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Nov. 12, 1946. A. C. W. ALDIS ET AL 2,411,076

MEANS FOR INSPECTING GUN BARRELS

Filed Nov. 16, 1943 3 Sheets-Sheet 1

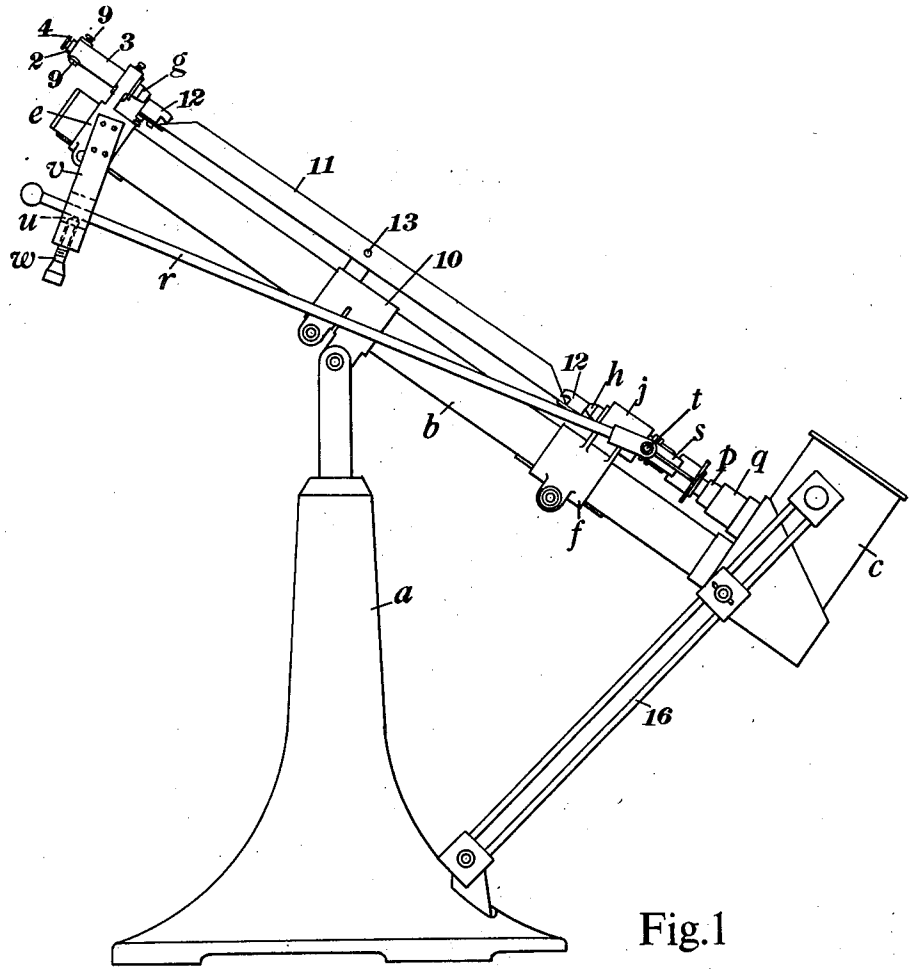


Fig.1

Inventors
A. C. W. Aldis
J. West
By Glascock Downing & Seibold
Attys

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MEANS FOR INSPECTING GUN BARRELS

