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METHOD OF AND APPARATUS FOR MAKING EXTRUDED ARTICLES

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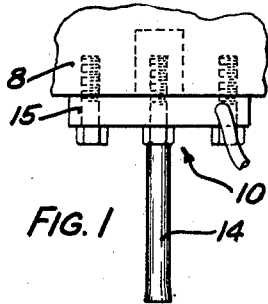


FIG. 1

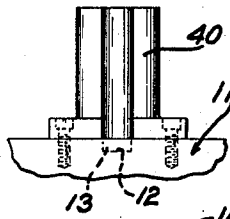


FIG. 3

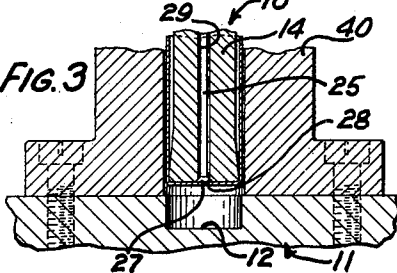


FIG. 4

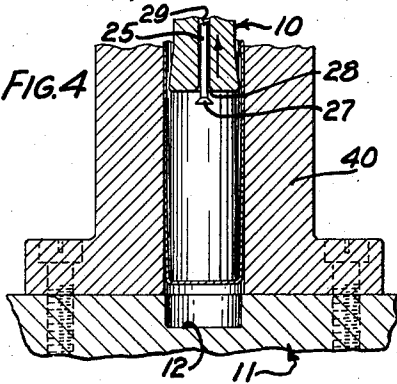
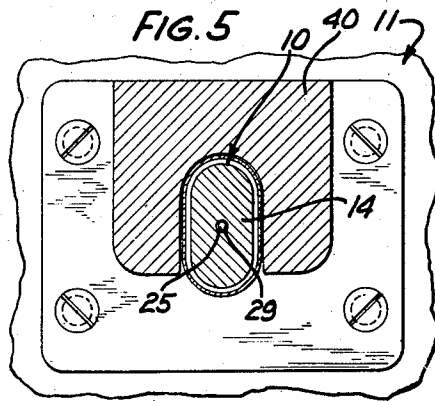
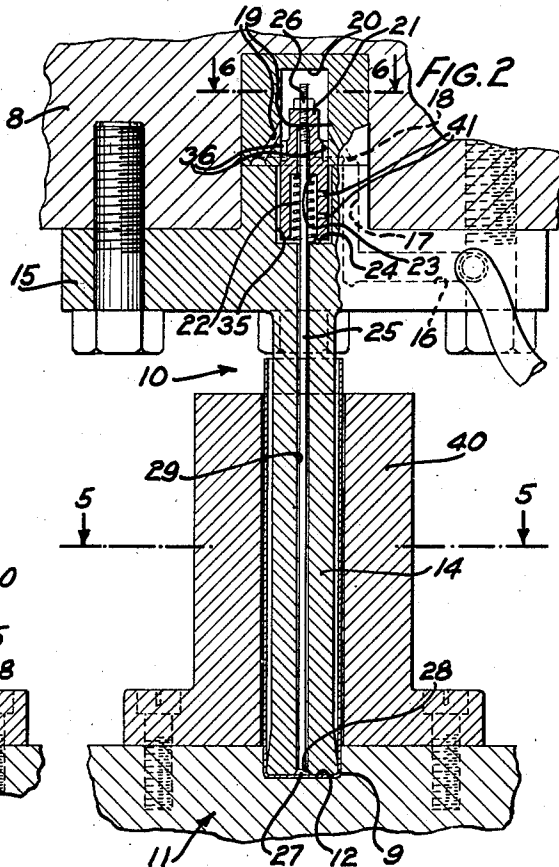
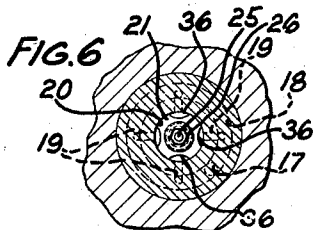


FIG. 6



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METHOD OF AND APPARATUS FOR MAKING
EXTRUDED ARTICLES

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7 Claims. (Cl. 207-9)

This invention relates to a method of and apparatus for making extruded articles, and more particularly to a method of and apparatus for making extruded, seamless containers.

