

[54] **ELASTIC DAMPING DEVICE FOR FIRE-ARMS**
[72] Inventor: **Bernard Maillard**, Geneva, Switzerland
[73] Assignee: **Brevets Aero-Mecaniques S.A.**, Geneva, Switzerland
[22] Filed: **Mar. 4, 1970**
[21] Appl. No.: **16,409**

[30] **Foreign Application Priority Data**
Mar. 5, 1969 Switzerland.....58,147
[52] **U.S. Cl.**.....89/44, 267/181
[51] **Int. Cl.**.....F41f 19/06
[58] **Field of Search**89/42, 43, 44, 44 A, 178, 198; 267/113, 181; 188/268

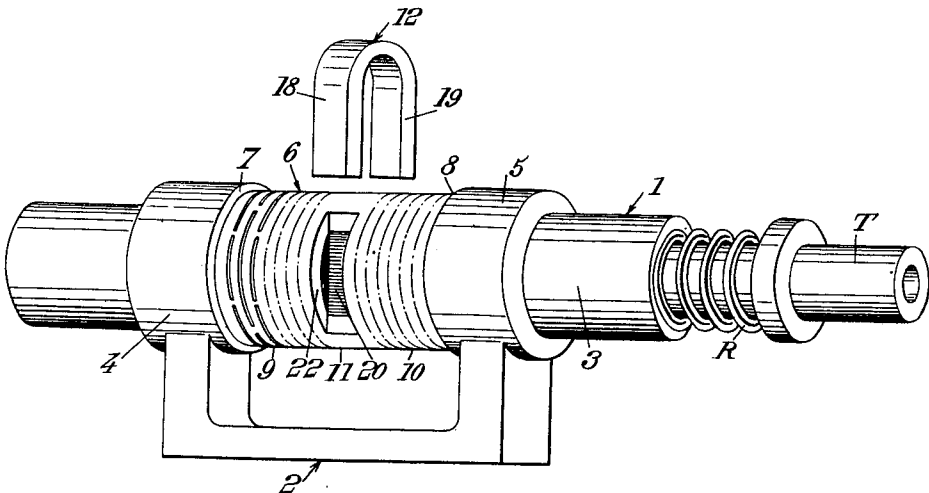
[56] **References Cited**
UNITED STATES PATENTS
2,415,952 2/1947 Loomis89/44 UX
2,293,069 8/1942 McNeill et al.89/44

