Dec. 7, 1943. F. C. A. OTT 2,335,879

METHOD OF FORMING PLUGS

Filed July 12, 1940 2 Sheets-Sheet 1

Fig. 1

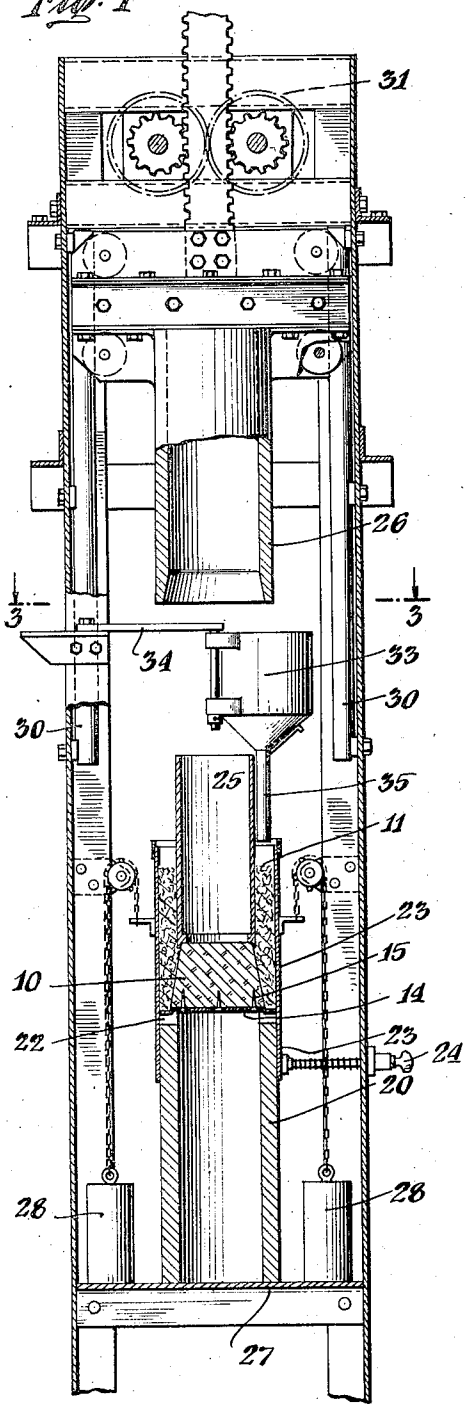
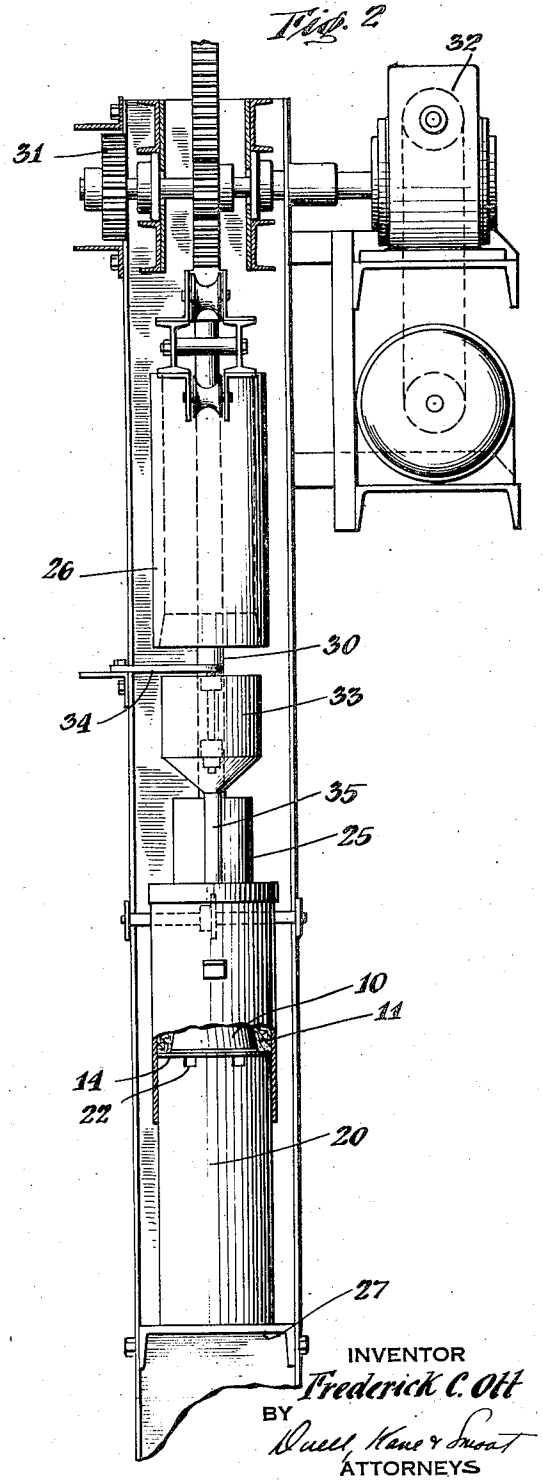



