Feb. 3, 1942. J. MARTIN 2,271,700

BLAST TUBE FOR MACHINE GUNS

Filed July 4, 1939 5 Sheets-Sheet 1

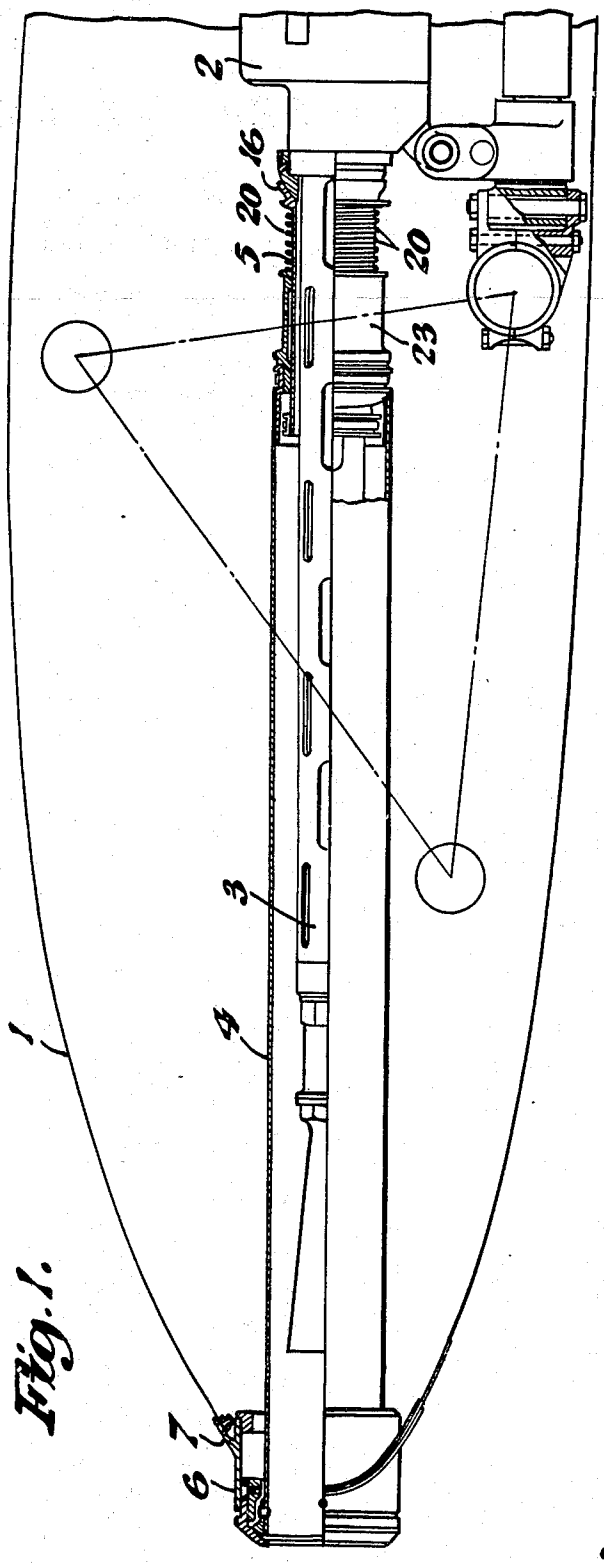


Fig. 1.

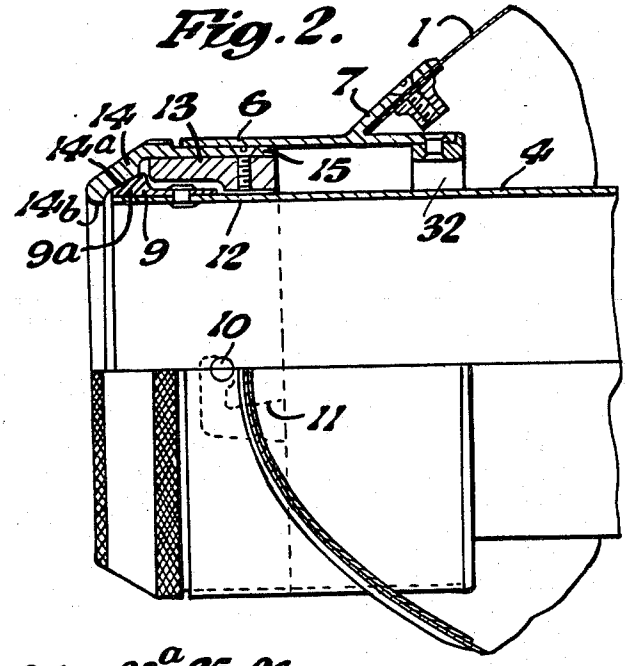
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BLAST TUBE FOR MACHINE GUNS

