

Sept. 28, 1948.

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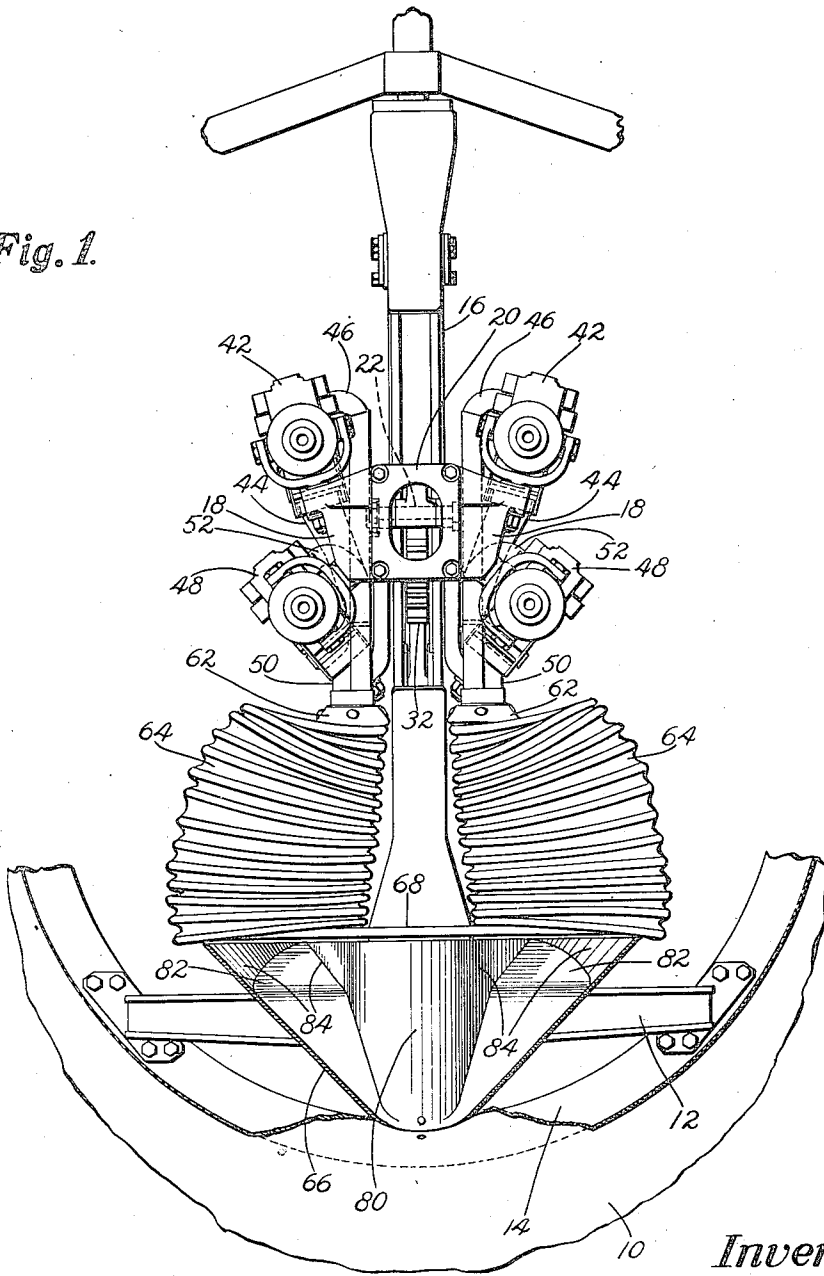
2,450,058

SPENT AMMUNITION ELIMINATING MEANS

Original Filed July 3, 1944

3 Sheets-Sheet 1

Fig. 1.