Fig. 2




INVENTOR
Frederick C. Ott
BY
Duell, Kane & Smoot
ATTORNEYS

Dec. 7, 1943. F. C. A. OTT 2,335,879

METHOD OF FORMING PLUGS

Filed July 12, 1940 2 Sheets-Sheet 2

Fig. 3

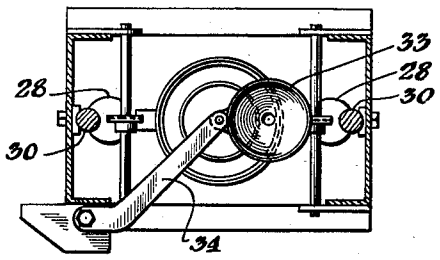



Fig. 7

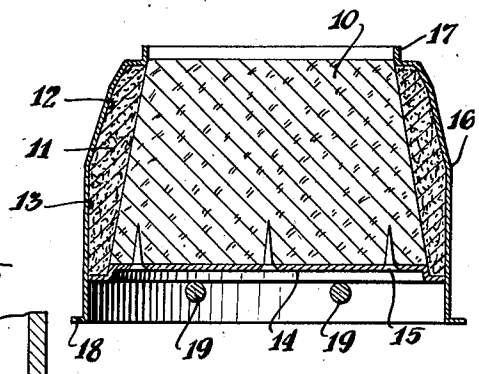



Fig. 4

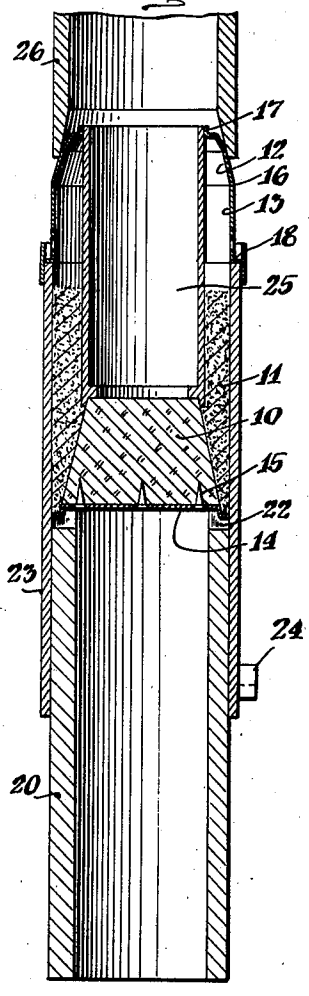



Fig. 5

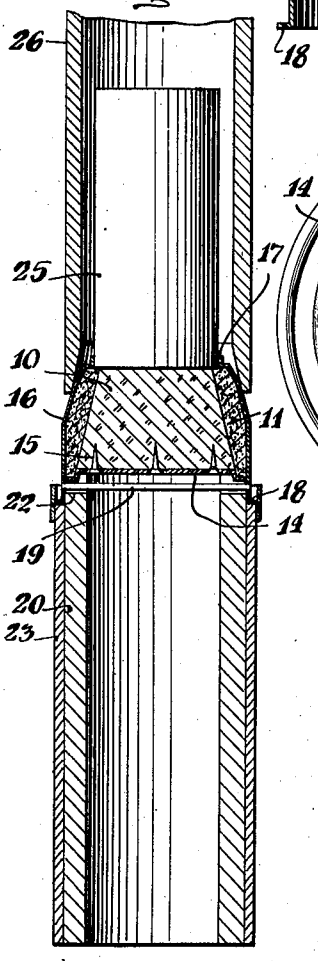



Fig. 8

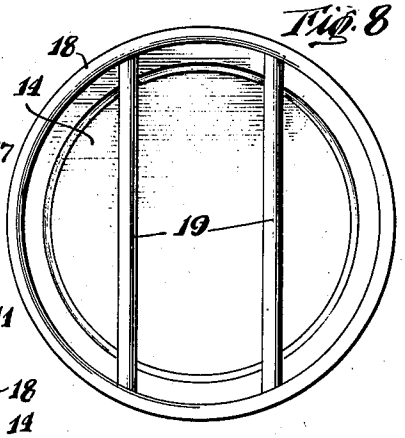
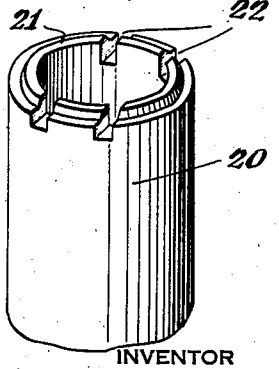



Fig. 6




INVENTOR

Frederick C. Ott

BY

Dwell, Hane & Smart

ATTORNEYS

Patented Dec. 7, 1943 2,335,879

# UNITED STATES PATENT OFFICE

2,335,879

## METHOD OF FORMING PLUGS

Frederick Charles August Ott, Glendale, N. Y., assignor to Mundet Cork Corporation, Brooklyn, N. Y., a corporation of New York

Application July 12, 1940, Serial No. 345,088

2 Claims. (Cl. 18—59)

This invention relates to a method of producing a plug. Moreover, the present invention contemplates the design of a machine, by means of which such method may be practiced.

It is a primary object of the invention to furnish a plug capable of use in numerous different associations, but of especial utility when employed in connection with ordnance work. Where so employed, the plug will be projected from the muzzle of the gun and will, thereafter, substantially immediately disintegrate. Such disintegration will occur to a degree that no fear need be felt of large or dangerous fragments of the plug constituting a menace to troops over whom the projectile is being fired.

A further object of the invention is that of teaching a simple and efficient method, capable of being practiced by relatively unskilled labor, and as a consequence of which a strong plug may be economically produced in large quantities.

