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RECOILLESS MECHANISM FOR GUNS AND MORTARS

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Fig. 1.

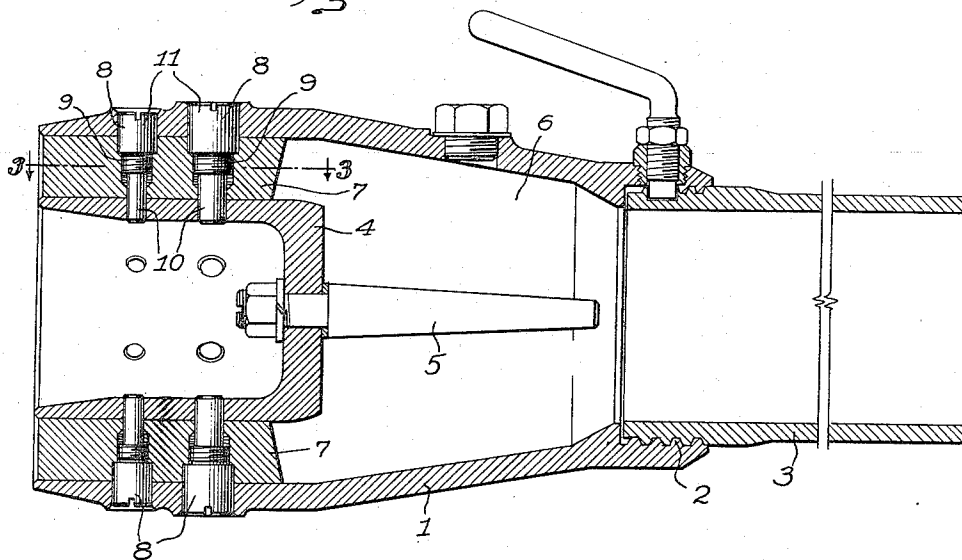


Fig. 2.

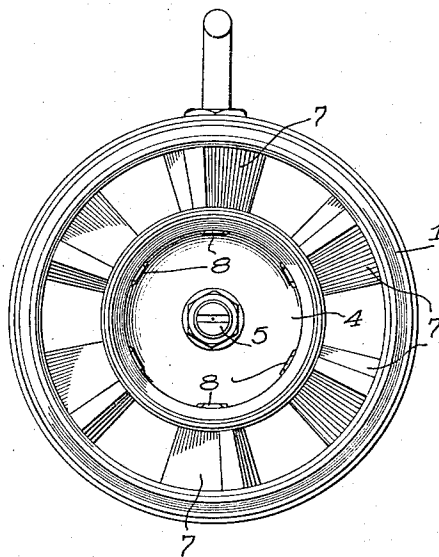
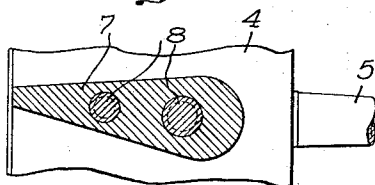


Fig. 3.



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RECOILLESS MECHANISM FOR GUNS AND MORTARS

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6 Claims. (Cl. 89—1)

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This invention relates to recoilless mechanism for mortars and guns, particularly of the type wherein the projectile is discharged as a result of gases produced by the burning of a combustible charge.

The invention is particularly directed to recoilless mechanisms for mortars and guns embodying a casing which constitutes a charge chamber, a support within the casing for the combustible charge and a plurality of vanes between the casing and the charge support.

In previously proposed constructions of this type the vanes were rigidly secured to both the casing and the charge support. In a construction of this type the casing incident to the burning of the combustible charge is subject to intense heat which tends to expand the casing. In these previously proposed constructions this expansion tends to rupture the connections between the vanes and the casing member with a result that the mechanism was rendered ineffective for efficient use. Another disadvantage of the previously proposed constructions is that no provision was made for the development of abnormally high pressures within the casing with a result here that the casing upon the development of these abnormally high pressures, would burst and cause serious personnel and property damage.

One of the objects of the present invention is to provide recoilless mechanism for guns and mortars wherein means is provided in the connections between the casing and vanes which will permit free expansion of the casing relative to the vanes and the support for the powder charge.

Another object is to provide a recoilless mechanism with connections between the vanes and the casing member which are of such strength as to shear upon the development of abnormally high pressures in the casing and permit the support for the powder charge to be discharged from the casing before the pressure within the casing reaches a value such as would cause bursting of the casing.

With the above and other objects in view which will be apparent to those skilled in the art to which the invention appertains, the present invention consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed.

In the drawing which illustrates a suitable embodiment of the invention:

Figure 1 is a longitudinal section of the recoilless mechanism.

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Figure 2 is an end view of the structure shown in Figure 1, and

Figure 3 is a section taken approximately on the line 3—3 of Figure 1.