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Fig. 2.



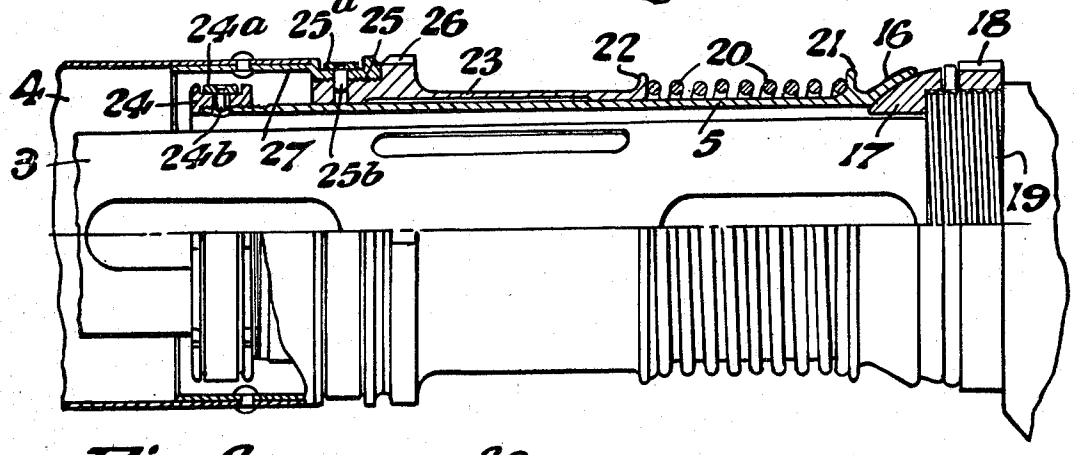


Fig. 3.

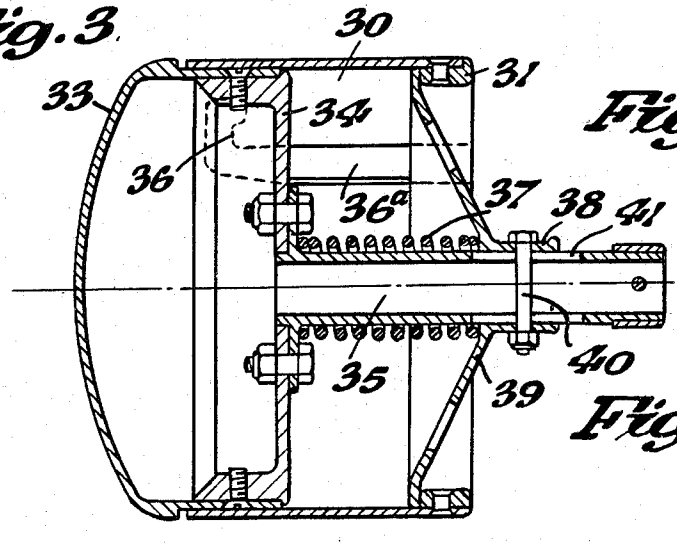


Fig. 5.

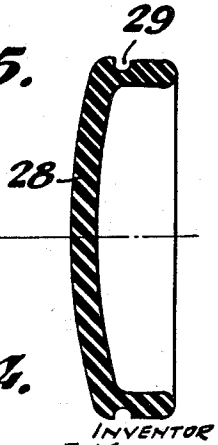


Fig. 4.