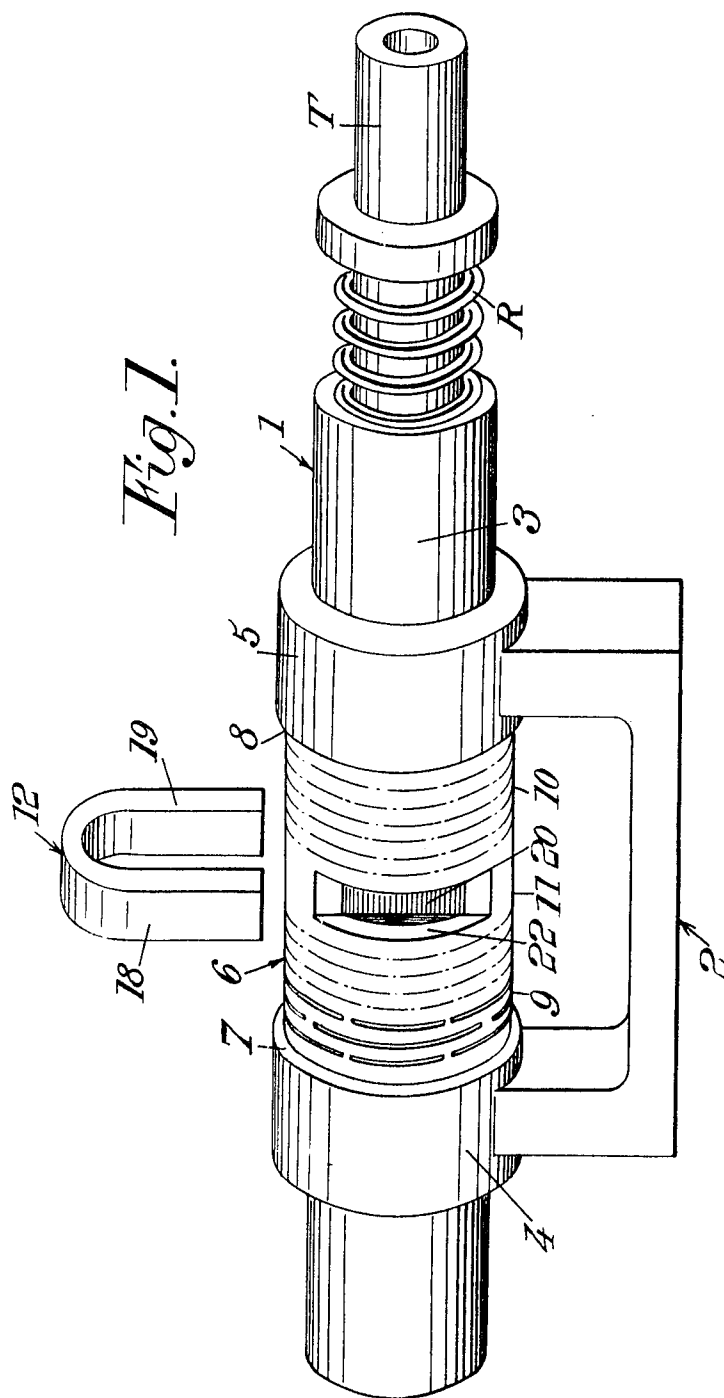
2,171,185	8/1939	Maier.....	267/181 X
168,346	10/1875	Schultz	89/44
3,053,526	9/1962	Kendall.....	188/268 X
521,400	6/1894	Canet.....	89/44 UX
442,919	12/1890	Schneider	89/44
2,831,404	4/1958	Sampson et al.....	89/198
3,198,075	8/1965	Maillard.....	89/198 UX

Primary Examiner—Stephen C. Bentley
Attorney—Larson, Taylor and Hinds

[57] **ABSTRACT**
The fire-arm includes a breech casing, a barrel recoiling with respect to the breech casing against elastic return means and a rigid support on which the breech casing slides. The elastic damping device interposed between the breech casing and the rigid support is an elastic cylindrical sleeve inserted between the two axial stop surfaces. The cylindrical sleeve has two elastic end zones separated by a rigid zone. The rigid support has two cylindrical co-axial rings axially separated. Yokes are used as removable fixing means for a cylindrical collar to the rigid zone. The weapon can be a fixed or movable installation.