Referring to the accompanying drawing, the recoilless mechanism of the present invention includes an annular casing 1 open at its opposite ends and secured, such as by the threaded connection 2 shown in the drawing, to one end of the gun barrel or mortar tube 3. Disposed concentrically within the casing 1 is a cylindrical cup shaped member 4 to which a spindle 5 is axially secured. The spindle 5 together with the member 4 constitutes the support for the combustible charge (not shown) within the pressure chamber 6 formed by the casing 1.

Disposed between the casing 1 and the peripheral surface of the concentric member 4 is a plurality of circumferential spaced elongated vanes 7. These vanes are so contoured as to provide Venturi passages between adjacent vanes.

Relative rotation and relative axial movement between the casing 1, the cylindrical member 4 and the vanes 7 is prevented by means of a plurality of pin members 8. These pin members are provided with a central portion 9 secured to the vanes 7, preferably, by a threaded connection, there being two such pin members for each vane. The central portions 9 of the pin members are provided at the radially extending inner ends with cylindrical portions 10 of reduced diameter which extend radially through the annular wall of the member 4, and at their radially extending outer ends with portions 11 of increased diameter which extend radially through the annular wall of the casing 1. The engagement of the end portions 10 and 11 with the cylindrical member 4 and casing 1, respectively, is such as to permit expansion of the casing 1 which occurs during the operation of the mechanism as a result of the high temperatures produced within the casing or chamber 6 by the burning of the combustible charge. It is thus seen that this connection will permit free expansion of the casing 1 without rupturing any connection with the vanes 7 or the cylindrical member 4 which might render the mechanism useless.

In order to provide for safety of operation and to guard against rupturing or bursting of the casing 1 in the event abnormally high pressures are developed within the chamber 6, the radial end portions 10 of the pin members 8 are of such strength that they will shear off upon the development of abnormally high pressures to a predetermined value less than the pressure which

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would be required to burst the casing 1. These pressures are such that upon shearing of the portions 10 the cylindrical member 4 will be blown or discharged axially from the casing 1, thus insuring against the development of abnormal pressures which might burst the casing 1.

From the foregoing it will be seen that a novel and effective means is provided not only for permitting expansion of the casing 1 but also for insuring safety of operation of the mechanism in case of the development of abnormally high pressures within the casing 1.

It is to be understood that various changes may be made in the detailed construction and arrangement of the parts described without departing from the spirit and substance of the invention, the scope of which is defined by the appended claims.

What is claimed is:

1. In a recoilless mechanism for guns and mortars, an annular casing forming a pressure chamber, a plug member disposed centrally within such chamber in spaced relation with respect to the wall thereof, a plurality of circumferentially spaced vanes disposed between said plug member and the wall of said chamber, and pin members extending through said annular casing and said vanes into said plug member, said pin members holding said casing, vanes and plug member against relative rotational and axial movements.

2. In a recoilless mechanism for guns and mortars, an annular casing forming a pressure chamber, a plug member disposed centrally within such chamber in spaced relation with respect to the wall thereof, a plurality of circumferentially spaced vanes disposed between said plug member and the wall of said chamber, and connections between said casing, vanes and plug member, said connections being in shear and of such strength as upon the development of abnormally high pressures within said chamber to shear and release said plug member for discharge from said chamber prior to bursting of said casing.

3. In a recoilless mechanism for guns and mortars, an annular casing forming a pressure chamber, a plug member disposed centrally within such chamber in spaced relation with respect to the wall thereof, a plurality of circumferentially spaced vanes disposed between said plug member and the wall of said chamber, and radial shear

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elements connecting said vanes to said casing and said plug member.

4. In a recoilless mechanism for guns and mortars, an annular casing forming a pressure chamber, a plug member disposed centrally within such chamber in spaced relation with respect to the wall thereof, a plurality of circumferentially spaced vanes disposed between said plug member and the wall of said chamber, and a plurality of pin members fixed to said vanes and having end portions extending radially into said casing and plug member and having such engagement with said casing as to permit expansion of said casing relative to said vanes and plug member.

5. In a recoilless mechanism for guns and mortars, an annular casing forming a pressure chamber, a plug member disposed centrally within such chamber in spaced relation with respect to the wall thereof, a plurality of circumferentially spaced vanes disposed between said plug member and the wall of said chamber, and a plurality of pin members having central portions fixed to said vanes, radially extending inner end portions connected with said plug member and radially extending outer end portions extending through said casing in such manner as to permit radial expansion movement of said casing relative to said vanes and pin member.

6. In a recoilless mechanism for guns and mortars, an annular casing forming a pressure chamber, a plug member disposed centrally within such chamber in spaced relation with respect to the wall thereof, a plurality of circumferentially spaced vanes disposed between said plug member and the wall of said chamber, and a plurality of pin members having central portions fixed to said vanes, radially extending inner end portions connected with said plug member and radially extending outer end portions extending through said casing in such manner as to permit radial expansion movement of said casing relative to said vanes and pin member, said radially extending inner end portions being of lesser diameter than said radially extending outer end portions and being arranged to shear off at pressures developed within said chamber which approximate but are less than pressures which burst said casing.

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