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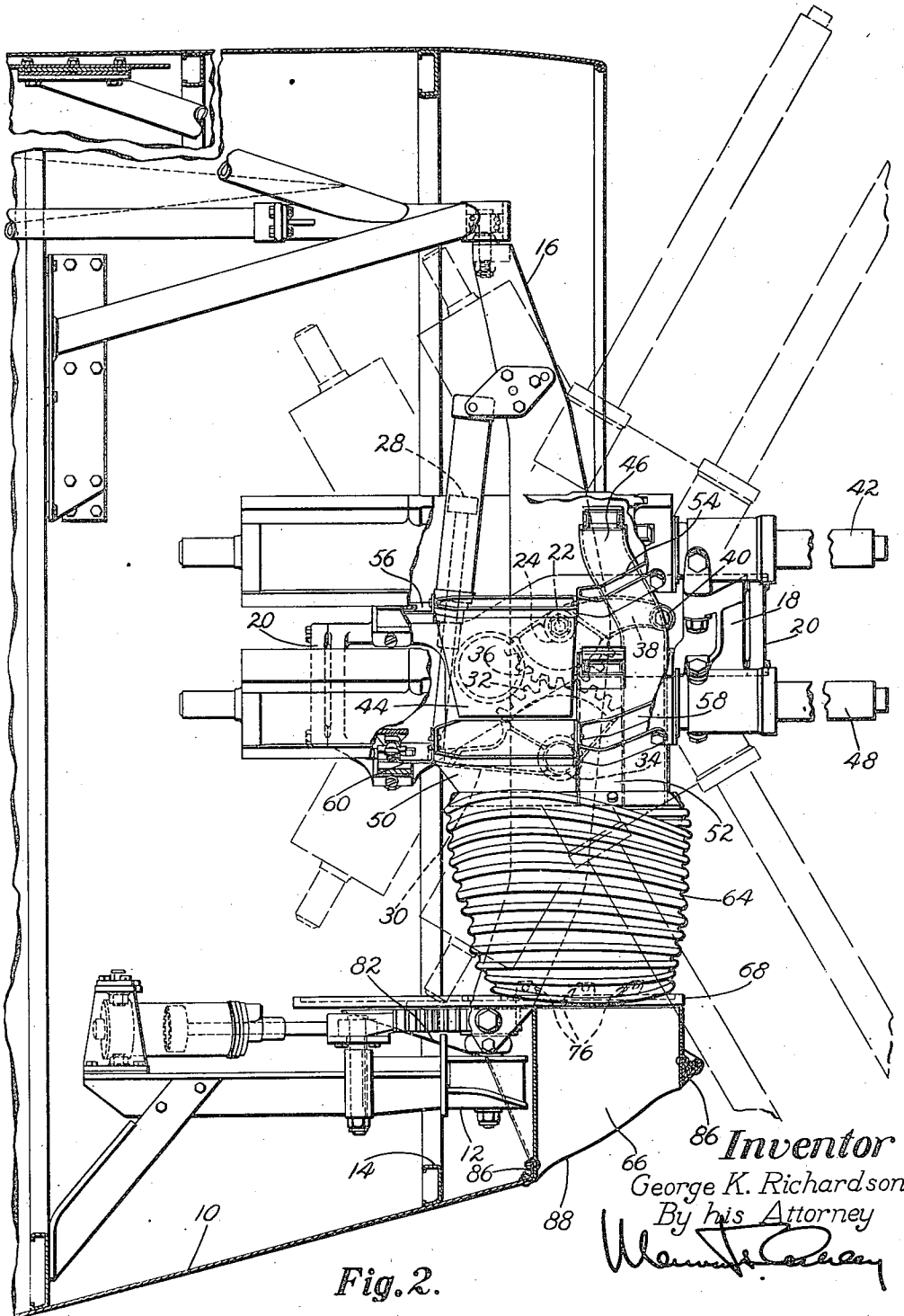


Fig. 2.