Filed Nov. 16, 1943 3 Sheets-Sheet 2

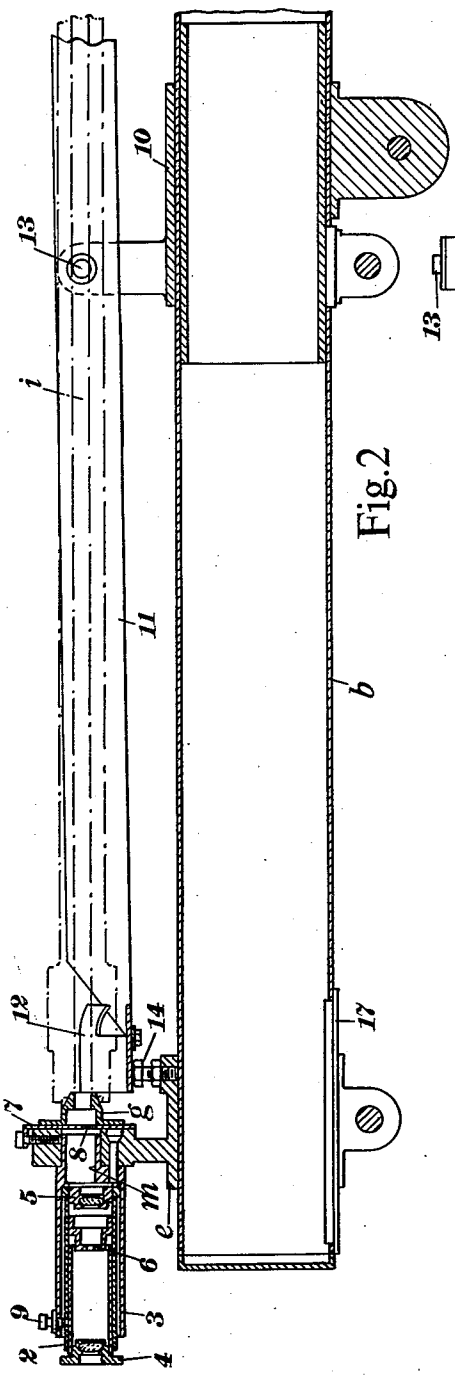


Fig.2

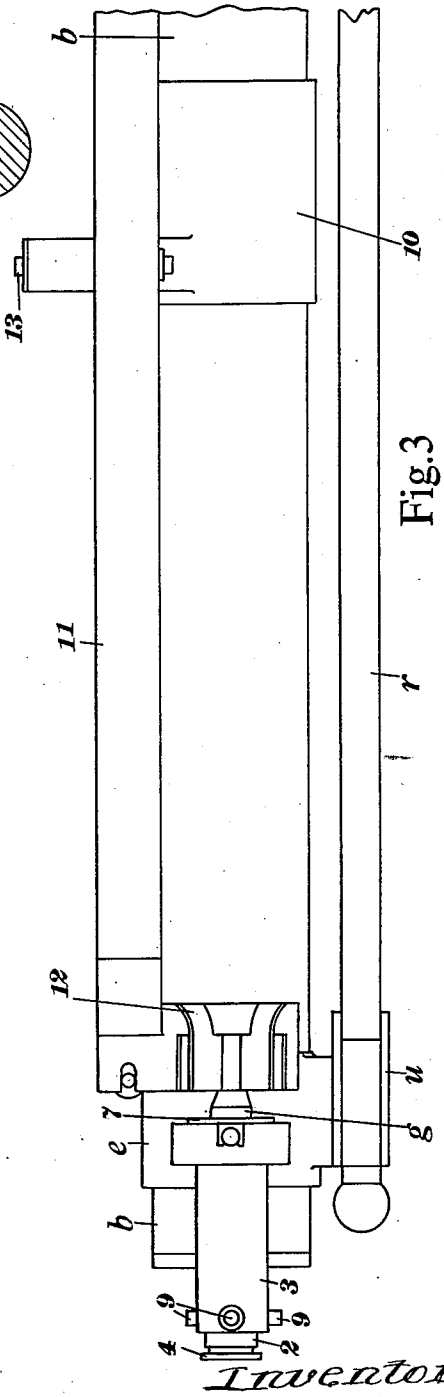


Fig.3

Inventors
A. C. W. Aldis
J. West
By Glascock Downing & Seibold Attys

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MEANS FOR INSPECTING GUN BARRELS

