Dec. 24, 1957 E. J. DOWER ET AL 2,817,233

FLEXIBLE FIRING MOUNT

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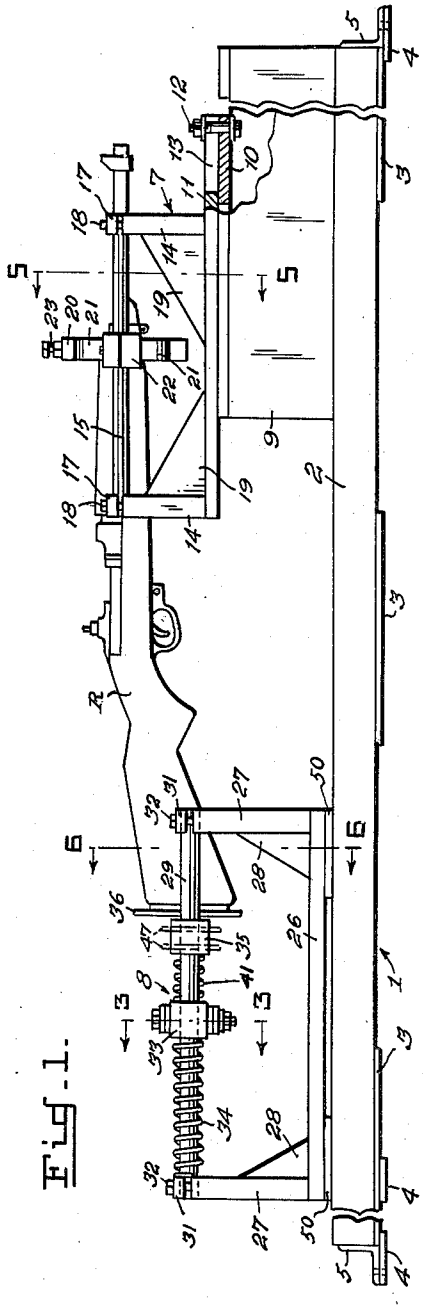


Fig. 1.

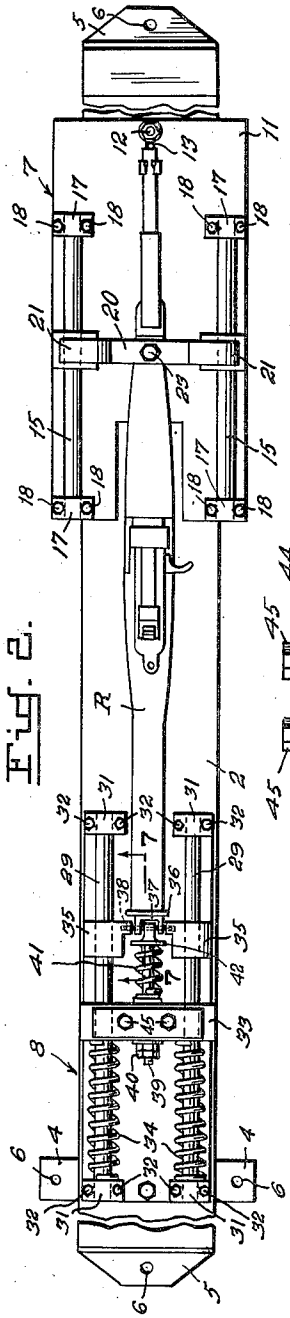


Fig. 2.

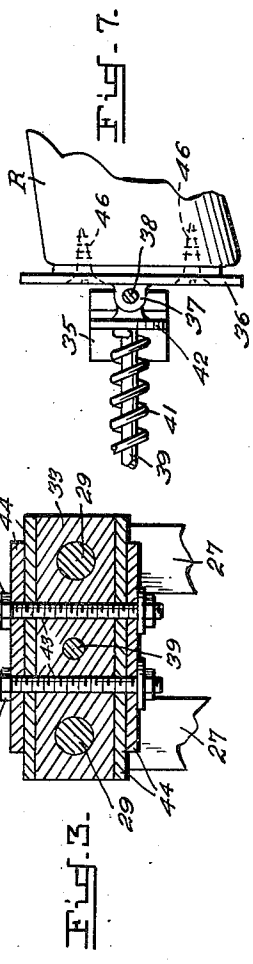


Fig. 7.

Fig. 3.

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Fig. 4.

