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DUMMY BLOCKS FOR EXTRUSION PRESSES

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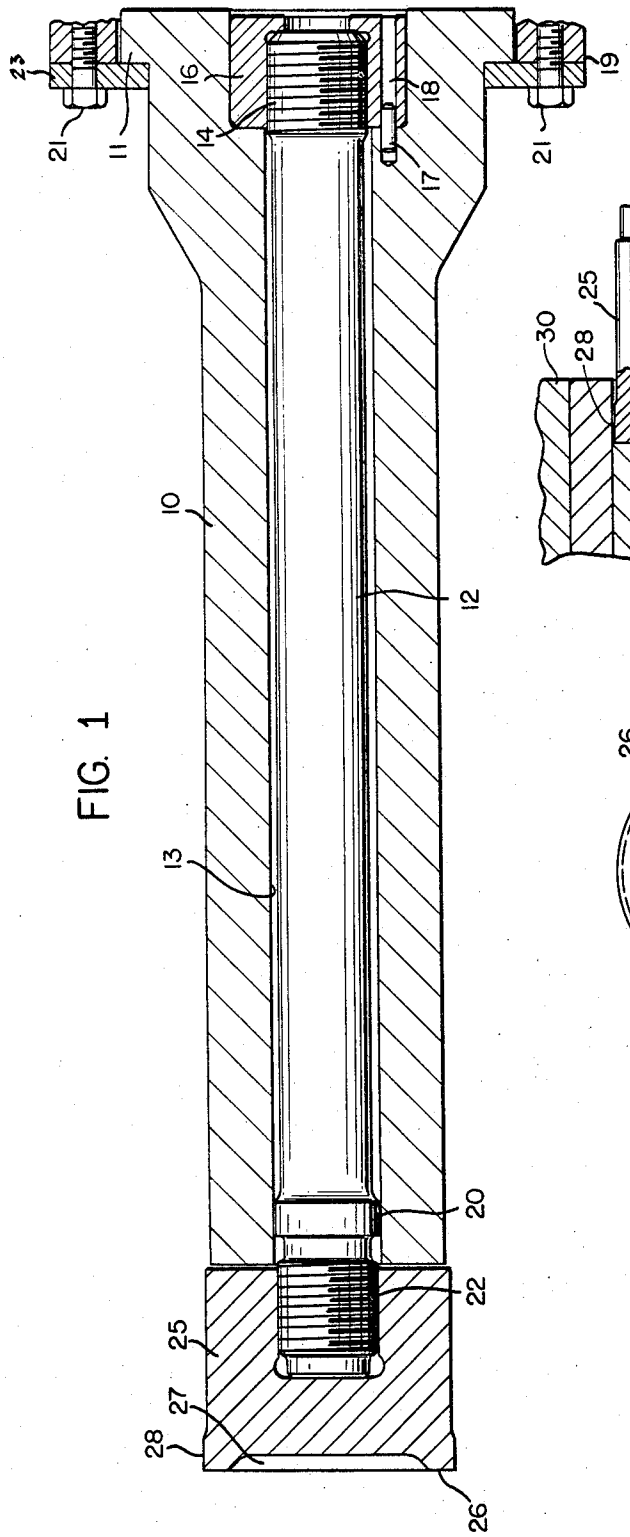

FIG. 1

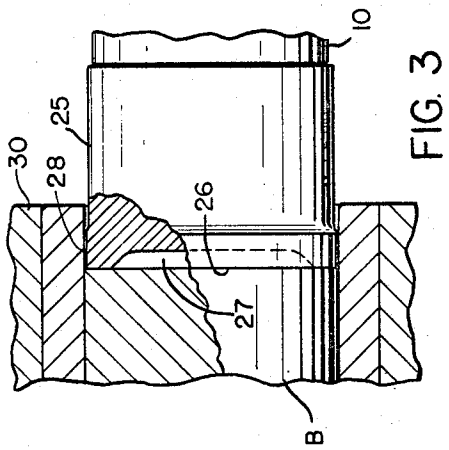

FIG. 3

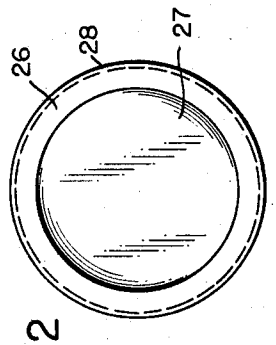

FIG. 2

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DUMMY BLOCKS FOR EXTRUSION PRESSES