7 Claims, 5 Drawing Figures





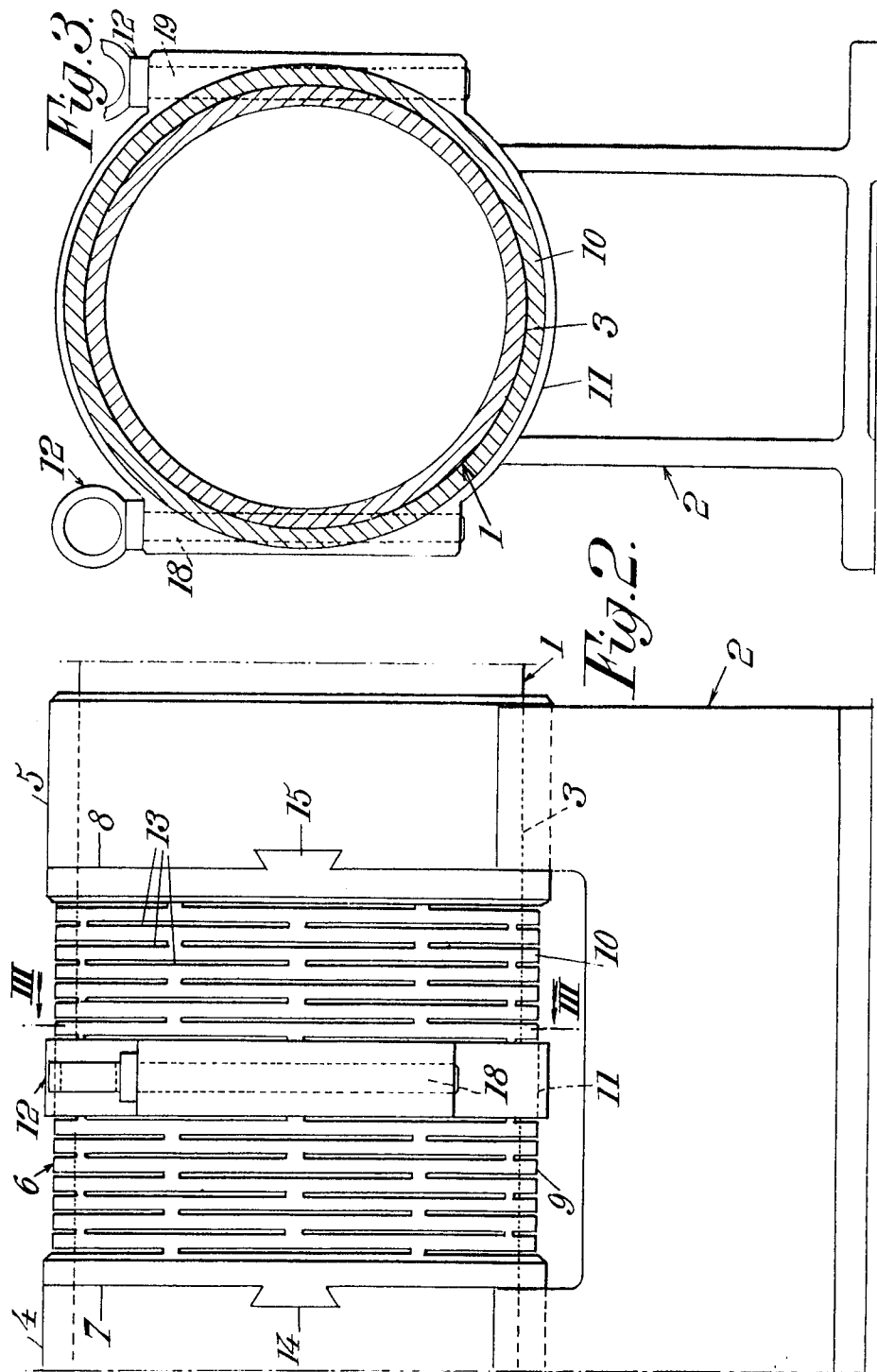


Fig. 4.

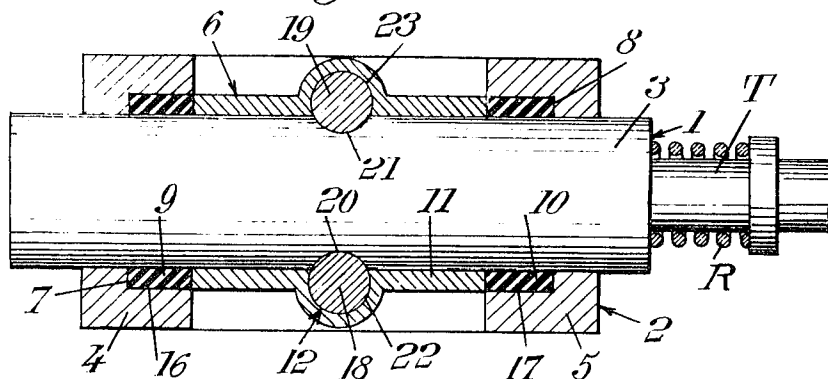
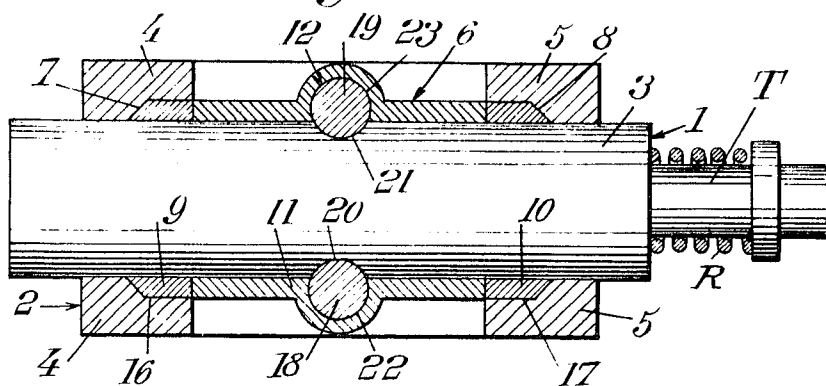


