

PUBLISHED
JUNE 1, 1943.
BY A. P. C.

O. F. A. BIGINELLI
METHOD AND MACHINE FOR CONSTRICTING A
TUBE BY MEANS OF A REVOLVING DIE
Filed March 18, 1942

Serial No.
435,234

3 Sheets—Sheet 2

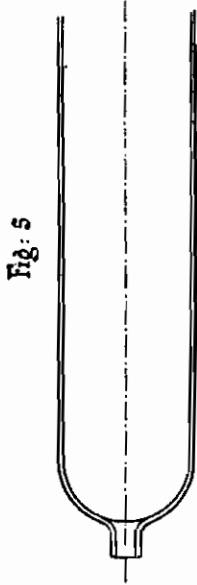


Fig. 5

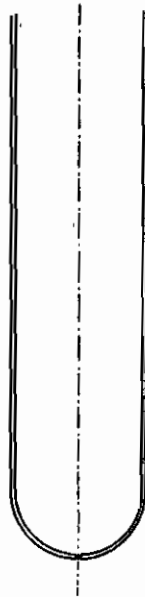


Fig. 7



Fig. 9

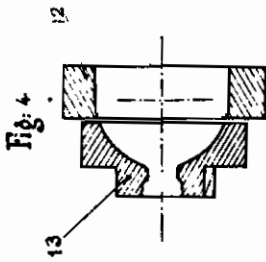


Fig. 4

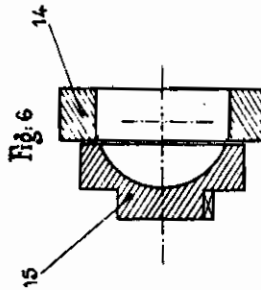


Fig. 6

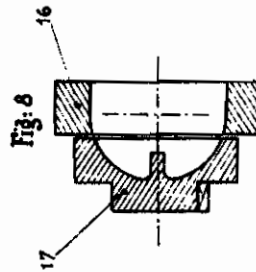
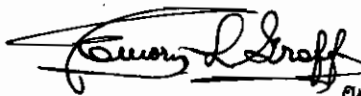


Fig. 8

Inventor

O. F. A. BIGINELLI

By  Attorney

PUBLISHED
JUNE 1, 1943.
BY A. P. C.

O. F. A. BIGINELLI
METHOD AND MACHINE FOR CONSTRICTING A
TUBE BY MEANS OF A REVOLVING DIE
Filed March 18, 1942

Serial No.
435,234

3 Sheets-Sheet 3

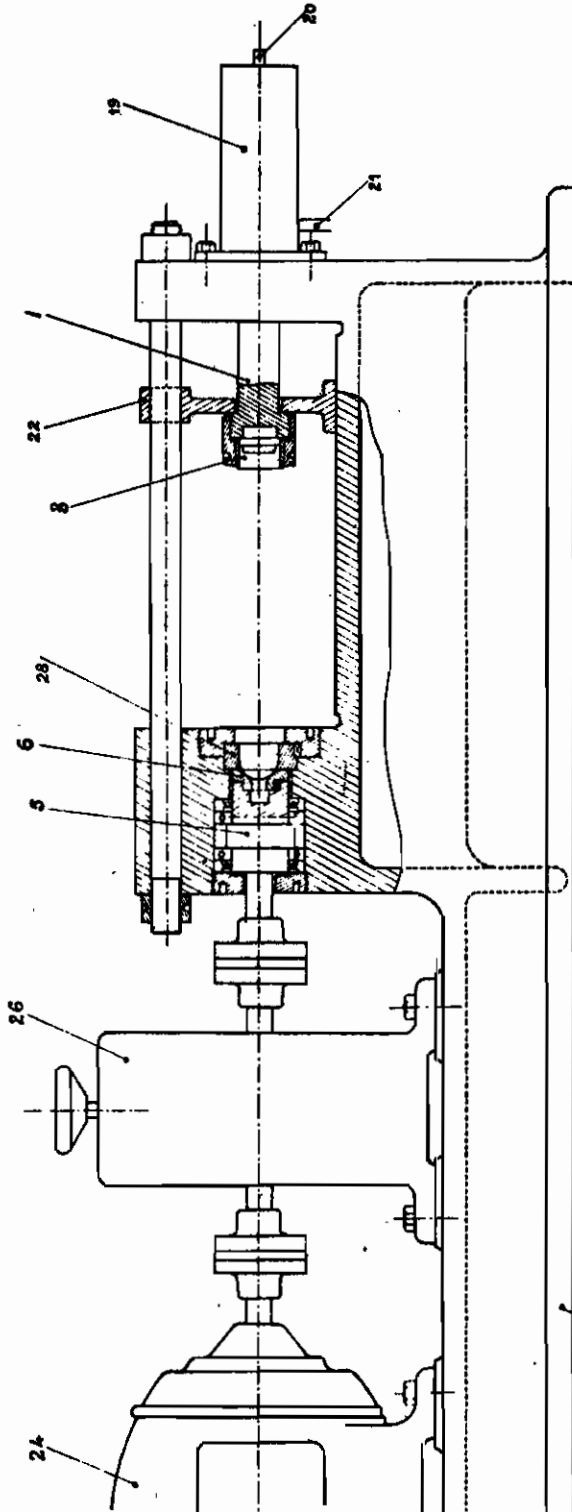


Fig. 10

Inventor
O.F.A. BIGINELLI

By *Emory D. Proff*
Attorney

ALIEN PROPERTY CUSTODIAN

METHOD AND MACHINE FOR CONSTRICTING A TUBE BY MEANS OF A REVOLVING DIE

Oreste Flavio Alfred Biginelli, Clermont-Ferrand, France; vested in the Alien Property Custodian

Application filed March 18, 1942

This invention relates to a method and a machine for constricting a tube by means of a revolving die.