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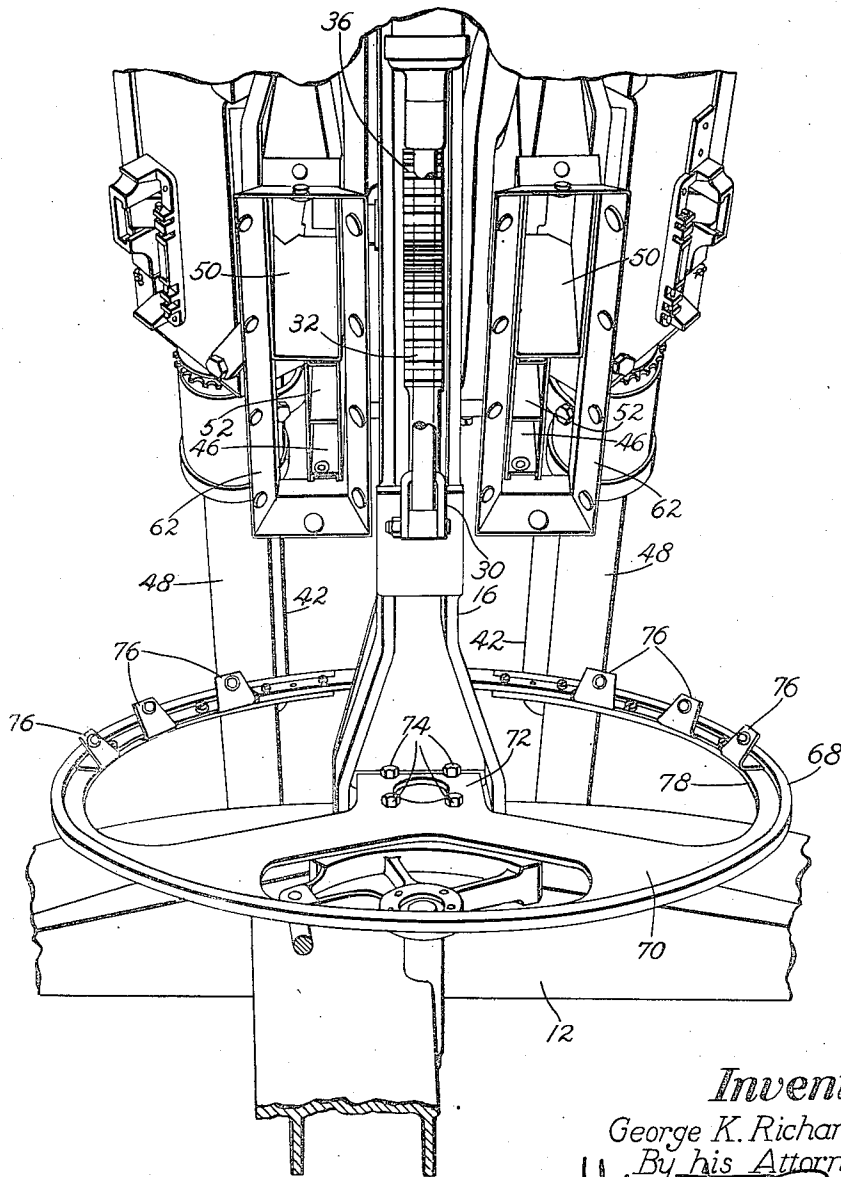
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Fig. 3.



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# UNITED STATES PATENT OFFICE

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## SPENT AMMUNITION ELIMINATING MEANS

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to United Shoe Machinery Corporation, Flem-  
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Original application July 3, 1944, Serial No.  
543,345. Divided and this application Decem-  
ber 2, 1946, Serial No. 713,572

3 Claims. (Cl. 89—33)

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This invention relates to ordnance and is herein illustrated in its application to means for eliminating spent ammunition elements from airplane gun mounts.

In a four gun mount, a considerable volume of spent ammunition elements is accumulated in a short period of fire particularly when the spent ammunition elements include, in addition to the empty cartridge cases, the metallic links which connected the cartridges together to form the ammunition belt. Since there is no suitable space in the tail portion of an airplane for storage, even temporarily, of the large volume of spent ammunition elements delivered from a four gun mount, suitable provision must be made for the elimination from the airplane of the spent ammunition elements immediately upon their delivery from the gun.