With these and other objects in mind, reference is had to the attached sheets of drawings, illustrating one practical embodiment of the invention, and in which:

Fig. 1 is a partly sectional front view of the machine for producing plugs;

Fig. 2 is a partly sectional side view thereof;

Fig. 3 is a sectional plan view taken along the lines 3—3 and in the direction of the arrows, as indicated in Fig. 1;

Fig. 4 shows the machine parts in initial or separated positions;

Fig. 5 illustrates such parts at the completion of their working stroke or cycle;

Fig. 6 is a perspective view of the bed or support of the machine;

Fig. 7 is a sectional side view of the plug, together with the parts which form the same; and

Fig. 8 is a bottom plan view of the unit, as shown in Fig. 7.

Referring primarily to Fig. 7—the numeral 10 indicates a core formed, for example, of corkboard, and which core is preferably tapered, as shown. Surrounding the core is a sleeve 11 presenting a tapered surface 12 and a surface 13, which latter preferably extends perpendicular to the base of the ensemble. The sleeve 11 is preferably formed of composition cork.

While various other materials might be employed in lieu of the corkboard and composition cork, it is preferred that these particular substances be utilized. To those skilled in the art, it is well known that by corkboard, it is meant—a body formed of a mass of cork granules secured together under pressure and heat, and so that the resins present in such granules act as a binder to cause maintenance of the configuration which is imparted to such body or mass. On the other hand, by a composition cork, there is understood—a mass of cork granules coated with one of any number of different adhesives.