Filed Nov. 16, 1943 3 Sheets-Sheet 3

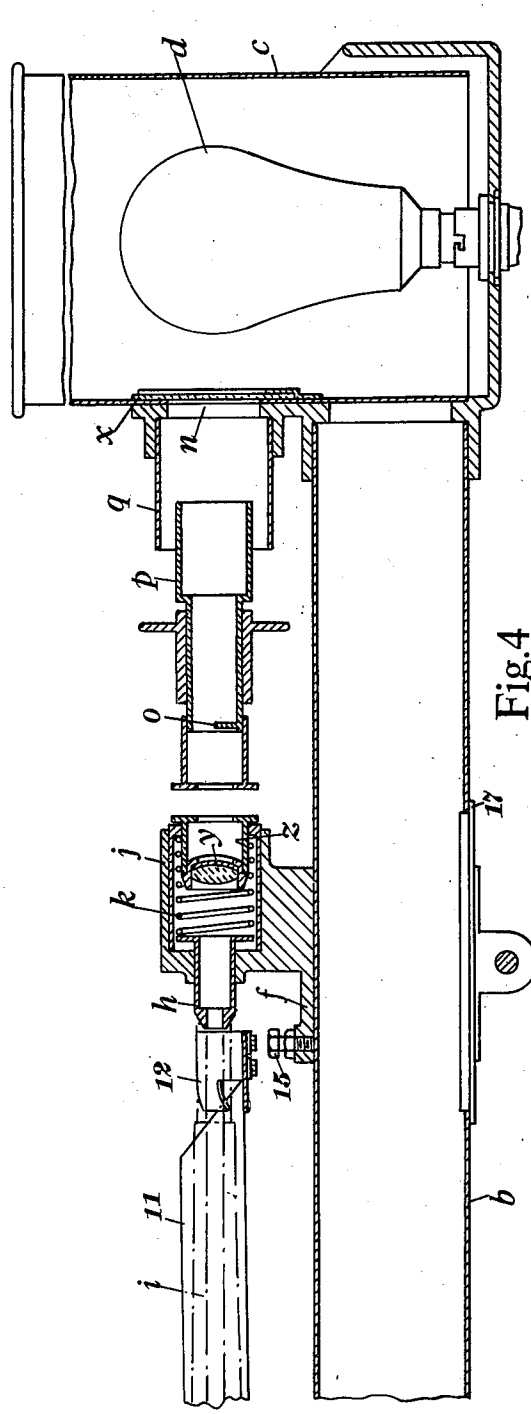


Fig.4

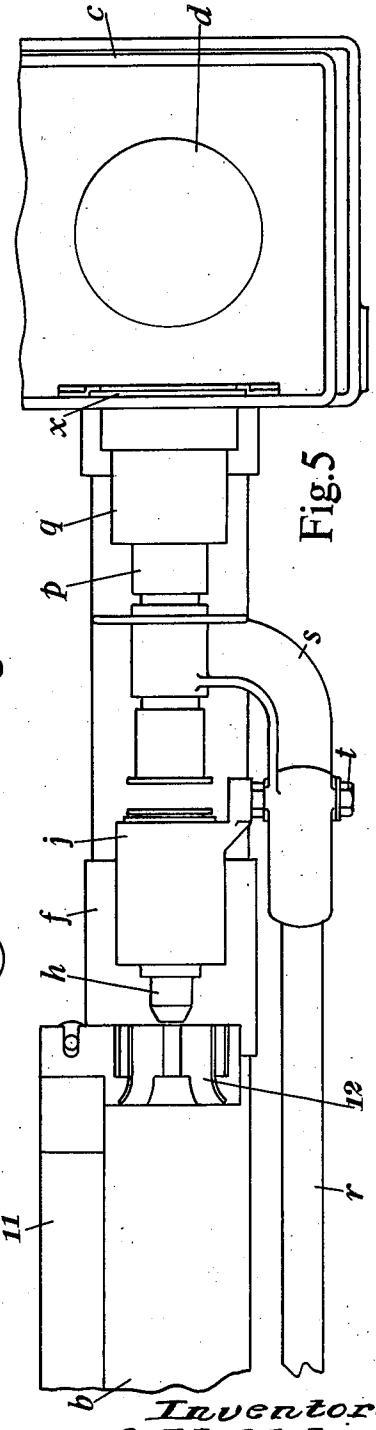


Fig.5

Inventors
A. C. W. Aldis
J. West
By Glascock Downing & Seibold Attys

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Search Room

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UNITED STATES PATENT OFFICE

2,411,076

MEANS FOR INSPECTING GUN BARRELS

Arthur Cyril Webb Aldis and John West, Sparkhill, Birmingham, England, assignors to Aldis Brothers Limited, Birmingham, England

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In Great Britain June 30, 1942

2 Claims. (Cl. 88—14)

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This invention has for its object to provide improved means for use in inspecting the straightness of gun barrels.

In the accompanying sheets of explanatory drawings:

Figure 1 is a side elevation of means constructed in accordance with the invention for inspecting the bores of rifle or like gun barrels.

Figures 2 to 5 are views illustrating to a larger scale various parts of the means shown in Figure 1, Figures 2 and 3 being respectively a sectional side elevation and a plan of one end, and Figures 4 and 5 being respectively a sectional side elevation and a plan of the other end.

