention shown in Figs. 1–4, a longer billet **15***a* can be loaded with the billet loader shown in Figs. 5 and 6 as compared with the billet loader shown in Figs. 1–4. Conversely, the billet loader shown in Figs. 5 and 6 can be used in a press having a shorter stroke and daylight opening to feed the same size billets as can be loaded with the billet loader shown in Figs. 1–4 in a press requiring a longer stroke and bigger daylight opening.

From the foregoing it will be seen that both forms of the present invention provide a very simple and positively acting billet loader for an extrusion press which, while the billet container is spaced from the die and while the die is being cleaned and cooled, performs its operation of receiving the billet and dummy block, bringing them

to a loading position and pushing both the billet and the dummy block into the bore of the billet container. Accordingly, by cleaning the die at the same time that the billet loading is taking place, the time cycle of the extrusion operation can be very materially reduced. Also, the form of the invention shown in Figs. 5 and 6 permits the loading of longer billets in a given press than with the form of the invention shown in Figs. 1–4.

We claim:

1. A billet loader of the character described, comprising a body pivotally mounted at its bottom to swing about a generally horizontal pivot axis, a cradle-like open trough along the upper end of said body and arranged to receive a billet in a position with its major axis generally parallel with said pivot axis, means arranged to swing said body about its said pivot axis, an injecting arm arranged in a plane intersecting said pivot axis and trough with its upper end arranged in one end of said trough, means pivotally connecting the lower end of said injecting arm to said bottom of said body to swing about a pivot axis perpendicular to said plane, and means for actuating said injecting arm.

2. A billet loader of the character described, comprising a body pivotally mounted at its bottom to swing about a generally horizontal pivot axis, a cradle-like open trough along the upper end of said body and arranged to receive a billet in a position with its major axis generally parallel with said pivot axis, a cylinder and piston at one side of said body and operatively interposed between said body and a stationary part to swing said body about its said pivot axis, an injecting arm arranged in a plane intersecting said pivot axis and trough with its upper end arranged in one end of said trough, means pivotally connecting the lower end of said injecting arm to said bottom of said body above said pivot axis to swing about a pivot axis perpendicular to said plane, and a cylinder and piston in said plane and operatively interposed between said body and a central part of said injecting arm to actuate said injecting arm.

3. A billet loader of the character described, comprising a body pivotally mounted at its bottom to swing about a generally horizontal pivot axis, a cradle-like open trough along the upper end of said body and arranged to receive a billet in a position with its major axis generally parallel with said pivot axis, means arranged to swing said body about its said pivot axis, an injecting arm arranged in a plane intersecting said pivot axis and trough with its upper end arranged in one end of said trough, a pivot member pivotally mounted in said bottom of said body to swing about a pivot axis perpendicular to said plane, means providing a sliding connection between said pivot member and injecting arm and permitting longitudinal movement of said arm with reference to said pivot axis, cam means at said upper end of said body and guiding the upper end of said injecting arm to traverse a non-circular path in swinging about the pivot axis of said pivot member and means for actuating said injecting arm.

4. A billet loader of the character described, comprising a body pivotally mounted at its bottom to swing about a generally horizontal pivot axis, a cradle-like open trough along the upper end of said body and arranged to receive a billet in a position with its major axis generally parallel with said pivot axis, means arranged to swing said body about its said pivot axis, an injecting arm arranged in a plane intersecting said pivot axis and trough with its upper end arranged in one end of said trough, a pivot block pivotally mounted in said bottom of said body to swing about a pivot axis perpendicular to said plane, said pivot block being provided on its opposite sides with slideways in said plane, the lower end of said injecting arm being bifurcated to provide jaws slidingly fitting said slideways, a cam track on said upper end of said body, a cam follower on said injecting arm guided by said cam track, said cam track being shaped to guide said upper end of said injecting arm to traverse a non-circular path in swinging about the pivot axis of said pivot block, and means for actuating said injecting arm.

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