It has been common practice, in the manufacture of seamless containers of various types, to place a slug or blank of relatively soft material in a die cavity, having a punch or die cooperating therewith of smaller diameter than the diameter of the die cavity, and then forcing the punch into the die cavity to cause a backward extrusion of the metal of the slug along the shank of the punch. In following this practice, where cylindrical containers are being manufactured, the punch is sometimes provided with a valve in its operating end, whereby compressed air may be forced through the punch to strip the formed container therefrom. In the manufacture of containers which are exactly circular in cross section, the air under pressure will tend to inflate the container equally in all directions when it is blown off the punch.

In manufacturing seamless containers which are not circular in cross section, difficulty has heretofore been experienced in stripping the formed container from the punch due to the fact that if a blast of air is directed through the punch, there will be a tendency for the container to assume a cylindrical form, resulting in the gripping of parts of the container on the punch. It is an object of the present invention to provide an inexpensive and efficient method of and apparatus for facilitating the manufacturing of extruded containers.

In accordance with one embodiment of the invention, the punch is provided with a normally closed passage through which compressed air may be directed to strip a formed container from the punch and the flattened sides of the container are restrained from movement away from the punch by a restraining member positioned a very small distance from the side of the formed container, whereby when the compressed air is directed through said passage, the flattened sides of the container are restrained from movement away from the punch, and the container is prevented from becoming distorted and gripping the punch at other portions thereof. The apparatus which accomplishes this highly desirable function comprises a restraining member mounted adjacent the path of the punch.

A better understanding of the invention will be had by reference to the following detailed description, when considered in conjunction with the accompanying drawing, wherein

Fig. 1 is a front elevational view of an apparatus embodying the features of the invention by means of which the method may be practiced, showing the punch in its extreme retracted position;

Fig. 2 is an enlarged sectional view, similar to Fig. 1, showing the punch in its extreme depressed position;

Fig. 3 is a fragmentary view of a portion of the punch and die showing the punch in one of its intermediate positions;

Fig. 4 is a view similar to Fig. 3 showing the punch in another position;

Fig. 5 is a fragmentary sectional view, taken on the line 5-5 of Fig. 2; and

Fig. 6 is a fragmentary sectional view, taken on the line 6-6 of Fig. 2.

Referring now to the drawing, wherein like reference characters designate the same parts throughout the several views, the numeral 10 designates, generally, a punch designed for co-operation with a mold 11. The mold 11 has a relatively shallow cavity 12 adapted to receive therein a slug or blank 13 which, when the punch moves downwardly and engages the slug, will cause the slug to be extruded upwardly along the shank 14 of the punch, the lower end of the punch and the side walls of the cavity 12 forming a passage 9 through which the material will be extruded upon the application of pressure to the punch.

The punch 10, which may be mounted on the ram 8 of a press of any suitable type, comprises the shank 14 and a shoulder portion 15, by means of which the punch may be mounted on the ram 8. Formed in the shoulder portion 15 is a relatively large passage 16 communicating with a smaller passage 17, the passage 16 extending horizontally and the passage 17 extending vertically. The passage 17 terminates in an annular passage 18 and fluid under pressure, for example, air, may be directed from the passage 16 through the passage 17 to the passage 18. In the upper end of the punch 10, there are a plurality of passageways 19 interconnecting the passage 18 and a hollow chamber 20. The chamber 20 is cylindrical and has mounted therein a valve 21, which is normally urged upwardly in the passage by a coiled spring 22 interposed between a shoulder 23 in the valve and a shoulder 24 50 formed in the punch proper. This spring 22 surrounds a rod 25, which is threaded at its upper end into the valve 21 and into a lock nut 26, and has an enlarged portion 27 formed on the lower end thereof. The enlarged portion 27, 55

which constitutes a valve, at the lower end of the rod 25 is normally held seated on a tapered shoulder 28 formed on the end of a passage 29 extending vertically through the shank of the punch. A cylindrical chamber 35 formed in the punch and terminating at the shoulder 24 is somewhat larger than the valve 21 and the valve 21 has its upper end notched, as shown at 36—36 so that when air under pressure is forced through the passage 16, the valve 21 will be moved downwardly, carrying with it the enlarged portion or valve 27. The air under pressure will thus be permitted to pass through the notches 36—36 into the cylindrical chamber 35 and through the passage 29 and out through the operating end of the punch. It will be noted that the valve 21 has apertures 41 in it to permit the flow of air to the passage 29 when the valve 21 engages the shoulder 24, which stops the valve from moving down too far.