Fig. 5.



ELASTIC DAMPING DEVICE FOR FIRE-ARMS

The present invention relates to fire-arms including a breech casing with respect to which the barrel of the fire-arm is mounted to recoil against the action of elastic return means, the breech casing being mounted on a rigid support itself belonging to a firing installation which may be fixed (casemate) or movable (terrestrial, maritime or aerial vehicle), this firing installation including generally a turret enabling the fire-arm assembly to be oriented.

It has already been proposed, in such fire-arms, to interpose an elastic damping device between the breech casing of the fire-arm and the rigid support.

Hitherto, elastic damping devices known had certain drawbacks, especially as regards their complexity and the impossibility of proceeding rapidly with dismounting and remounting the assembly of the fire-arm with respect to its rigid support.

It is an object of the present invention to provide a fire-arm comprising a simple, light, robust, easily interchangeable elastic damping device and lending itself to rapid dismounting and remounting of the assembly of the fire-arm with respect to its rigid support.

The invention relates more particularly, because it is in this case that its application seems to have most advantage, but not exclusively, among such fire-arms, to automatic or semi-automatic fire-arms of a caliber comprised between 20 and 50 mm.

The fire-arm according to the invention includes a breech casing, a barrel recoiling with respect to said breech casing against the action of elastic return means, the breech casing being mounted slidably on a rigid support with the interposition of an elastic damping device between said breech casing and said rigid support, and is characterized by the fact that,

the breech casing of the fire-arm has a cylindrical collar for sliding and guiding,

the rigid support includes two co-axial cylindrical rings and separated axially from one another, the inner diameter of these cylindrical rings and their axial separation being such that said cylindrical collar occurs constantly engaged, on firing, in said cylindrical rings which ensures permanent guidance of the breech casing of the firing-arm,

and the elastic damping device is constituted by a cylindrical sleeve inserted between two axial stop surfaces occurring opposite and belonging respectively to the two cylindrical rings, this cylindrical sleeve including two elastic end zones (preferably with identical mechanical characteristics) separated by an intermediate rigid zone, removable fixing means (preferably yokes) being provided to fix at least axially the cylindrical collar of the breech casing of the fire-arm with the intermediate rigid zone of the said cylindrical sleeve.

According to a preferred embodiment of the fire-arm according to the invention, the cylindrical sleeve is constituted by a section of metal having elastic characteristics and including an intermediate solid zone (constituting the intermediate rigid zone) and two end zones cut along circular sectors arranged in staggered arrangement (constituting respectively the two elastic end zones).

In another preferred embodiment of the invention, the two ends of the cylindrical sleeve include means of assembly holding the end considered in contact with the surface of the corresponding axial stop, so that each elastic end zone of the said sleeve works, on firing, under compression and under traction, the abovesaid assembly means being also capable of immobilizing in rotation the above-said cylindrical sleeve with respect to the cylindrical rings of the rigid support.

