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PACKINGS FOR ANCHORING MISSILES

Filed Dec. 16, 1960

Fig.1

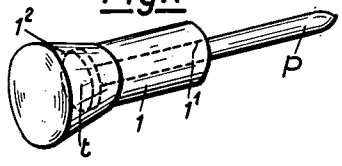


Fig.2

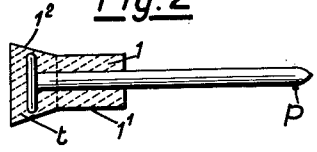


Fig.3

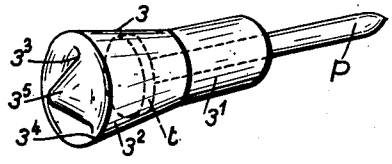


Fig.4

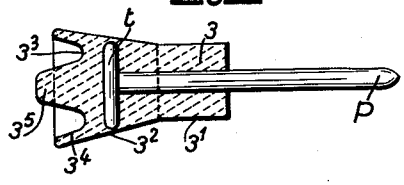


Fig.5

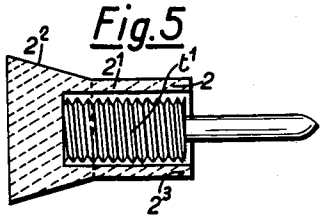


Fig.6

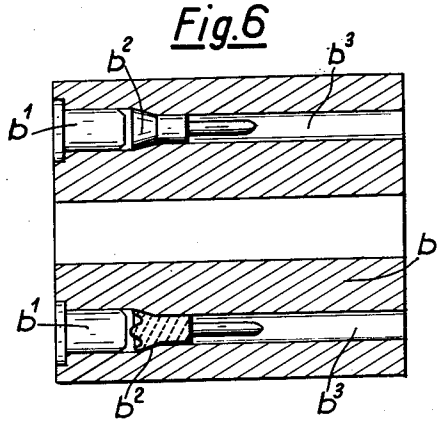
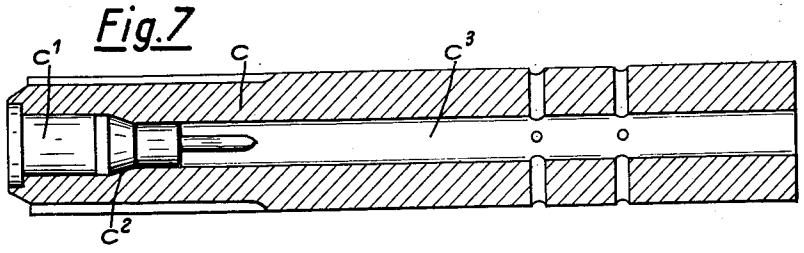


Fig.7



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PACKINGS FOR ANCHORING MISSILES

Joseph Barbier de Courteix, Saint-Etienne, Loire, France, assignor to Societe Civile d'Etude de Procedes de Scellement, Saint-Etienne, Loire, France

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The present invention relates to packings which are particularly suitable for anchoring missiles which are adapted for being fired by sealing guns or tools. In particular, the guns are of the type in which the missile is driven by a propelling gas thrust caused by percussion on a cartridge loaded with an explosive charge. The missiles are adapted for being ejected from the gun at high speed in order to be able to penetrate into hard materials.

Sealing guns of the above type are well known, and it is also known to fit a bolt or other fastener with a packing to form an anchoring missile. The packing may be fitted on the bolt either permanently or in such a manner to enable rapid assembly of the packing on the bolt prior to loading. Generally, known packings are made of flexible materials and are intended to guide the missile and to support it by friction centrally in the barrel or firing tube of the sealing gun. Sometimes, these packings are provided with a radially retaining collar which is ripped off or torn at the moment of firing, and, due to the usual irregularity of the edge of the retaining collar where it is fractured, the propelling gases are discharged when the explosive charge is fired and are not confined between the barrel and the anchoring missile as the missile moves down the firing tube. Consequently, a portion of the gases leaks between the missile and the firing tube and filters to the front of the missile so that the thrust on the missile is correspondingly reduced.