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BLAST TUBE FOR MACHINE GUNS

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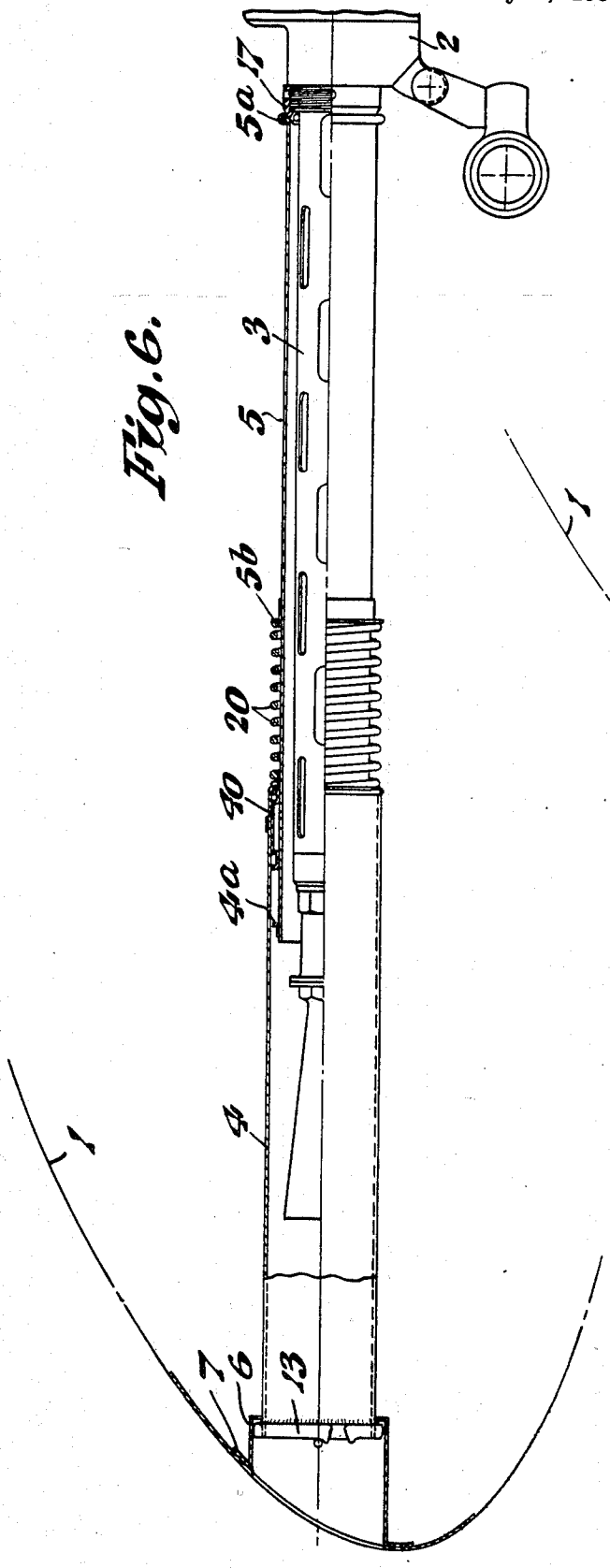


Fig. 6.