In order that the invention may be more fully understood, several embodiments thereof are described below, purely by way of illustrative but non-limiting example, with reference to the accompanying drawings in which:

FIG. 1 is a diagrammatic view in perspective of a first embodiment of a fire-arm according to the invention;

FIG. 2 is a partial view in elevation of the embodiment of FIG. 1;

FIG. 3 is a sectional view along the line III—III of FIG. 2; and

FIGS. 4 and 5, lastly, illustrate respectively, by partial axial sections, two further embodiments of a fire-arm according to the invention.

As shown in FIG. 1, the fire-arm includes a breech casing 1 with respect to which the barrel T of the fire-arm is mounted to recoil against the action of elastic return means R. The breech casing 1 is mounted on a rigid support 2 belonging to a firing installation (casemate, terrestrial, maritime, aerial vehicle, etc.). This firing installation includes generally a turret enabling the whole of the fire-arm to be oriented.

An elastic damping device is interposed between the breech casing 1 and the rigid support 2.

This is the case and conforms to the principal arrangement of the invention of which the principal is illustrated in FIG. 1, the breech casing 1 of the fire-arm has a cylindrical driving and guiding collar 3,

the rigid support 2 includes two co-axial cylindrical rings 4 and 5 and separated axially from one another, the inner diameter of the cylindrical rings 4 and 5 and their axial separation being such that the above-said cylindrical collar 3 occurs constantly engaged, on firing, in the above-said cylindrical rings 4 and 5 which ensure a permanent guidance of the breech casing 1 of the fire-arm,

and the elastic damping device, interposed between the breech casing 1 and the rigid support 2, is constituted by a cylindrical sleeve 6 inserted between two axial stop surfaces 7 and 8 facing and belonging respectively to the two cylindrical rings 4 and 5, this cylindrical sleeve 6 including two elastic end zones 9 and 10 (preferably with identical mechanical characteristics) separated by an intermediate rigid zone 11, removable fixing means 12 (preferably yokes) being provided to fix at least axially the cylindrical collar 3 of the breech casing 1 of the fire-arm with the intermediate rigid zone 11 of the above-said cylindrical sleeve 6.

To this end, recourse is advantageously had to the method of construction illustrated in FIGS. 2 and 3, and according to which the cylindrical sleeve 6 is constituted by a section formed of a metal having elastic characteristics, this section including an intermediate solid zone constituting the rigid intermediate zone 11 and two end zones cut along circular sectors 13 arranged in staggered arrangement, these two cut out end zones constituting respectively the two springs or elastic end zones 9 and 10.

Preferably, each of the two ends of such a cylindrical sleeve 6 includes assembly means, respectively 14 and 15, holding the end considered in contact with the corresponding axial stop surface 7 or 8, so that each elastic end zone 9 or 10 of this cylindrical sleeve 6 works, on firing, under compression and under traction.

These assembly means 14 and 15 may advantageously be of the dovetailed type.

It is also advantageous to note that the removable fixing means 12 may also fix in rotation the cylindrical collar 3 of the breech casing 1 of the fire-arm with the intermediate rigid zone 11 of the cylindrical sleeve 6.

Means of rotary immobilization may also be provided between the two ends of the cylindrical sleeve 6 and the axial stop surfaces 7 or 8 of the two cylindrical rings 4 or 5.

Such means of rotary immobilization may advantageously be constituted by dovetails which constitute the assembly means 14 and 15 due to which the elastic end zones 9 and 10 of the cylindrical sleeve 6 work under compression and under traction on firing.

However recourse could also be had to the method of construction of which two embodiments are illustrated in FIGS. 4 and 5.

According to this method of construction, the cylindrical sleeve 6 includes a rigid intermediate section constituting the intermediate rigid zone 11, and two elastic end sections constituting respectively the two elastic end zones 9 and 10, each

of these two end sections being housed in a bore 16 or 17 arranged in the ring 4 or 5 considered and having, when it is not deformed, a diameter equal to that of the cylindrical collar 3 of the breech casing 1 of the fire-arm, due to which, when one of these end sections is compressed, its diameter tends to diminish and grip the said cylindrical collar 3, thus obtaining a restraining effect on the movements of the breech casing 1 of the fire-arm with respect to the rigid support 2.