In carrying the invention into effect as shown in the drawings, we employ any convenient vertical stand *a* having an enlarged base adapted to rest on a bench or on the ground, and we mount on this stand an inclined tubular or other support *b* having at its lower end a housing *c* for an artificial light source *d*, such as an electric lamp of high intrinsic brightness. On the support *b* are mounted a pair of brackets *e*, *f*. The bracket *e* is situated near the end of the support *b* remote from the lamp housing *c*, and the bracket *f* is situated near the lamp housing, the distance between the two brackets being dependent on the length of the gun barrels whose bores are to be inspected. The brackets *e*, *f* respectively carry a pair of coaxially arranged hollow centres *g*, *h* by which a gun barrel (shown in broken lines and indicated by *i*) can be supported in a position parallel or substantially parallel to the support *b*, the inner ends of the centres being shaped to a conical or like form so that they can enter and serve as supports for the adjacent ends of the barrel *i*, and both the inner and outer ends of the centres being open.

The centre *h* on the bracket *f* adjacent to the lamp housing *c* is slidably supported by and extends from the inner end of a hollow cylindrical portion *j* of the bracket, and this hollow cylindrical portion contains a helical compression spring *k* which by acting on the adjacent end of the centre tends to move the latter to its fully extended position. The other centre *g* is fixed to the corresponding bracket *e* at the inner end of an aperture *m* in the upper portion of this bracket. By moving the centre *h* against the action of the spring *k* the gun barrel *i* can be mounted in position between the centres *g*, *h*.

Between the outer end of the hollow cylindrical portion *j* ofthe bracket *f* and an aperture *n* in the adjacent side of the lamp housing *c* is mounted a screen *o* in the form of a flat metal

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sheet which occupies a position at right angles to the axis of the hollow centres *g*, *h*, and which has a straight or substantially straight upper edge, herein termed the operative edge. The screen *o* is contained in a tubular housing *p* which at one end is situated adjacent to the outer end of the bracket *f*, and at the other end extends into *a* tubular enclosure *q* on the adjacent side of and surrounding the aperture *n* in the lamp housing *c*, the enclosure being of sufficiently larger diameter than the screen housing to permit lateral movement of the latter for traversing the operative edge of the screen *o* in a plane at right angles to the axis of the barrel *i*. For effecting this movement of the screen housing *p* a lever having a long arm *r* and a short arm *s* is connected by a pivot pin *t* to the bracket *f* at the junction of the lever arms, the lever being arranged obliquely at one side of the barrel support *b*. The short arm s of the lever is cranked and serves to carry the screen housing *p*. The outer end of the long lever arm *r* extends through an elongated aperture *u* in a third bracket *v* secured to and depending from the bracket *e*, and rests on an adjusting screw *w* passing through the lower end of the third bracket, the length of the aperture in this bracket being sufficient to permit the angular movement of the lever *r*, *s* required to effect the desired lateral movement of the screen housing *p*.

A blue transparent screen *x* may with advantage be arranged as shown over the aperture *n* in the lamp housing *c* to impart to the light passing through this aperture from the lamp *d* a colour which is restful to the eye of the viewer using the apparatus.

Between the screen *o* and the adjacent hollow centre *h* is arranged a projecting lens *y* which in the example shown is carried by a tubular mounting *z* in the outer end of the hollow cylindrical portion *j* of the bracket *f*, the mounting being axially adjustable in the said portion.

The light passing from the lamp *d* through the aperture *n* in the lamp housing *c* serves to illuminate the operative edge of the screen *o*, and the latter serves to produce in the barrel *i* an effect known to gun-barrel viewers as a "shade" which is a shadow of the screen, and which extends along the inner surface of the barrel. It is by means of the shade that the viewer ascertains the nature and position of any faults in the straightness of the bore of the barrel *i*, the faults being manifest by irregularities in the shape or continuity of the shade.

On the outer side of the bracket *e* are mounted

any convenient optical viewing means for enabling the shade above described to be viewed through the adjacent end of the barrel *i*. In the example shown such means comprise a telescope **2** mounted in and extending from one end of a tubular housing **3** which is secured to its other end to the outer side of the bracket *e* around the aperture *m* in this bracket, the axis of the telescope being in line with the lower side of the bore of the barrel *i*. The telescope is provided with an eye-piece **4** at its outer end, a lens **5** or lens system at its inner end, and a light stop **6** at a position between its ends, the eye-piece having combined with it a graticule (not shown) if desired. Moreover, there is arranged between the telescope **2** and the adjacent hollow centre *g* a mask **7** having a small orifice **8** situated coaxially with the telescope, this mask being adjustably supported by the bracket *e*. For enabling the position of the telescope **2** to be adjusted, its housing **3** is made of larger diameter than the telescope, and is provided near its outer end with radial adjusting screws **9** adapted to support the adjacent part of the telescope.