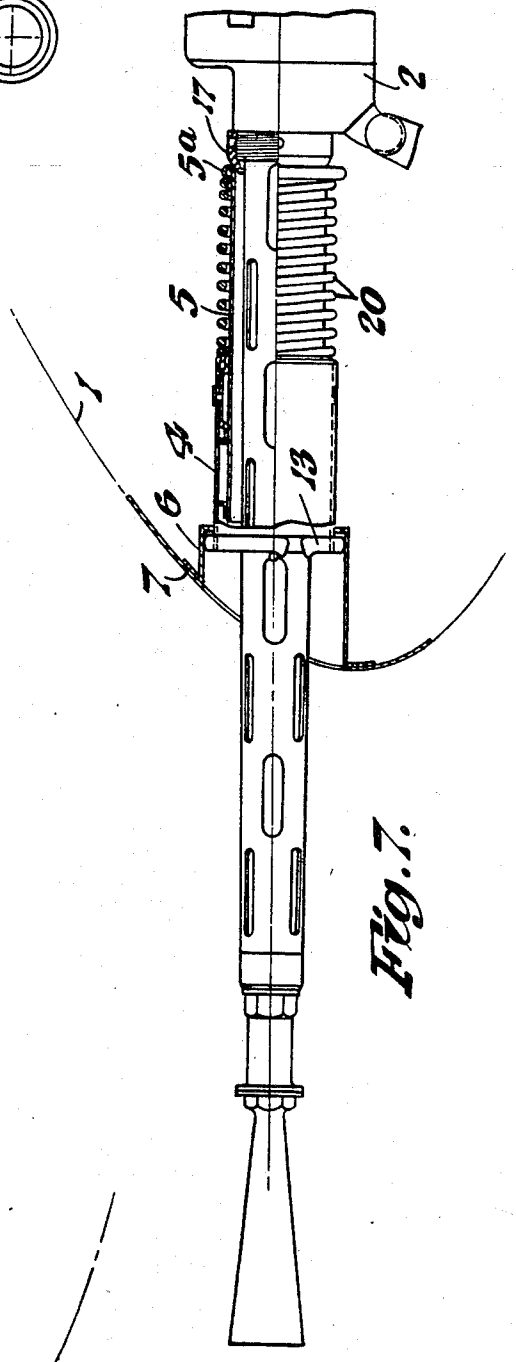


Fig. 7.

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BLAST TUBE FOR MACHINE GUNS

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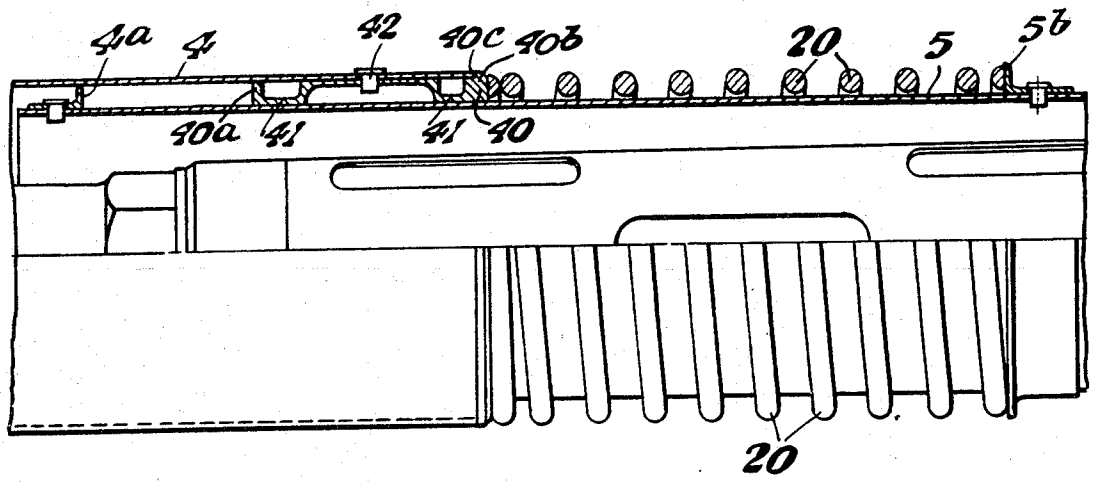


Fig. 8.