According to a variation of this method of construction illustrated in FIG. 4, the axial stop surface 7 or 8 in the corresponding cylindrical ring 4 or 5 is perpendicular to the axis of the fire-arm, and each end section is constituted of elastics synthetic material deforming under compression.

In the embodiment illustrated in FIG. 5, the axial stop surface 7 or 8 in the corresponding cylindrical ring 4 or 5 is inclined with respect to the axis of the fire-arm and this in such manner that, when each end section is subjected to a force applying it against the corresponding axial stop surface, its inner diameter tends to diminish.

It is to be noted, regarding the damping effect obtained by the end sections in the embodiment shown in FIGS. 4 and 5, that a restraining effect could also be obtained in the case of the method of construction shown in FIGS. 2 and 3 by providing a viscous frictional substance (such as a wax for example) interposed between one at least of the two cylindrical rings 4 or 5 and the cylindrical collar 3 of the breech casing of the fire-arm.

With regard to the yoke form fixing means 12, they may be of various types, but it would seem that preference should be given to yoke form fixing means 12 comprising two parallel yokes 18 and 19 held respectively in two parallel grooves 20 and 21 fashioned in the cylindrical collar 3 of the breech casing 1 of the fire-arm and in two parallel housings 22 and 23 arranged in the intermediate rigid zone 11 of the cylindrical sleeve 6.

Thus and whatever the method of construction adopted, there is provided a fire-arm in which the elastic damping device interposed between the breech casing of the fire-arm and the rigid support is simple, light, robust, easily interchangeable and lends itself to rapid dismounting and remounting of the assembly constituted by the breech casing and the barrel with respect to its rigid support.

Moreover, this elastic device has a small bulk, which constitutes an important advantage in certain firing installations.

As is self evident, and as emerges already besides from the preceding description, the invention is in no way limited to that of its methods of application, nor to those of its methods of construction of its various parts which have been more par-

ticularly described; it embraces, on the contrary, all variations.

What I claim is:

1. Fire-arm especially an automatic or semi-automatic fire-arm of a caliber comprised between 20 and 50 mm, including a breech casing, a barrel recoiling with respect to said breech casing against the action of elastic return means, the breech casing being mounted slidably on a rigid support with the interposition of an elastic damping device between said breech casing and said rigid support,

the breech casing having a sliding and guiding cylindrical collar,

the rigid support including two cylindrical and co-axial rings axially separated from one another, the inner diameter of said cylindrical rings and their axial separation being such that said cylindrical collar is constantly engaged, on firing, in said cylindrical rings which ensure permanent guidance of the breech casing,

the elastic damping device being constituted by a cylindrical sleeve inserted between two axial stop surfaces facing and belonging respectively to the two elastic end zones separated by a rigid zone, removable fixing means being provided to fix the cylindrical collar at least axially to said rigid zone,

and wherein each end of the cylindrical sleeve includes means for assembling and holding the end concerned in contact with the surface of the axial stop, so that each elastic end zone works, on firing, under compression and under traction.

2. Fire-arm according to claim 1, wherein the two elastic end zones have identical mechanical properties.

3. Fire-arm according to claim 1, wherein the removable fixing means include yokes.

4. Fire-arm according to claim 1, wherein the cylindrical sleeve is constituted by a section of metal having elastic properties and including a solid intermediate zone constituting said rigid zone, and two end zones cut along circular sectors in staggered arrangement, constituting respectively the two end elastic zones.

5. Fire-arm according to claim 1, wherein said removable fixing means fix in rotation the cylindrical collar to said rigid zone.

6. Fire-arm according to claim 1, wherein means of rotary immobilization are provided between the two ends of the cylindrical sleeve and the axial stop surfaces or of the two cylindrical rings.

7. Fire-arm according to claim 6, wherein said means of rotary immobilization are constituted by the assembly means.

* * * * *