

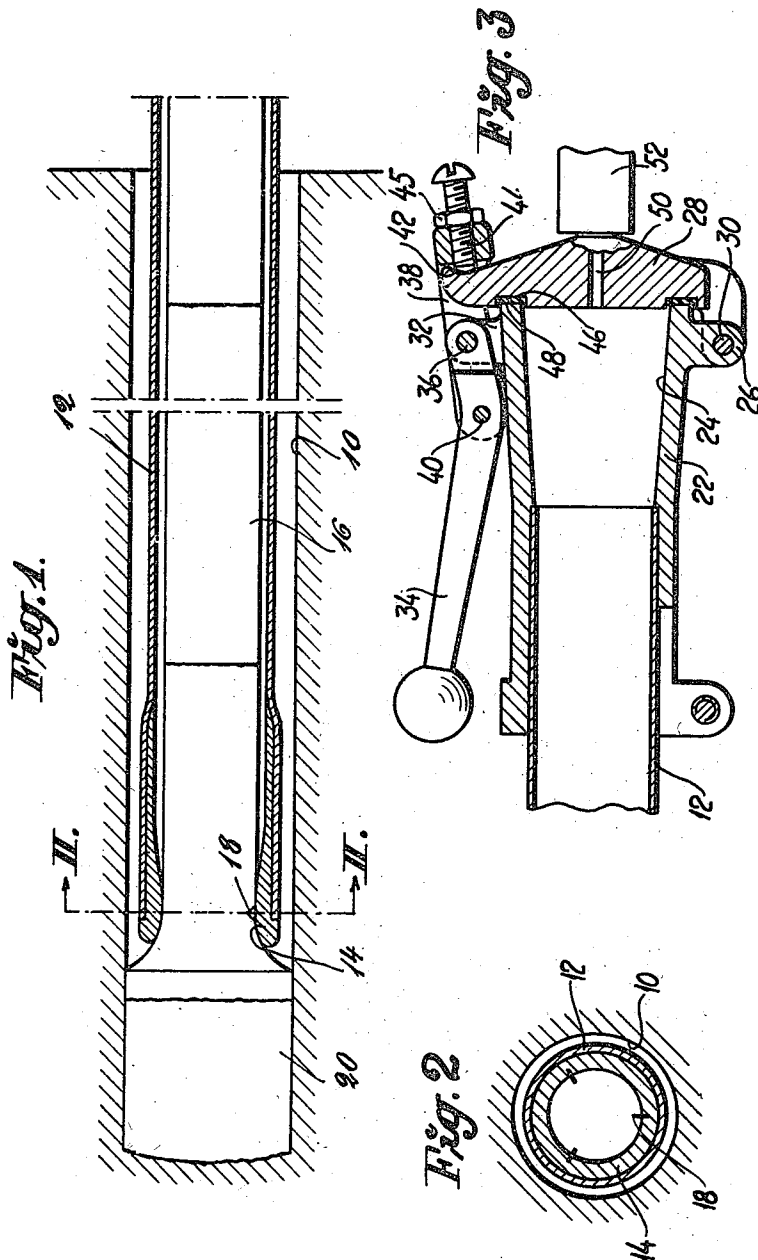
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DEVICE FOR PACKING EXPLOSIVE CARTRIDGES INTO BORE-HOLES

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DEVICE FOR PACKING EXPLOSIVE CARTRIDGES INTO BORE-HOLES

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6 Claims. (Cl. 86—20)

My invention relates to means for inserting and packing cartridges of explosive in the form of a plastic mass or a powder in bores or bore-holes formed in rocks or the like.

In practice sticks are generally utilised, by means of which the cartridges are pushed into the bore and compressed or packed at the bottom of the hole. This method of procedure is comparatively time-wasting and does not give entirely satisfactory results. The cartridges are normally surrounded by a strong wrapping of paper which permits only with difficulty the deformation of the cartridge to cause the latter to entirely fill the larger bore-hole diameter of the hole. The drawback inherent in this method increases with increase of the length of the bore-hole. Pipes sometimes are used, through which the cartridges are introduced into the bore-hole by means of compressed air, without however producing the compressive packing of the cartridges so important for the explosive effect.

The object of my present invention is to provide a simple device which facilitates the insertion and packing of explosive cartridges in bore-holes.

Further objects and advantages of the invention will be apparent from the following description considered in connection with the accompanying drawing, which forms a part of this specification, and of which:

Fig. 1 is a sectional view of a portion of a bore-hole containing a pipe constructed according to the invention.

Fig. 2 is a sectional view taken on the line II—II of Fig. 1 and

Fig. 3 is a sectional view of the exterior end of the pipe and of a device for connecting it to a source of compressed air.

Referring to the drawing, 10 designates a bore-hole provided in the bed-rock in which is inserted a pipe 12 having a diameter smaller than that of the hole. The pipe may be composed of a plurality of pipe elements joined together to provide the desired length. At its inner end adjacent the bottom of the bore-hole the pipe 12 has an internal diameter smaller than that of the other portions of the pipe. To produce this effect the pipe is preferably provided with an insert sleeve 14, which may be removable and forms a sort of nozzle.

The smallest section of the insert sleeve 14 is approximately equal to or somewhat smaller than the cross section of the explosive cartridges formed as cylindrical rods 16 or the like. A plurality of knives or cutters 18, preferably three in number, are distributed round the circumference of the sleeve 14 and extend inwardly therefrom, preferably at the narrowest portion thereof.