While, as afore brought out, a plug of this type may be employed in various different associations, it is of primary utility when utilized in connection with ordnance. More especially in such use, it is quite customary to employ a case filled with explosive. This explosive is maintained against displacement usually by a partition member of any desired construction. The projectile is disposed beyond the case, and the present plug is interposed between the projectile and the partition member. Ordinarily, the plug may extend into the case. In any event, with the firing of the charge, the thrust is transmitted through the plug to the projectile and both are discharged from the muzzle of the rifle. By having the unit formed preferably of corkboard and composition cork, it is found that while the plug is, in every respect, sufficiently strong to fulfill all purposes for which it is intended, it will embody the characteristic that, immediately after its discharge from the muzzle, it will disintegrate.

In order to facilitate the handling of the plug, and allow for its association with the case, the inclined surface 12 of such plug may be graphited. The surface 13 may be coated with lacquer or shellac in order to seal such surface. The disintegrating characteristic, as well as the strength of the plug, is generally enhanced by having the core 10 of a tapered configuration. It will be understood, however, that the tapering, if present, may be varied within wide limits.

As will be observed, the core of corkboard 10 is supported upon a molded cap comprising a base portion 14, from the upper surface of which spikes or retaining members 15 extend into the body of the core 10, to prevent displacement of the latter. Encircling the sleeve 11 of cork composition is a mold shell.

This includes a generally annular body 16 having an inner contour corresponding to that which is to be imparted to the outer surface of the plug. The upper surface of the mold shell may terminate in an upwardly extending flange 17 having an area and configuration corresponding to the adjacent surface of the core 10. The lower edge of this shell is preferably extended outwardly, as indicated at 18. Realizing that sleeve 11 would be under compression, and with a view to retaining the cap 14 and shell against displacement

with respect to each other, rods 19 may be passed through openings in the latter and engage the base of the former.

With a view to bringing the cap and shell to the condition shown in Fig. 7, and to correspondingly compress and assemble the materials disposed within these parts, a mechanism, such as is primarily shown in Figs. 4, 5 and 6, is employed. In these views, the numeral 20 indicates a bed, or support, preferably in the nature of a tube and which, adjacent its upper end, is conveniently formed to provide an inner and outwardly extending flange portion 21 of a height corresponding substantially to the distance between the flange 13 of the shell and the base of the cap 14. This flange, and also the body of the tube 20 adjacent the same, may be formed with slots 22 of a depth such that the rods or pins 19 may conveniently be passed through the shell. At the same time, it will be observed that the diameter of the tube or bed 20 is preferably substantially equal to that of the cap 14, while the internal diameter of the shell is such that it may slip over the tube or bed.

A filling tube 23 is slidably mounted and capable of being telescoped over the tube 20. The length of tube 23 is less than that of the tube 20 and a stop member 24 may be provided and which will maintain tube 23 in elevated position. A core pipe 25 may be supported upon the core 10, and a pressure cylinder 26 may be disposed above this pipe 25. The lower inner surface of the cylinder 26 may conform generally to the upper surface of the mold shell and have a diameter less than that of the body portion 16 thereof.

If now, a core 10 is mounted upon cap 14 and prevented from moving, with respect to the same, the latter may, in turn, be mounted upon the bed or tube 20. The core pipe 25 may now be supported on the core 10, and the filling tube 23 may be elevated. The stop, or latch, 24 may maintain it against displacement and, as shown in Fig. 4, the mold shell may be supported upon the upper end of the filling tube. This mounting of the shell is not resorted to, however, until the space intervening the core and core pipe and the filling tube has received a charge of composition cork. This charge may, in aggregate, be anywhere up to three times the height which the finished plug is to have.

Thereafter, and with the shell positioned upon the filling tube, the pressure cylinder 26 is shifted to a point at which it engages the shell, as shown in Fig. 4. If now, the catch or latch 24 is released, and the cylinder is projected, pressure will be exerted upon the shell so that it will slide along the core pipe 25. In such sliding action, it will simultaneously telescope tube 23 over the support 20. Eventually, the upper surface of the mass of composition cork will engage the inner face of the shell and the latter will begin to compress the same. This will continue until the mold cap, as shown in Fig. 7, is disposed within the face of the shell. With this positioning of the parts—which has been shown in Fig. 5—the pins or rods 19 may be disposed to lock the cap against movement, with respect to the shell.