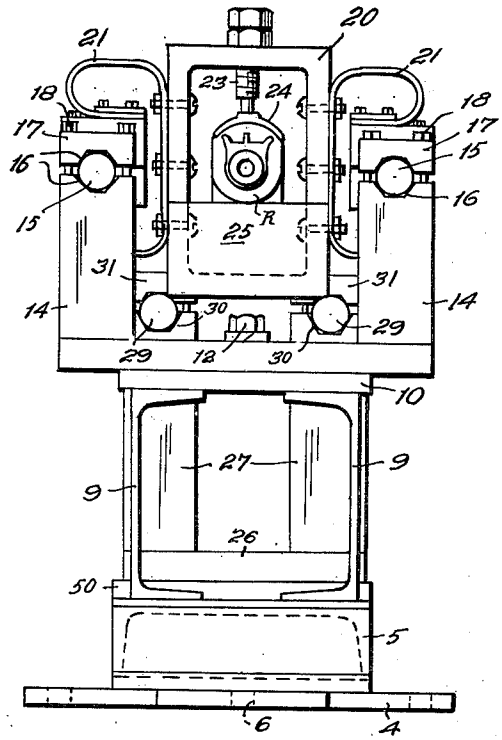


Fig. 5.

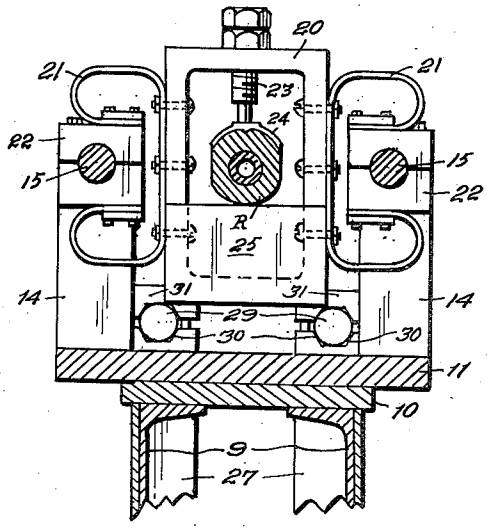


Fig. 6.

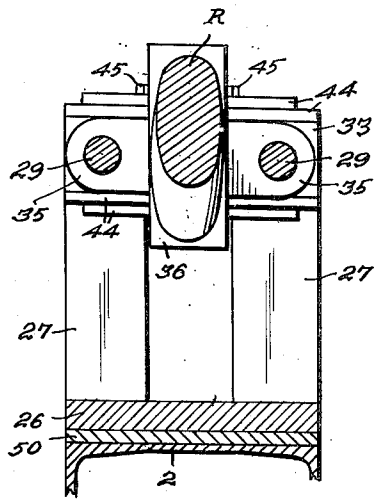
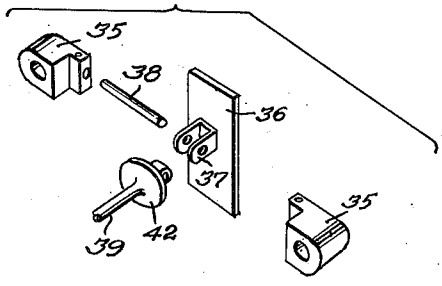


Fig. 8.



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FLEXIBLE FIRING MOUNT

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1 Claim. (Cl. 73—167)

This invention relates to a flexible firing mount and more particularly to a mount for investigating the recoil force which exists between a rifle and the shoulder of the rifleman and simulating the various resulting motions and their influences upon accuracy of aim.

Existing mounts of this type support the rifle too rigidly to permit study of these motions and their effects. The functioning of automatic weapons depends upon the manner in which they are held. Although the initial operating impulse is more or less uniformly produced by the cartridge, the functioning of the gun mechanism depends on the interactions between the moving parts and the receiver. As the receiver is wholly or partly free to move under the urging of the moving parts, the resultant receiver motion necessarily affects the distance the parts must move, and therefore, their ability to properly complete the functioning cycle. This is particularly important in the case of shoulder weapons because various persons will afford various degrees of restraint to the motion of the weapon. Any weapon intended for general use must function in a satisfactory manner over the range of restraints afforded by each and all of its uses.

With the present invention, a mount is provided that, when properly adjusted, will determine the degree and nature of these restraint patterns and reproduce the support given the same weapon by any selected rifleman in any selected position.

It is therefore an object of this invention to provide a mount for studying the recoil force existing between a rifle and the shoulder of the rifleman.

Another object is to provide a mount of sufficient flexibility to simulate live firing by compensating for muzzle jump and sideway as well as recoil force.