At its outer end the pipe 12 is connected to a sleeve 22 (Fig. 3) which may have an inner wall surface 24 conically widening towards the free edge 48 of the sleeve. It is provided with an ear 26 on which a cover 28 is hinged by means of a pin 30. Opposite the ear the sleeve carries a further ear 32 on which the one end of a handle 34 is journaled by means of a pin 36. A pin 40 engages a bore in the handle 34 in spaced relation to the

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pin 36, and also the ends of a U-shaped member 38. The cover 28 has a recessed shoulder 42 adapted to be engaged by an adjusting screw 44 threaded into the central portion of the member 38. The screw 44 is secured in desired position by a nut 45. When the lever members 34 and 38 take the position shown in Fig. 3 an annular packing 46 of rubber or the like disposed in a recess in the cover 28 is pressed against the edge 48 of the sleeve 22 so that a tight fit is secured between the cover and the sleeve. By swinging the handle 34 in clockwise direction the screw 44 is moved away from the shoulder 42 so that the cover 28 can be swung outwardly to permit cartridges 16 to be loaded into the pipe 12. The cover 28 has a central bore 50 connected to a hose 52 of rubber or like material. The hose 52 is secured to a source of compressed air (not shown) preferably the same source as that used for the boring machines. If desired, a pressure reduction valve (not shown) may be connected to the hose 52 or to a part integral therewith, so that the pipe 12 is supplied with air of a lower pressure than is the boring machine.

When used for packing the cartridges 16 within the bore-hole said cartridges are introduced in succession into the pipe 12, through which they readily pass upwardly to the insert sleeve 14. Then compressed air is supplied to the pipe 12, said air forcing the cartridges out of the pipe. In this process the knives 18 cut longitudinally extending slits in the paper wrapping of the cartridges, so that the wrapping will no longer offer any effective resistance to the packing operation.

The discharge pressure may be of such magnitude that the cartridges 16 fill up the bore-hole section, as indicated at 20, solely due to said pressure, the pipe 12 being drawn, or returning by itself out of the hole 10, according as the cartridges are packed one upon the other.

However, the pressure need be only of such magnitude as to force the cartridges out of the pipe, after which the pipe is pressed inwardly of the bore at regular intervals, so as to pack the cartridges ejected successively from the pipe while the pipe is moved step-by-step outwardly of the hole. In this case, the restricted inner end portion of the pipe 12 ensures that a cartridge cannot wholly or in part slide back into the pipe after having been discharged therefrom.

According to the invention, cartridges of various kinds may be packed consecutively in an arbitrary manner and, if desired, intermediate members of non-explosive material may be arranged between groups of cartridges in known manner. In some cases, barbs, bristles or the like may be arranged on the inside of the pipe, particularly at the leading end portion thereof, said barbs and the like permitting movement of the cartridges in a direction toward the bottom of the bore-hole, but preventing movement in the other direction. The reduction of the end portion of the pipe opening towards the bottom of the bore-hole may be represented in such case merely by the knives 18. Further, the discharge of the cartridges may be effected without compressed air, for instance by means of a vibrator which preferably is driven by compressed air. The pipe 12 may be flexible or in the form of a hose.

While one more or less specific embodiment of the invention has been shown, it is to be understood that this is for purpose of illustration only, and the invention is not to be limited thereby, but its scope is to be determined by the appended claims.

What I claim is:

1. Means for loading and packing cartridges of explosive in a bore hole comprising a tubular member having an external diameter dimensioned to be inserted in the bore and an internal diameter throughout substantially the entire length of the member dimensioned

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to permit free movement of the cartridge through the member and restricted at the discharge end of the member to closely engage a cartridge discharged therefrom, means providing an opening for loading cartridges into the member, and means for forcing the cartridges from the member, said restricted discharge end providing means for engaging cartridges discharged therefrom to pack them in the bore, said member being provided at its discharge end with a relatively thick and blunt end surface for engaging the discharged cartridges to pack them in place.

2. Means as defined in claim 1 in which said member comprises a tubular pipe element and a nozzle-like sleeve engaging the discharge end of said pipe element, said sleeve having a relatively thick and blunt end surface.

3. Means as defined in claim 1 in which one or more cutters project inwardly from the restricted discharge end portion of the member for longitudinally slitting the wrappings of the cartridges as they are discharged from the member.

4. The method of inserting and packing a plurality of explosive cartridges in a bore hole by the aid of a tubular member having a restricted discharge end providing a relatively thick and blunt end surface which comprises inserting the member into a bore so that the discharge end is adjacent to the bottom of the bore, inserting one or more cartridges into the member, forcing the cartridges in sequence through the restricted discharge end by the application of fluid pressure and packing the discharged cartridges in place in the bore by oscillating the member longitudinally of the bore

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while progressively withdrawing the member from the bore as the cartridges are discharged in sequence.

5. Means for loading and packing cartridges of explosive in a bore hole comprising a substantially rigid tubular member having an external diameter dimensioned to be inserted in the bore and an internal diameter throughout substantially the entire length of the member dimensioned to permit free movement of a cartridge through the member, said member including at the discharge end thereof means providing a restricted outlet dimensioned to be closely engaged by a cartridge discharged from the member, a cover for the inlet end of said member, quick-acting means for releasing said cover to permit the insertion of cartridges and for holding said cover in pressure-tight engagement over the inlet opening of said member, and means for supplying gaseous fluid under pressure to the inlet end of said member for forcing cartridges through the member and past the restricted discharge end thereof, said discharge end being formed to provide a thickened end surface and operative when said member is reciprocated to tamp in place the material discharged from the member.

6. Means as defined in claim 5 including one or more cutters projecting inwardly at the discharge end of the device for slitting the wrappings of the cartridges as they are discharged from the member.

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