It is an object of the present invention to provide an improved anchoring missile which can be mass produced cheaply and which is provided with a packing which reinforces the seal between the anchoring missile and the bore of a sealing gun through which the anchoring missile is adapted to be propelled thereby preventing leakage of the propelling gases. Furthermore, the packing centers the missile in the bore and guides the same along said bore.

If desired, the packing can be made from flexible or yielding material, for instance a suitable plastic material, so that the packing may be moulded directly above the head of the bolt or moulded separately and then assembled over the resulting head of the bolt before the anchoring missile is fired.

It is another object of the present invention to provide an anchoring missile adapted for being fired by a sealing gun and comprising a bolt and a packing, said packing being concentrically supported on said bolt, said packing having a leading bearing portion and a trailing conical bearing portion of diameter at least equal to the diameter of said leading portion.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made to the accompanying drawing, in which like designations indicate like parts and in which:

FIGURE 1 is a perspective view of one embodiment of a packing according to the invention when assembled to a bolt to form an anchoring missile,

FIGURE 2 is a longitudinal view of the anchoring missile shown in FIGURE 1 partly in section,

FIGURE 3 is a perspective view of a second embodiment of a packing according to the invention when assembled on a bolt to form a modified anchoring missile,

FIGURE 4 is a longitudinal view of the anchoring missile shown in FIGURE 3 partly in section,

FIGURE 5 is a longitudinal view of a further embodiment of a packing according to the invention shown partly in section and assembled to a bolt different from that shown in FIGURES 1 through 4,

FIGURE 6 is a longitudinal view partly in section of anchoring missiles according to the invention shown in revolvable chambers of a multi-shot sealing gun which is adapted to fire the anchoring missiles, and

FIGURE 7 is a longitudinal view partly in section showing an anchoring missile according to the invention which is mounted in the rear end of the barrel or firing tube of a sealing gun.

Now referring to FIGURES 1 and 2 the anchoring missile consists of a packing 1 and a bolt P. The packing 1 is made of any suitable yielding material preferably a plastic which is formed by being directly moulded on the head t and a portion of the shank of bolt P. The packing 1 is formed with a forward cylindrical bearing portion 1^1 having a diameter which provides a free fit in the barrel or firing tube of the sealing guns. The cylindrical bearing portion is followed by a rear bearing portion 1^2 of conical shape with increasing diameter in a direction away from the cylindrical bearing portion 1^1. The conicity of the rear bearing portion 1^2 is appropriately determined in order to permit compression of this portion in the barrel of the firing tube without fracturing or tearing of the packing.

The head t of the bolt P is shown encased in the conical bearing portion 1^2. However, the head t can be encased in the cylindrical bearing portion 1^1. The diameter of the circular rim of the head t is slightly larger than the diameter of the bore of the firing tube so that upon firing of the explosive charge in a cartridge (not shown), the anchoring missile is projected forward after a very brief hesitation in the firing tube during which time the circular rim of the head t is slightly deformed together with the conical bearing portion 1^2 so that a sudden releasing effect is provided to thereby improve the thrust of the propelling gases and the penetrating power of the anchoring missile into hard material.

There is shown in FIGURE 5 an anchoring missile consisting of a packing 2 and a bolt P. The packing is formed with a cylindrical bearing portion 2^1 and a rear conical bearing portion 2^2 having the same characteristics as the packing shown in FIGURES 1 and 2 except that packing 2 is moulded as an independent component and formed with an inner chamber 2^3 enabling the user to fit packing 2 on the head t^1 of bolt P. For instance, the head t^1 may be formed with a threaded portion which can be threadably engaged in chamber 2^3.

The anchoring missile 3 shown in FIGURES 3 and 4 is comparable with the anchoring missile shown in FIGURES 1 and 2 and in general the bearing portions 3^1 and 3^2 of the packing have the same features of construction as 1 and 1^2 respectively. However, the rear face of the conical bearing portion 3^2 facing the propelling gas space of the firing device is formed with an annular groove 3^3 between peripheral thin lip 3^4 and axial projecting boss 3^5. The latter boss 3^5 extends beyond the plane defined by the edge of the peripheral thin lip 3^4. The deformation of the conical bearing portion 3^2 is improved when compared to bearing portion 1^2 by virtue of groove 3^3. Moreover, the thin peripheral lip 3^4 bears tightly in the barrel when subjected to the thrust of the propelling gases, and this thrust is still more effectively distributed and directed against the thin lip 3^4 due to the presence of the axial boss 3^5 which reduces the volume of the propelling gas space and therefore increases the thrust of the propelling gases. The packings which are illustrated in FIGURES 1 through 4 show the packing material enclosing both the head t and also a part of the shank of the bolt P. The length of the

packing around the part of the bolt P may be extended or reduced in order to improve the guiding of the anchoring missile as required.