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ABSTRACT OF THE DISCLOSURE

A fixed dummy block is secured to the front end of a hollow extrusion plunger by an elongate stud which is secured at its rear to the plunger. The stud has a guide portion of enlarged diameter adjacent its front that fits the bore of the plunger with enough clearance to allow some float of the block but is of appreciably smaller diameter than the bore of the plunger for the remainder of its length to achieve flexibility. The front face of the block is plane adjacent its periphery and centrally dished. It is of enlarged diameter adjacent its front.

The present invention relates to extrusion presses, and more particularly to an improved dummy block for the ram of an extrusion press.

In extruding metals, such as aluminum, brass, bronze, etc., a billet, usually cylindrical in shape, is heated to the required extruding temperature, positioned in alignment with the extrusion cylinder or container and with the die; and the billet is pushed through the container or cylinder and the die by a ram, usually hydraulically actuated. The die, of course, has an opening conforming to the desired cross-sectional shape of the extrusion.

Because a small block can be made to fit more accurately into the bore of the cylinder or container than can an elongate ram or plunger, and because a short block can be hardened much more cheaply and with greater accuracy than a long plunger or ram, it is customary to fit a so-called "dummy block" to the front end of the extrusion ram. As the ram moves forward the dummy block engages the rear end of the billet to force the billet forward through the container and die. The dummy block has the big advantage of protecting the ram from damage. The dummy block, relative to the extrusion ram, is expendable.

As the billet is forced against the die by the dummy block and the ram, the metal of the billet is caused to flow or extrude through the die opening. If the dummy block does not fit the container or cylinder closely, then under the tremendous pressures employed, the metal of the billet will tend to get in between the dummy block and the wall of the cylinder, that is, will tend to by-pass the dummy block. Therefore, the dummy block has to be made to a diameter only slightly less than the internal diameter of the container or cylinder.

Heretofore, two types of dummy blocks have been employed. One is a loose or unattached dummy block. Such a block is mounted over and rides on a guide pin which is secured to the front end or nose of the ram. At the end of the extrusion stroke, the loose dummy block is stripped from this pin and, as the ram returns, drops off into a chute. It is delivered by the chute to a position where it can be replaced on the pin for another extrusion operation. Usually several loose dummy blocks are provided, so that one is always available in the chute for use on the next working stroke of the ram.

The other type of dummy block is the fixed dummy block, that is, a dummy block which is secured fixedly to the front end of the ram.

Most dummy blocks used today are loose dummy

blocks. This is primarily because prior designs of fixed dummy blocks and methods of securing them to the ram have not been satisfactory.

During the extrusion operation, for instance, the dummy block may adhere to the butt end of the billet, thereby necessitating the application of a force or impact to separate the dummy block from the butt of the billet. Where loose or unattached dummy blocks are employed, the container is retracted over the extrusion stem away from the die. This exposes the butt end of the billet and the dummy block which are then sheared from the face of the die and dropped into a chute.

A fixed dummy block normally has the advantage over a loose dummy block that it eliminates the need for manual separation of the dummy block from the butt end of the billet by a hammer or by a manually operated shear. Where the dummy block is fixedly attached to the ram, however, if there is any difficulty experienced in separating the dummy block from the butt of the billet, on the return stroke of the ram, the extrusion is pulled back slightly through the die. This makes it easier to shear. The amount of pull-back is never excessive in a properly controlled press because it can be limited by locking up the main ram. There may be some extra scrap; but much time may be lost if the dummy block refuses to separate from the butt end of the billet. Lubricants have been tried to prevent the sticking or adhering of the dummy block to the butt of the billet but this has not proved a complete answer to the problem of preventing adherence of the dummy block to the billet.