When the barrel *i* is mounted in position the viewer examines the shade (produced in the barrel by the screen *o*) through the telescope **2**. He can modify the view of the shade to suit his personal requirements and the bore of the gun barrel by adjusting the telescope **2** and mask **7**. Exploration of the barrel *i* is effected by rotating it about its axis, and by causing the shade to move along the barrel, this latter being effected by traversing the screen *o* as above described. A fault is revealed by the shade in the usual manner.

Having examined the barrel *i* from one end, the position of the barrel can be reversed so that it can be similarly scrutinized from the other end.

For relieving the hollow centres *g*, *h*, of the weight of the barrel *i*, there is secured to the support *b* at a position midway between the brackets *e*, *f*, another bracket **10**, and to this bracket is pivotally connected the centre of a lever **11** having secured to its ends V-shaped supports **12** for the opposite ends of the barrel. The pivot **13** of the lever **11** is situated opposite to the position occupied by the centre of the barrel *i*, and the arrangement is such that when the barrel occupies the position shown the V-shaped support **12** adjacent to the bracket *e* abuts against an adjustable stop **14** on this bracket, but when the position of the barrel is reversed the other V-shaped support **12** abuts against another adjustable stop **15** on the bracket *f* adjacent to the lamp housing *c*.

For enabling the inclination of the tubular support *b* to be varied to suit the requirements of the viewer, it is pivotally connected to the upper end of the stand *a* through the medium of the bracket **10**, and is held in the required position by an adjustable link **16** interconnecting the base of the stand and the end of the tubular support adjacent to the lamp housing *c*.

The brackets *e*, *f* are axially adjustable on the tubular support *b* to suit gun barrels of different lengths, but are prevented from angular movement by rib-like projections **17** on adjacent parts of the support.

By this invention the detection of defects in the straightness of gun barrel bores can be carried out in a very expeditious manner and with a degree of accuracy which exceeds that obtainable by ordinary methods involving the direct inspection of a shade. Moreover a photographic record of the shade can easily be made by arranging a camera in conjunction with the telescope.

The invention is not, however, limited to the example above described, as subordinate optical and constructional details may be varied to suit different requirements. Thus the lamp housing may be dispensed with, and the screen illuminated by daylight, but as intense brightness of illumination is advantageous, it is desirable to employ an artificial light source.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. Means for inspecting the bore of a rifle or other gun barrel, comprising the combination of a pair of hollow centres which are shaped to enter the ends of the barrel and between which the barrel can be rotatably mounted, a support on which the centres are mounted at the required distance apart to permit the barrel to be supported by the centres, a screen having a substantially straight edge and arranged on the support at the outer side of one of the centres, said straight edge being disposed in the path of light passing through the centres, a projecting lens situated between the screen and the adjacent centre, means for adjusting the screen to move said straight edge toward or away from the axis of the gun barrel, and a telscope arranged on the support at the outer side of the centre remote from the screen so that shadows produced by the screen in the bore of the barrel can be inspected.

2. Means for inspecting the bore of a rifle or other gun barrel, comprising the combination of a pair of hollow centres which are shaped to enter the ends of the barrel and between which the barrel can be rotatably mounted, a screen having a substantially straight edge and arranged at the outer side of one of the centres, said straight edge being disposed in the path of light passing through the centres, a projecting lens situated between the screen and the adjacent centre, a lever adjustably supporting the screen for moving said straight edge toward or away from the axis of the gun barrel, a telescope arranged at the outer side of the centre remote from the screen so that shadows produced by the screen in the bore of the barrel can be inspected, means for illuminating the straight edge of the screen from the side remote from the centres, a stand, an elongated support mounted on the stand, a bracket mounted on the support and carrying the telescope and the adjacent centre, and another bracket mounted on the support and carrying the other centre at the required distance from the centre on the first mentioned bracket to permit the barrel to be supported by the centres, the screen-supporting lever being mounted on the support, and having an operating arm which at its outer end is situated adjacent to the telescope.

ARTHUR CYRIL WEBB ALDIS.
JOHN WEST.