With the hitherto known methods from a certain diameter the constriction of tubes in a hollow state, i. e. without the use of an inner mandrel is a difficult operation which practically can be effected only by means of machines acting through hammering on the tube revolving about its axis. This work is effected on annealed metal and for somewhat important constrictions it requires a plurality of operations with an equal number of intermediary annealings. This process is a noisy and comparatively slow one.

This invention has for its object to avoid these drawbacks and to permit of effecting the constriction irrespectively of its magnitude in a smooth operation and of insuring a quick working, since the duration of the advance of the die is of a few seconds only, and it being possible to apply the said process on both ends of the tube successively.

According to this invention the method which permits of attaining the above mentioned aims shows the characteristic features which result from the following description and from the appended claims.

In the drawing the device which is necessary for effecting the processes of the operation of constriction is shown by way of example.

Figures 1, 2 and 3 show the various steps of the operation.

Figures 4, 5, 6, 7, 8 and 9 show different forms of constriction and the dies used for making the same.

Figure 10 shows the machine for carrying into practice the processes according to the invention.

The device is essentially formed of a press frame which comprises, on the one hand, a device for obtaining a double acting press movement in the longitudinal axis and, on the other hand, a plate revolving about the said axis.

1 is an extension of the press slide which can slide in the longitudinal direction but the rotation of which about the axis is prevented owing to the fact that it is guided on the standards which are fast with the frame.

The extension 1 of the frame receives a clamping chuck which permits of firmly securing the end of the tube opposed to the end to be constricted. In the example of Figure 1 this clamping chuck is formed of the following three parts:

1. An abutment encasing the tube;
2. A clamping member 3 of outwardly conical

and inwardly cylindrical shape which is adjusted outwardly of the tube; this clamping member is divided into sectors by planes passing through the axis.

3. A clamping chuck 4 which is screwed on 1 and has inwardly a conical shape corresponding to the external shape of the sectors 3. By screwing this casing on 1 the sectors 3 are clamped on the tube which has been previously encased on the abutment 2, thus rendering the said tube fast and compelled to follow the longitudinal press movement.

5 is the plate revolving about the axis and counterabuted on the frame in both directions so that it can move in the longitudinal direction.

The constriction tool equipment comprises:

1. A revolving die 6 encased on the plate 5 which imparts its movement of rotation to the die by means of the key member 7, and
2. A fixed die 8 fast with the press frame.

The process of the constricting operation is as follows:

The press slide being in the position shown in Figure 1, the tube 9 is set on the clamping chuck.

The die 6 is revolved and the press movement is started towards the left.

The end of the tube first engages the fixed die 8 which obliges the tube to center itself exactly on the axis and imparts to it a first constriction which is still comparatively small. Thus the tube takes the form 10 shown in Figure 2.

Through its clamping action on the tube this die also partially prevents the rotation of the tube and thus diminishes the torsion stress imparted to the body of the tube by the action of the revolving die.

The movement of the press then going on towards the left, the wall of the end of the tube engages the revolving die 6. Since the tube cannot revolve owing to the fact that it is clamped on the abutment 2 of the press slide and in the fixed die, a considerable rubbing action results therefrom between the wall of the end of the tube and the revolving die, thus producing a heating action which renders the metal of this wall sufficiently malleable for causing the movement of the press to oblige the tube to take the form of the revolving die.

On the end of the operation the tube has taken the form 11 shown in Figure 3.

As soon as the constricting operation is achieved the press slide is returned back, i. e. to the right so that it resumes the position of Figure 1. During this movement the constricted end is drawn out of both dies 6 and 8 and the

tube can be released by loosening the clamping chuck 4.

As above explained, the form of both dies, the fixed die 8 and the revolving die 6 must be adapted to the constricted form to be obtained.

By way of example Figure 4 shows at 12 and 13 respectively the form of the fixed and of the revolving dies which permit of obtaining the constricted form with a neck shown in Figure 5.

Figure 6 shows this form at 14 and 15 for obtaining the constriction shown in Figure 7 and Figure 8 shows at 16 and 17 the said form for obtaining the constriction with upsetting of the metal inwardly as shown in Figure 9.

The method according to the invention which permits of effecting a constriction in the hollow state can be applied successively at both ends of the tube, thus permitting to obtain from a tube the form of a bottle or vessel with two necks, which is not possible with the methods requiring for the constriction the use of an inner mandrel of a given form. The only modification of the above described device for obtaining the second constriction consists in adapting the clamping shuck 4 of the press slide so that the latter can receive and firmly secure the tube end which has received the first constriction.

Figure 10 shows by way of example a form of execution of a machine for carrying into practice the process according to the invention.

On the frame 10 of the machine is mounted, on the one side, a double acting hydraulic press cylinder 19; 20 and 21 are the inlets for the fluid coming from the pump. The end of the piston rod is guided by a slide 22 and carries the clamping chuck 3.

On the other side the frame carries the device for rotating the revolving die. This device comprises an electric motor 24 which drives the revolving plate 5 by means of a speed controller 26.

The plate 5 is mounted on ball bearings and abutments so that it can rotate without being shifted in the longitudinal direction under the action of the press. It carries the revolving die 6 which is encased and keyed on the press face; the speed controller permits of importing to the revolving die a speed of rotation which is adapted to the diameter, the thickness and the kind of the metal of the tube to be treated.

Against the external face of the revolving die 6 is arranged with a small play the fixed die 8, which is fast with the frame of the machine.

ORESTE FLAVIO ALFRED BIGINELLI.