Fxed dummy blocks though have the advantage over loose dummy blocks that loss of dummy blocks, as occurs very often with loose dummy blocks, where the dummy block has to be separated from the butt by a sharp blow, is obviated. Some dummy blocks separate too easily and too early from the butt end of the billet, and being free, they rebound fast and wildly. The use of a fixed dummy block furthermore eliminates possibility of damage to the tooling by placing the dummy block in the press with the wrong face forward. Another advantage of a fixed dummy block is that it obviates the damage to tooling which not infrequently happens with loose dummy blocks becoming tilted or cocked or otherwise misplaced. Furthermore, with a fixed dummy block there is no possibility of damage to tooling by starting up without a dummy block in place. Furthermore, a fixed dummy block simplifies the construction of the extrusion press itself, because the container does not need to move as far away from the die as is required with a loose dummy block in order to provide room to separate the loose block from the ram. Moreover, with a fixed dummy block return chutes for the dummy blocks are eliminated. Still further, the loader for loading the billet into the machine can be shorter, and a separate dummy block loader may be eliminated entirely.

One object of the present invention is to provide a dummy block which is fixedly secured to the ram, but which will readily separate from the butt end of the billet on the return stroke of the ram.

Another object of the invention is to provide a fixed type of dummy block shaped to facilitate separation of the block from the butt end of the billet after extrusion.

Another object of the invention is to provide a dummy block shaped to trap air and lubricant between the block and the butt end of the billet to prevent overheating of the dummy block.

Another object of the invention is to provide a dummy block shaped to reduce or prevent completely backward extrusion of metal into the annular clearance space between the dummy block and the bore of the container.

Another object of the invention is to provide a fixed dummy block shaped so that there is a minimum of fric-

tional drag between the dummy block and the cylinder on the return movement of the ram.

Another object of the invention is to provide a mounting for a fixed dummy block on a ram which will allow some float of the dummy block so that it can center itself in the container or cylinder on the extrusion stroke of the ram.

A further object of the invention is to provide a mounting for a dummy block on a ram which is more elastic than prior designs and less likely to fail through sudden application of the stripping force in pulling the dummy block away from the butt end of the billet.

Still another object of the invention is to provide a mounting for a fixed dummy block which can be heat-treated more uniformly and to greater hardness than prior such mountings.

A still further object of the invention is to reduce the number of dummy blocks required with a press.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claim, particularly when read in conjunction with the accompanying drawing.

In the drawing:

FIG. 1 is a longitudinal axial sectional view showing a fixed dummy block and its mounting constructed according to one embodiment of the invention;

FIG. 2 is a front elevation of the dummy block; and

FIG. 3 is a fragmentary view, partly in longitudinal section and partly in elevation showing fragmentarily the cylinder or container of the press, and a dummy block made according to the invention in position of forcing a billet through the cylinder or container.

Referring now to the drawing by numerals of reference, **10** denotes a tubular extrusion stem or plunger which is of enlarged diameter at its rear end and is formed at that end with a flange **11** by means of which it is secured to the ram **19** (shown only fragmentarily) of the extrusion press by means of a retaining ring **23** and screws or bolts **21**.

Mounted within the bore **13** of the stem or plunger **10** is a bar or stud **12** which is threaded at its rear end **14** into a nut **16** that is mounted in a recess in the rear end of the stem or plunger. This nut is held against rotation with reference to the stem or plunger by a dowel pin **17**, tha engages in the hole **18** in the nut. Adjacent its forward end the stud **12** is formed with a guide portion **20** of enlarged diameter that first the bore **13** of the plunger or stem with enough clearance to allow for some float of the dummy block, carried by the stud, to enable the dummy block to center itself in the container or cylinder.

The stud **12** is threaded at its forward end **22** and threadably mounted on this end **22** of the stud is a dummy block **25** made according to one embodiment of this invention. It has an enlarged diameter or land **28** at its front or leading end which reduces or prevents backward extrusion of metal into the annular clearance between the dummy block and the bore of the container as illustrated in FIG. 3. Here the container is shown fragmentarily at **30**. The billet which is to be extruded is denoted at B. It is loaded in alignment with the container so that upon forward movement of the ram, the extrusion stem **10**, and the dummy block **25** carried thereby push the billet into the bore of the container and through the die.