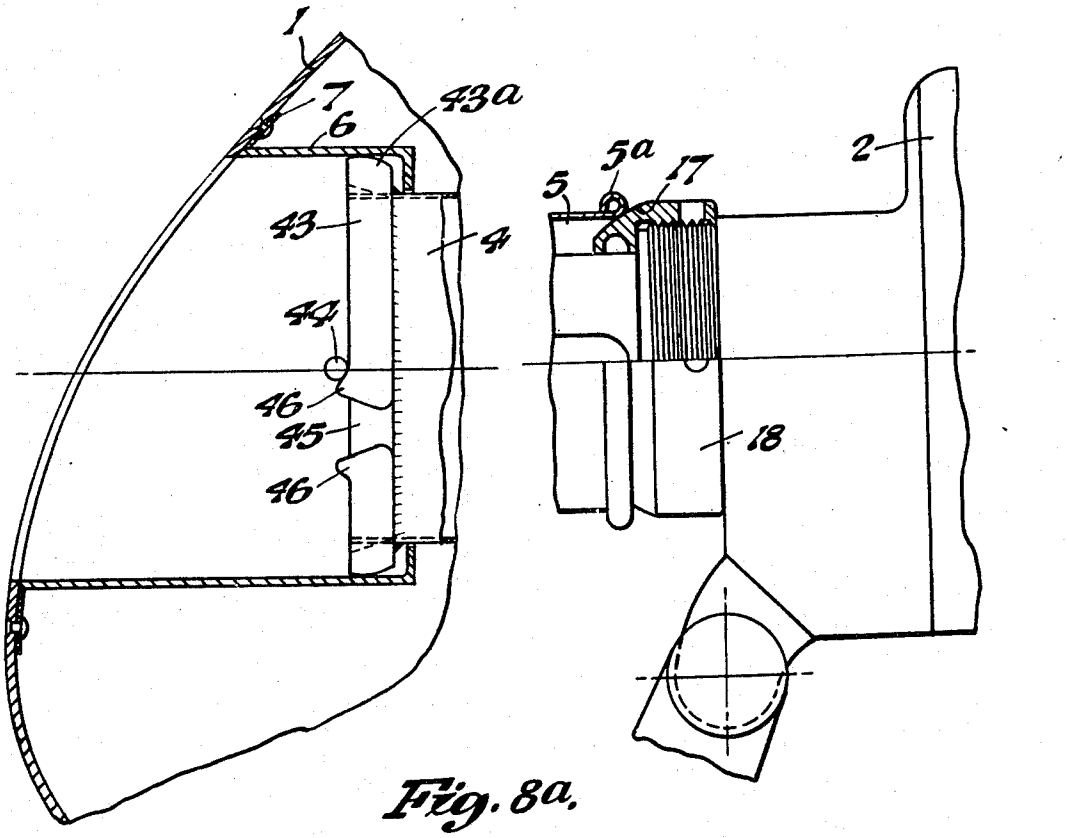


Fig. 8a.

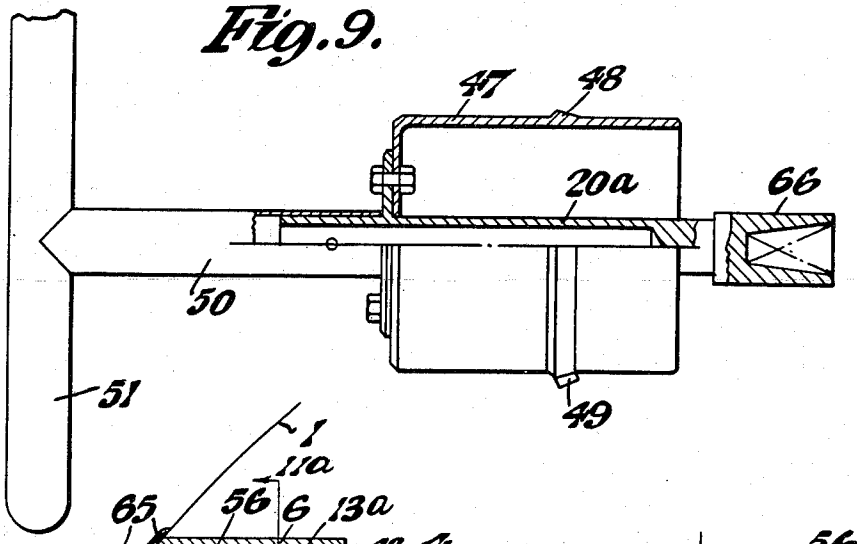
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BLAST TUBE FOR MACHINE GUNS

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Fig. 9.