The latter, together with the enclosed core and sleeve, may now be placed in an oven and subjected to a temperature of approximately 300° F. The pressure under which the granules of composition cork are placed will vary from 300 to 600 pounds to the square inch. This will depend upon the depth to which the filler tube 23 is filled with the mass, and the depth of the cap-shell assembly. In any event, after the assembly has been baked for 45 minutes, it will be found that the adhesive with which the granules of composition are coated has served as a binder to maintain the entire sleeve as a unit, and to secure the same against movement, with respect to the core which it encloses.

By withdrawing the rods or pins 19, the shell may be removed from the cap 14 and these parts may again be employed. The plug may be trimmed so as to remove any rough or uneven edges. Thereafter—and as afore brought out—the tapered surfaces of the plug may be coated with graphite, and at this time, or else at the time the plug is associated with the case or other mounting member, its surfaces 13 may receive one or more coatings of lacquer or shellac.

In any event, there results from this treatment a resilient unit comprising the core and the sleeve which is concentrically disposed with respect to such core. This sleeve will be of even thickness throughout, and when employed in connection with ordnance work, a plug results which embodies ample strength but which, at the same time, substantially completely disintegrates upon being projected at ordinary velocity from the muzzle of a gun.

Now referring to the apparatus which conveniently manipulates the several parts, as heretofore described in connection with Figs. 4 and 5, attention is invited to Figs. 1, 2 and 3. In the first figures, it will be seen that the tube or bed 20 has been shown as supported upon a deck 27. Counterweights 28, by chains or other flexible supports, serve to mount the filling tube 23 in a manner such that the weight of the same is counterbalanced. Thus, an operator will have no difficulty in raising this tube after the parts have assumed a position, such as has been shown in Fig. 5. Supports 30 may extend upwardly from the deck 27, and in addition to suspending the counterweights 28, may mount gearing 31 or any other suitable mechanism whereby the pressure cylinder 26 may be projected and retracted. A motor 32 may also connect with this gearing, and a control is, of course, provided for governing the operations of the motor.

One of the supports 30 may mount a receptacle 33 by means of a pivotally supported arm 34. With the arm shifted to one position, the receptacle or bucket 33 may rotated around the end of this arm so that the spout portion 35, extending from the bucket, will traverse the space between the pipe 25 and the filling tube.

In this manner, and without any difficulty, an operator will be enabled to evenly distribute the composition cork, or other material, throughout this space, so that after the latter is filled, no further levelling of the mass is necessary. Thereafter, the arm 34 may be swung to one side. The pressure cylinder may now be projected and retracted, as afore described, and in order to provide plugs including sleeves having even compression and density factors with body characteristics of even compression and density.

Thus, among others, the several objects of the invention, as specifically afore noted, are achieved. Obviously, the structure of the plug and the material from which the same is formed might be varied in numerous particulars, the steps of the method might likewise be varied and the general construction of the machine might be changed, as seems most expedient, without

departing from the spirit of the invention, as defined by the claims.

And now, having described my invention, what I claim is:

1. A method of forming a plug having a unitary and frangible body comprising a central core and an encircling sleeve and which core and sleeve are formed of materials such as cork board and composition cork respectively, such method including the providing of the central core, mounting said core upon a base, encircling the core with a mass of granules and which granules extend in the form of a column above the core, applying a mould sleeve above the mass of granules and the base, projecting the mould sleeve toward the base to compress the ganules in the form of a sleeve having a height substantially equal to that of the core, locking the mould sleeve against movement with respect to the base to retain the mass of granules under compression, baking the entire plug enclosed within the mould sleeve and base and finally removing said base and mould sleeve from said plug assembly.

2. A method of forming a plug having a unitary and frangible body comprising a central core and an encircling sleeve and which core and sleeve are formed of materials such as cork board and composition cork respectively, such method including the providing of the central core, mounting said core upon a base, encircling the core with a mass of granules to be received in and longitudinally and circumferentially compressed by a mould sleeve, such granule mass extending initially in the form of a column above the core, positioning the mould sleeve beyond the mass of granules, projecting such mould sleeve towards the base to compress the granules in the form of a sleeve having a height substantially equal to that of the core and at the same time circumferentially compress the mass around such core, locking the mould sleeve against movement with respect to the base to maintain the granule mass under compression, and thereupon baking the entire plug body enclosed within said mould sleeve.

FREDERICK CHARLES AUGUST OTT.