Another object is to provide a mount capable of adjustment to simulate varied techniques of different firers of the same type of rifle.

Another object is to provide a mount in which several types of rifles may be test fired without constructional alteration.

A further object is to provide a mount to facilitate the photographic recordation of time rates of displacement.

Still another object of the invention is to provide a flexible mount for firearms which will enable accurate determination of the rate of fire and other characteristics of any selected firearm under varying degrees of restraint simulating those encountered in actual use.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a side elevation of the flexible firing mount of the invention and a rifle supported therein for test firing,

Fig. 2 is a top plan view of the assembly of Fig. 1,

Fig. 3 is a cross sectional view taken along the line 3—3 of Fig. 1 and looking in the direction of the arrows,

Fig. 4 is a front view of the assembly,

Fig. 5 is a cross sectional view taken along line 5—5 of Fig. 1 and looking in the direction of the arrows,

Fig. 6 is a cross sectional view taken along line 6—6 of Fig. 1 and looking in the direction of the arrows,

Fig. 7 is a fragmental section taken along line 7—7 of Fig. 2 and looking in the direction of the arrows, and

Fig. 8 is an exploded perspective view illustrating the construction of the back plate and blocks.

Referring more particularly to the drawing in which like reference characters designate like parts throughout, 1 designates generally a base comprising an inverted channel member 2 and is reinforced by a plurality of plates 3 secured to the under side of the channel member 2 at its ends and intermediate portion thereof. Mounting pads 4 are provided for securing the base to a stationary surface and are secured to the under sides of respective angle members 5 which is secured to the respective ends of channel member 2 and to a portion of reinforcing plates 3. These pads and angle members 5 are bored as at 6 to receive bolts, not shown, for the securement of the base 1 to a level stationary surface likewise not shown.

Two assemblies for supporting a rifle are provided, namely, a front support assembly generally indicated by 7 and a rearward support assembly generally indicated by 8. These assemblies are bolted to the upper surface of the channel member 2 in longitudinal spaced relation. The front assembly 7 supports the forearm portion of a rifle R while the rearward assembly 8 supports the butt or stock end.

Assembly 7 comprises a pair of channel members 9 secured in laterally spaced relation to the upper surface of member 2. A reinforcing plate 10 is secured to the upper surface of the channel members 9. A plate 11 is pivotally mounted to the upper surface of the reinforcing plate 10 by a bolt 12 which slides in a slot 13 in plate 11 to allow for longitudinal adjustment of plate 11. Laterally and longitudinally spaced posts 14 are secured to the upper surface of plate 11 and support a pair of parallel right and left guide rods 15 in notches 16 cut in their upper end surfaces. See Fig. 4. Rods 15 are fixed at their ends to the upper ends of the respective right and left pairs of posts 14 by caps 17 and bolts 18. Posts 14 are reinforced by suitable means such as webs 19, Fig. 1. A mounting frame is mounted for sliding on and along rods 15 by a pair of diametrically opposed flat springs 21 curved as clearly illustrated in Fig. 5 and secured to a pair of split bearings 22 slidably mounted on rods 15. This construction permits longitudinal movement of the frame 20 in the support 7. An adjusting screw 23 is provided in the top of frame 20 and is provided with a clamp 24 for engagement of the forearm of rifle R. A pad 25 of resilient material is received in the lower portion of frame 20 to provide a rest for the lower portion of the forearm of the rifle.

The rear rifle support assembly 8 comprises a plate 26 secured to reinforcing plates 50, which are secured to the upper surface of member 2 and are rearwardly disposed from front rifle support 7. From laterally and longitudinally spaced posts 27 are secured to the upper surface of plate 26 and reinforced by webs 28. A pair of parallel rods 29 are received in notches 30 on the upper ends of respective right and left pairs of posts 27 and are held rigid by caps 31 and bolts 32. An inertia bar 33 is slidably mounted on rods 29 by a pair of parallel bores therein through which the rods pass with a smooth sliding fit. Return springs 34 are mounted on rods 29 rearwardly of inertia bar 33 and urge bar 33 in a forward direction. A pair of mounting blocks 35 are slid-

ably mounted on rods 29 and a back plate 36 is trunnioned between blocks 35 by a pair of ears 37 integral with the plate and pin 38. This pin extends with a smooth fit through alined holes in two blocks 35 and the lugs or ears on the plate. A spring guide rod 39, Figs. 2 and 3, is pivotally mounted between ears at its forward end thereof and is slidably mounted in bar 33. Nuts 40 on the free end of rod 39 limit the forward sliding motion of rod 39 relatively to bar 33. A recoil spring 41 is mounted on rod 39 between bars 33 and a stop plate 42 integral with the forward end of rod 39. By adjusting nuts 40, the initial compression force exerted by spring 34 may be varied and the force required to move blocks 35 and associated parts rearwardly relatively to inertia weight 33, correspondingly varied. The effective inertia or mass of weight 33 may be increased as desired, by the attachment thereto of bars or plates 44, by means of bolts 45. See Fig. 3.