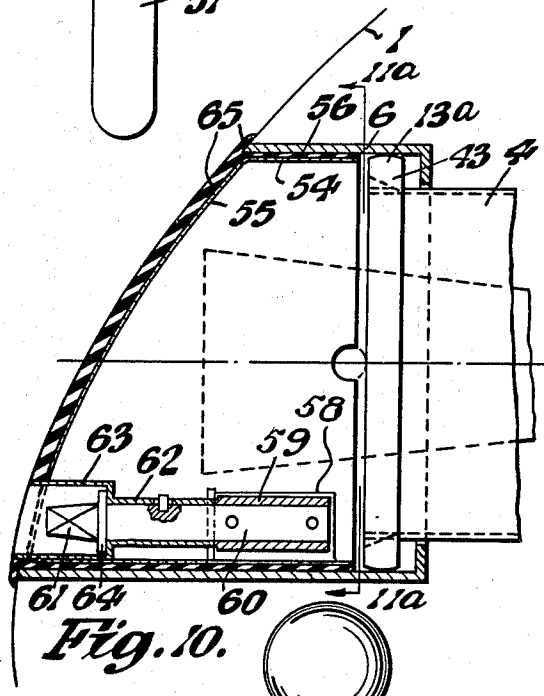


Fig. 10.

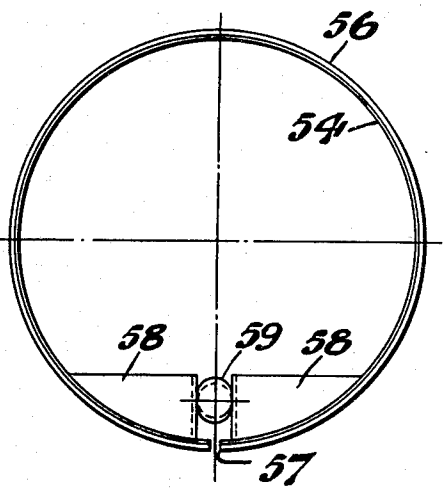


Fig. 11.

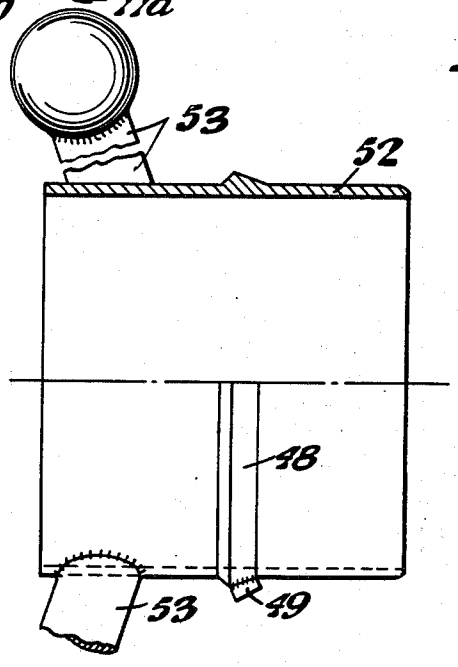


Fig. 12.

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Patented Feb. 3, 1942

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UNITED STATES PATENT OFFICE

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BLAST TUBE FOR MACHINE GUNS

James Martin, Higher Denham, near Uxbridge, England

Application July 4, 1939, Serial No. 282,829
In Great Britain July 8, 1938

10 Claims. (Cl. 89—37.5)

My present invention relates to the mounting of guns of small bore, e. g. machine guns, in aeroplane wings and other hollow bodies where it is essential that the interior of the wing or other body is screened as much as possible from the effects of the firing of the gun, and, particularly in the case of aeroplane wings is shielded against the high pressure of air entering the wing around the muzzle of the gun when the machine is flying.

One object of the present invention is to provide means for shielding or screening the interior of the wing or other hollow body for accommodating a gun, from air pressure and gases around the barrel of the gun. Another object of this invention is to provide such a screening means which is adjustable for effective length and which comprises a blast tube adapted to encircle and extend along the barrel of the gun, and is provided with supports for both of its ends, said supports being adapted to be carried by the gun and by the wing or other hollow body at the firing opening, opposed abutments with the blast tube and said supports forming at both ends of the blast tube an airtight seal between the blast tube and the interior of the aeroplane wing or other body accommodating the gun, one of said abutments at the front end of the blast tube being removable to free the blast tube for removal by sliding the blast tube over the muzzle end of the barrel.