Accordingly, it is an object of the present invention to make suitable provision for the elimination of spent ammunition elements from a gun mount such, for example, as the airplane gun mount illustrated and described in my copending application for United States Letters Patent Serial No. 543,345, filed on July 3, 1944, of which the present application is a division.

To this end, the present invention in one aspect thereof consists in the provision, in a gun mount having a plurality of guns constructed and arranged for movements in azimuth and in elevation, of a column on which the guns are supported for movement in elevation, chutes for conducting spent ammunition elements from the guns, a flexible conductor one end of which is connected to said chutes, and a ring secured to the column and arranged to provide a mounting for the other end of said flexible conductor, said ring having an opening through which spent ammunition elements pass from the flexible conductor. In the illustrated assembly, the ring registers with an opening in the bottom of the fuselage of the airplane through which spent ammunition elements are eliminated. In the illustrated gun mount each gun is provided with two rigid chutes one of which receives empty cartridge cases while the other receives the metallic links which connect the cases together. In the illustrated construction two flexible conductors are provided one at each side of the column and a common outlet is provided for the rigid chutes at each side of the column, said outlet being attached to the receiving end portion of the flexible conductor. The flexible construction of the conductor attached to the rigid chutes permits free expansion and contraction of said

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conductor during movements of the gun assembly in elevation.

These and other features of the invention will now be described with reference to the accompanying drawings and pointed out in the appended claims.

In the drawings,

Fig. 1 is a view in elevation of a gun mount, embodying the features of the present invention, taken from a point outside the airplane and looking in the general direction of the bores of the guns;

Fig. 2 is a side elevation of the gun mount illustrated in Fig. 1 with the fuselage of the airplane shown in section and the central portions of the guns broken away, the extremelimits of movements of the guns in elevation being diagrammatically shown; and

Fig. 3 is a perspective view of the gun mount taken from the gunner's position, the flexible conductors of spent ammunition elements being omitted and the guns being shown in a downturned position but centrally located as to their position in azimuth.

Referring to Fig. 1, the illustrated gun mount is located in the tail portion of an airplane, a portion of the fuselage of which is indicated by the numeral 10. The gun mount is supported on a crosshead 12 secured to a rib 14 of the fuselage. The crosshead 12 supports a column 16 for movement on an axis extending heightwise of the airplane. Mounted on the column for swinging movement on an axis extending widthwise of the airplane is a hollow cradle surrounding the column, the illustrated cradle comprising two adapters 18 the opposite ends of which are secured together by heads or end plates 20. Mounted on the adapters are four .50 caliber machine guns, the bores of said guns defining four corners of a rectangle the sides of which are respectively parallel and perpendicular to the axis of the column. Referring to Fig. 2 the adapters 18 are secured by a clamping bolt 22 to a hollow shaft 24 which turns in roller bearings mounted in the column 16. For swinging the cradle together with the gun assembly to move the guns in elevation a hydraulically actuated piston 28 is connected to an arm 30 extending from a gear segment 32 mounted on a shaft 34 extending through the column 16, and arranged to mesh with a similar segment 36 mounted on the hollow shaft 24, said segment having an extension 38 the end of which has a crosshead 40 secured to the adapters 18.

For eliminating spent ammunition elements, which ordinarily comprise empty cartridge cases