The front face **26** of the dummy head is plane adjacent the periphery of the dummy head and then is dished as denoted at **27**. The dished portion of the face of the dummy block traps air and lubricant and minimizes the area of the dummy block in contact with the butt end of the billet thereby facilitating separation of the dummy block from the butt end after extrusion. Furthermore, the trapped air and lubricant serve as insulation means intended to prevent overheating of the dummy block. The shaped face of the dummy block moreover affects the flow of metal, which ordinarily flows from the outside surface of the billet inwardly and forward into the center of the extrusion. Hence, fewer contaminants are drawn into the extrusion center or core from the outside surface of the billet. Furthermore, the high pressure, created in the billet during extrusion, acts within the dished face of the dummy block and tends to expand the loaded face of the dummy block outwardly. This reduces the radial clearance between the periphery of the dummy block and the bore of the container. The dummy block thus becomes a self-energizing seal; and backward extrusion of the billet into the annular space between the dummy block and the container is reduced or prevented. The short length of the enlarged diameter or land **28** reduces the frictional drag especially if there is some backward extrusion of the metal being extruded.

The long draw bolt **12**, which connects the dummy block to the plunger, since it is somewhat flexible, allows some float of the dummy block so that it can center itself in the container. Because of its elasticity, also, the long draw bolt is much less likely to fail due to sudden application of the stripping force pulling the dummy block away from the butt end of the billet upon the return movement of the ram. It is much superior to a short bolt or stud.

Furthermore, the hollow extrusion stem **10** can be heat-treated more uniformly and to a greater hardness than a solid stem.

A fixed dummy block, moreover, eliminates all problems associated with the handling of loose dummy blocks such as:

(1) Manual separation of the dummy block from the butt end of the billet after extrusion. Ordinarily this separation must be effected by a hammer or for large sizes, by a manually operated shear.

(2) Loss of dummy blocks into the foundation pit.

(3) Damage to handling equipment by the heavy mass and high velocity of the dummy blocks coming out of the press, as compared to the smaller and much lighter severed butt ends of the billet.

(4) Damage to the tooling of the press when the dummy block is placed into the press with the wrong face forward.

(5) Damage to the tooling of the press when the dummy block becomes tilted or cocked or otherwise misplaced.

(6) Damage to the tooling when the extrusion is started without a dummy block in place.

A fixed dummy block simplifies the extrusion press. For instance, the container does not need to move as far away from the die as where a loose dummy block is employed. Moreover, return chutes for the dummy blocks may be eliminated. Still further, the billet loader may be shorter and a separate dummy block loader may be eliminated. Finally, the considerable shock always associated with high speed handling of loose heavy dummy blocks both into and out of the press is obviated. Moreover, the number of dummy blocks required is reduced.

While the invention has been described in connection with a particular embodiment thereof it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claim.

Having thus described my invention, what I claim is:

1. In combination:
   - a tubular plunger adapted to be secured to the front of the ram of an extrusion press,
   - a stud mounted centrally within the bore of said plunger, and
   - a solid dummy block secured to the front end of said stud, said stud extending from approximately the

rear end of said bore beyond the front end of said plunger so that said dummy block protrudes beyond the front end of said plunger, said dummy block having a greater diameter than the front end of said plunger, and

the front face of said dummy block having a relatively narrow land adjacent the periphery of said block lying in a plane perpendicular to the axis of said bore for engagement with the butt end of a metal billet that is to be extruded, the remainder of said front face being dished to trap air and lubricant and minimize the area of the dummy block in contact with said butt end, said dummy block having a narrow cylindrical peripheral land extending from its front face rearwardly for a relatively short portion of the length of said dummy block, and

said stud having a guide portion of enlarged diameter adjacent its front end which fits closely within the bore of said plunger but with clearance to allow float of the dummy block relative to the plunger, the remainder of the length of said stud within said bore being appreciably smaller in diameter than said bore.

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