To prepare the rifle mount for use in testing a rifle, the base is secured to a firm level surface by suitable means as bolts or screws, not shown through holes 6 in mounting pads 4. Return springs 34 of the desired tension are placed on the rear guide rods 29 between bar 33 and the rearward pair of posts 27. The desired weight of bar 33 is then regulated by addition or removal of a number of bars 44 on inertia bar 33, the weight of bar 33 and tension of springs 34 to be determined for the particular type of rifle being tested, ammunition used and other factors. After springs 34 are assembled, the bars 29 are tightened by caps 31 and bolts 32. Rifle R is slipped through the mounting frame 20 between the clamp 24 and the resilient pad 25. Back plate 36 is firmly secured to the butt of rifle R by suitable means such as screws 46. The mounting frame 20 is then slid along guide rods 15 until the frame 20 is a predetermined distance from back plate 36. Screw 23 is then tightened to secure the forearm of the rifle in the frame. The rifle is now ready for testing.

If desired, time displacement records may be made by high speed motion picture or other photographic means and light reflecting pins 47 may be added on mounting blocks 35 for this purpose (see Fig. 1).

From the foregoing description, it is apparent that a highly efficient, resilient mount has been devised that is capable of supporting a rifle to simulate the motions of a rifle in firing as held by various types of riflemen.

Time displacement records will be co-related against pertinent factors such as: recoil energy, drop of stock, caliber of weapon, weight of firearm, feeling of discomfort, maximum force at shoulder, energy at shoulder and rate of transfer at shoulder.

The mount is simple of construction and may be assembled and dismantled with a minimum of labor. The mount is quickly adjustable to accommodate various types of rifles.

While a preferred form of the invention has been shown and described, various modifications and substitutions of equivalents will occur to those skilled in the art after a study of the foregoing disclosure. Hence, the disclosures should be taken in an illustrative rather than a limiting sense, and it is the desire and intention to reserve all modifications within the scope of the subjoined claim.

What is claimed is:

In a test firing mount including an elongated base, an elevated forward supporting structure on said base for supporting the forearm portion of a rifle and a rearward supporting structure for the support of the butt end of said rifle; said front structure comprising a pair of laterally spaced upright members secured on the front end of said base, a plate secured to the upper surface of said upright members, a plurality of laterally and longitudinally spaced posts secured to the upper surface of said plate, a pair of parallelly arranged guide rods secured in the upper ends of said posts, a mounting frame slidably and resiliently mounted on said rods for restrained movement in directions normal to the longitudinal axis of said mount, an adjustable clamp for engagement with the upper surface of the forearm of said rifle carried by the top of said frame and a resilient pad mounted in the lower area of said frame supporting the lower portion of the forearm of said rifle; said rearward structure comprising a plate secured on the rearward end of said base, a plurality of laterally and longitudinally spaced posts secured on the upper surface of said plate, a pair of parallelly arranged guide rods supported in the upper ends of said posts, adjustable means for resisting the recoil forces of said rifle comprising substantially rectangular solid member having a pair of laterally spaced transverse bores therethrough adapted to receive said guide rods on said rearward structure slidably therein, there being a third bore piercing said rectangular member transversely and centrally of said lateral bores and a return spring encircling each said guide rod rearwardly of said rectangular member, a pair of mounting blocks slidably mounted on said rods forwardly of said rectangular member, a back plate for attachment to the butt end of said rifle, a pair of ears integral with the rearward surface of said back plate, a spring guide rod having an integral stop plate pivotally connected at its forward end to said ears and said mounting blocks, its rearward portion extending through said third bore in said rectangular member, an adjusting nut threadably engaging the rear end of said spring guide rod and a recoil spring encircling said spring guide rod between said rectangular member and said stop plate, said adjusting nut on said spring guide rod adapted to vary the compression of said recoil spring between said rectangular member and said stop plate.

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