In the specific embodiment of the invention chosen for illustration, the punch and its associated die cavity are non-cylindrical in configuration, as shown in Fig. 5, for the purpose of forming a container having two flat sides and two rounded ends. Mounted upon the mold 11 is a restraining member 40, U-shaped in configuration, and conforming in configuration to the shape of two sides and one end of the article being formed. This restraining member 40 is just slightly larger than the container to be formed in the press so that when the punch is moved to its lowermost position and extrudes the metal of the slug 13 upwardly along the shank of the punch, the metal of the container will not engage with either the shank of the punch or the sides or end of the restraining member 40 to any appreciable extent which would damage it or interfere with the upward extrusion of it.

Other objects and advantages of the invention will become more apparent from the following brief description of the operation of the device.

After a slug or blank 13 has been placed in the mold cavity 12, while the punch is in its uppermost position, as shown in Fig. 1, the punch may be moved downwardly by the press mechanism into engagement with the slug and forced downwardly to cause the metal of the slug to be extruded upwardly along the shank of the punch, as shown in Fig. 2. After the slug has thus been extruded, the punch may be withdrawn from the mold cavity 12 to the position shown in Fig. 3 to withdraw the container from the die. Due to the shape of the punch, the container will adhere to the end of the punch and will be lifted to the position shown in Fig. 3. As soon as the punch, in moving to its retracted position, reaches the position shown in Fig. 4, a blast of air may be directed through the passages 16, 17, 18 and 19 into the chamber 20 to force the valve member 21 downwardly. As soon as the valve member 20 moves to a position where the notches 36 therein have their shoulders below the walls of the chamber 30, the air which is holding the valve 21 in its downward position, will pass through the notches 36—36 and the chamber 35 and passage 29 and out through the valve 27, tending to blow the container off of the punch. When this blast of air is directed to the interior of the container, there will be a tendency for the sides of the container to bulge, whereupon they will engage the inner walls of the U-shaped restraining member 40 and will be held by the walls of the member

40, thereby permitting the punch to move upwardly while the container is held within the restraining U-shaped member 40. The container will not, however, be very tightly engaged by the walls of the member 40 and may be easily removed therefrom, whereupon the operation may be repeated.

Although a specific embodiment of the invention has been disclosed in detail hereinbefore, it will be understood that various modifications and adaptations may be made without departing from the scope of the appended claims.

What is claimed is:

1. The method of forming a container which consists in extruding a part of a blank through an annular space between a punch head and a mold cavity, stripping the blank from the punch by directing a blast of air through the punch, and restraining the sides of the blank while it is being stripped from the punch.

2. The method of forming a container which consists in extruding a part of a blank through an annular space between a punch head and a mold cavity, stripping the blank from the punch by directing a blast of air through the punch, and preventing undesirable bulging of the container during the stripping operation.

3. In a container forming apparatus, a punch having an air passage therethrough, a valve for normally closing an end of said passage, a mold cavity of slightly larger size than said punch, and a restraining wall spaced from said punch to restrain undesirable movement of parts of a container when said valve is opened.

4. In a container forming apparatus, a punch having an air passage therethrough, a valve for normally closing an end of said passage, a mold cavity of slightly larger size than said punch, and a restraining wall spaced from said punch to prevent distortion of a container when said valve is opened.

5. In a container forming apparatus, a punch, a mold cavity cooperating with said punch and of a size to form an annular space between it and the punch when the punch is moved to operative position, means for directing air under pressure to the end of said punch to strip a formed container from the punch, and means cooperating with said punch for preventing distortion of the container by said air under pressure.

6. In a container forming apparatus, a punch having an air passage therethrough, a valve for closing said air passage, a mold cavity conforming in configuration with a portion of said punch and slightly larger than said punch, means for supplying air under pressure to said passage to strip a container from the punch, and means positioned adjacent the path of movement of said punch for preventing distortion of a container being stripped from the punch.

7. In an apparatus for forming containers having at least one flat side, a punch having an air passage therethrough, a mold cavity conforming in configuration to a portion of said punch and slightly larger than said portion of said punch, means for supplying air under pressure through the passage to strip a container from the punch, and a stop member positioned adjacent the path of movement of said punch and at the flat side of the container for preventing distortion of a container being stripped from the punch.

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