It is preferable in cooperation with the anchoring missiles described above to provide the rear end of a barrel or firing tube *c* with a particular construction which is shown in FIGURES 6 and 7. Referring to FIGURE 6, a revolvable cylinder *b* is shown which is formed with cartridge chamber b^1 each having at their forward end a conical bearing surface b^2 communicating with firing bores b^3. Referring to FIGURE 7 a barrel or firing tube *c* is formed with cartridge chambers c^1 and a conical bearing surface c^2 which extends from the front end of cartridge chamber c^1 to firing bore c^3 which extends through the barrel *c*. The charging of the sealing guns is therefore effected from the rear by firstly inserting the anchoring missiles including the packings thereof and then inserting the cartridges.

The conical bearing portions 1^2, 2^2 and 3^2 of the embodiments of the packings above described perform a triple function, as follows:

The anchoring missile is retained in the barrel of the sealing gun before it is fired whatever the position in which the sealing gun is held;

The compression of the conical bearing portion immediately after firing gives the maximum efficiency to the cartridge and provides maximum use of the propelling gas pressure because the compression of the said conical bearing portion and of the said rim of the head *t* of the bolt P provides a tight plug which for a very brief instant resists the gas pressure and then releases this pressure suddenly while preventing the propelling gas from leaking between the barrel and the anchoring missile during the entire travel of the missile along the barrel. Furthermore, the anchoring missiles are guided axially as they move along the barrel or firing tube of the gun.

In addition and as has already been indicated the packings prevent wear of the barrels.

Although several embodiments have been shown of anchoring missile, it is to be understood that modifications and changes can be made without departing therefrom, and all such modifications that fall within the scope of the appended claims.

What I claim is:

1. An anchoring missile adapted for being ejected from the chamber of a gun, said missile comprising: anchoring means, and deformable means supported on the anchoring means and adapted for engagement in the chamber of the gun to position said missile therein and resist relative movement between said missile and said gun in the direction of ejection, the latter said means being deformable under the action of a force to permit delayed ejection of the missile from said chamber, said anchoring means being also deformable and supported in said chamber in interfering relation such that said anchoring means is also deformed under the action of said force.

2. A missile as claimed in claim 1 wherein said anchoring means is a bolt, and said deformable means includes a packing of a first cylindrical portion and a second portion extending coaxially from said first portion and being substantially of frusto conical shape, said bolt including a head which is larger than the diameter of the cylindrical portion.

3. A missile as claimed in claim 2 wherein said frusto-conical portion covers said head of the bolt.

4. A missile as claimed in claim 2 wherein said frusto conical portion includes a rear face which is provided with an annular groove to define an axial boss.

5. A missile as claimed in claim 2 wherein said frusto conical portion has increasing diameters in a direction extending away from said cylindrical portion.

6. A missile as claimed in claim 2 wherein said frusto conical portion has a forward face of substantially the same diameter as said cylindrical portion, the frusto conical portion being coupled to the cylindrical portion at said forward face.

References Cited in the file of this patent

UNITED STATES PATENTS

2,499,227	Miles	Feb. 28, 1950
2,666,252	Temple	Jan. 19, 1954
2,722,004	Webber et al.	Nov. 1, 1955
2,821,397	Hartigan	Jan. 28, 1958
2,887,925	Kopf	May 26, 1959

FOREIGN PATENTS

506,755	Belgium	Nov. 14, 1951
706,137	Great Britain	Mar. 24, 1954
149,829	Sweden	Apr. 26, 1955
1,117,318	France	Feb. 20, 1956
567,900	Belgium	June 14, 1958