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and metallic links which connect the cartridges together, each of the upper guns 42 is provided with a rigid chute 44 (Fig. 2) which receives the empty cartridge cases and a smaller rigid chute 46 which receives the metallic links, and each of the lower guns 48 is provided with a short rigid chute 50 for the empty cartridge cases and a rigid chute 52 for the metallic links. Each chute 44 is secured to one of the upper guns by a yoke 54 and a bracket 56, and similarly each chute 50 is secured to one of the lower guns by a yoke 58 and a bracket 60. The lower end of each chute 44 is positioned just above the mouth of the lower chute 50, and the mouth of each lower chute 50 is extended inwardly toward the column 16 to receive the empty cartridge cases which pass through the upper chute. The chutes 46, 50 and 52 at each side of the gun mount terminate in a common outlet 62 (Fig. 3) having outwardly flaring margins provided with fastenings for attaching the open upper end portion of a flexible conductor 64 (Fig. 2). As shown in Fig. 1, there are two such flexible conductors, one at each side of the gun mount. Spent ammunition elements pass through the flexible conductors and into a fixed funnel 66 (Fig. 1), which directs said elements downwardly through an opening in the bottom of the fuselage. As illustrated in Fig. 1, each flexible conductor is a generally cylindrical fabric member arranged in upright position and supported solely by its connection to the outlet 62 of the rigid chutes. The flexible conductors are constructed and arranged to expand and contract during movement of the guns in elevation and have inserted therein a spiral wire, or alternatively, a series of generally parallel metallic hoops, to prevent the conductors from collapsing and thus impeding the discharge of the spent ammunition elements. Inasmuch as the flexible conductors are required to move with the gun assembly in azimuth their lower or outlet portions are secured to a plate or ring 68 (Fig. 3) having a web portion 70 which extends into the center of the ring and terminates in a plate 72 secured by screws 74 to the hub of a gear segment (not shown) comprising part of the base mounting of the column 16. For fastening the flexible conductors to the ring 68 the ring is provided with upstanding, outturned tabs some of which are shown at 76 in Fig. 3, each tab being provided with a headed stud for fastening a predetermined portion of the flexible conductor to the tab. The outlet portion of each flexible conductor registers with an opening 78 in the ring 68 and spent ammunition elements passing through said opening in the ring are received by the funnel 66. Referring to Fig. 1 it will be seen that the funnel, which is shown in section in said figure, is shaped to fit into the irregular space available for it beneath the ring 68. Said funnel has a cylindrical central section 80 which extends about the lower bearing of the column 16. In order to insure the discharge of the spent ammunition elements into the funnel when the gun assembly is in an extreme position in azimuth, the funnel is provided

with generally parallel portions extending forwardly of the airplane and overlying the cross-head 12. These forward extensions have bottom surfaces 82 sloping downwardly toward the outlet portion of the funnel and side walls 84 which diverge rearwardly and terminate respectively in the cylindrical portion 80 and the upper margin of the body portion of the funnel. As shown in Fig. 2, the funnel 66 is secured by brackets 86 to the bottom of the fuselage adjacent to an opening 88 provided in the fuselage for the outlet of the spent ammunition elements.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a gun mount, a plurality of guns, a column on which the guns are supported for movement in elevation, rigid chutes secured to said guns and arranged to conduct spent ammunition elements therefrom, a flexible conductor one end of which is connected to said chutes, a ring secured to the column and arranged to provide a mounting for the other end of said flexible conductor, said ring having an opening through which spent ammunition elements pass from the flexible conductor.

2. In a gun mount, a plurality of guns, a column on which the guns are supported for movement in elevation, rigid chutes secured to said guns and arranged to conduct spent ammunition elements therefrom, a flexible conductor one end of which is connected to said chutes, a ring secured to the column and arranged to provide a mounting for the other end of said flexible conductor, said ring having an opening through which spent ammunition elements pass from the flexible conductor, and a fixed funnel constructed and arranged to receive spent ammunition elements passing through the opening in the ring.

3. In a gun mount, four guns, a column on which the guns are supported for movement in elevation, two guns being mounted at each side of the column, rigid chutes secured to the guns and arranged to conduct spent ammunition elements therefrom, two flexible conductors one at each side of the column for conducting spent ammunition elements from said rigid chutes, a ring secured to the column and arranged to provide a mounting for each of said flexible conductors, said ring being open to permit the passage of spent ammunition elements from the flexible conductor.

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#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
2,336,557	McCallister	Dec. 14, 1943

#### FOREIGN PATENTS

Number	Country	Date
785,893	France	May 27, 1935