A still further object of this invention is to provide a simple construction and arrangement of the supporting means and said abutments at the front end of the blast tube, whereby the front end of the blast tube can be freed from its normal or operative position by relative rotation of the front blast tube end and a supporting member receiving such end of the blast tube.

In addition to the foregoing the present invention contemplates an improved nose cap for the front end of the blast tube and for the opening which receives the nose cap to be adequately sealed by readily removable means when the gun is not fitted or contemplated for use. A still further object of this invention is to provide a temporary form of sealing means which normally will protect the gun and interior of the blast tube against ingress of rain, dust and other foreign matter but yet will enable the gun to be fixed in the normal manner.

Other objects and advantages of the present invention will be apparent by reference to the accompanying drawings illustrating embodiments of the invention and wherein:

Fig. 1 is a part sectional side elevation view of the complete assembly.

Fig. 2 is a detail half sectional side elevation view to a larger scale showing one method of mounting the front end of the blast tube.

Fig. 3 is a detail part sectional side elevation view, also to a larger scale showing the manner of supporting the rear end of the blast tube.

Fig. 4 is a detail sectional side elevation of a closure cap device for use in sealing the front end of the blast tube when the gun is not mounted or adapted for use.

Fig. 5 is a detail sectional side elevation of a closure cap device adapted to form a readily discharged sealing device suitable for use when the gun is loaded ready for firing.

Figs. 6 and 7 are sectional side elevation views of a modification with the blast tube in half section, showing the invention applied to a gun wholly and partly accommodated respectively within the wing of an aeroplane.

Fig. 8 is a broken sectional side elevation view of the telescopic part of the arrangement shown in Fig. 6 but to a larger scale.

Fig. 8*a* is a broken sectional side elevation showing the front and rear ends of the blast tube, i. e. the parts opposite ends of the median part shown in Fig. 8.

Fig. 9 is a half-sectional elevation view of a suitable tool for use in removing and affixing the blast tube.

Fig. 10 is a sectional side elevation of a device for readily sealing the mouth of the cap receiving the front end of the blast tube.

Fig. 11 is a sectional elevation of the line 11*a*—11*a* of Fig. 10, and

Fig. 12 is a broken half-sectional elevation of a form of tool useful in removing and affixing the front ends of blast tubes used with machine guns which project beyond the blast tube, e. g. project in front of an aeroplane wing, fuselage or other suitable part.

Referring to the drawings, the aeroplane wing is indicated by the reference numeral 1, and the gun with its mounting, by the reference numeral 2. The gun barrel cooling tube is indicated by the reference numeral 3.

A tubular assembly is provided to encircle the gun barrel or tube 3 to prevent air under high pressure from passing freely into the wing so as to applying an inflating pressure against the fabric or shell of the wing. For this purpose a tube, known as a blast tube is inserted in the wing 1 so as to be spaced about the tube or

barrel 3 and to seal both ends of the cooling tube 3 from the interior of the wing.

The said blast tube comprises a main tubular body part 4, a rear telescopic tubular part 5 and suitable supports for both ends of the tubular assembly combined with suitable air sealing supports which allow the gun to be adjusted for elevation and direction without affecting the efficacy of the sealing action of the blast tube. The main body part tube 4 is supported at its front end in a housing which comprises a cap or cylinder 6 with a flange 7 welded or otherwise formed integral therewith, said flange being shaped as shown to fit snugly against the nose of the wing so as to firmly secure the cylinder 6 in a hole of corresponding diameter in the nose of the wing and to seal effectively the hole in which the cylinder 6 engages.

The front end of the tubular body part 4 has a sealed universal joint form of support and the rear end of the tubular part 5 is formed with a flared part spherical seating 16 which is pressed firmly over a part spherical front part 17 of a collar 18 screwed on to the threaded rear part 19 of the cooling tube 3. The necessary axial pressure to ensure a good sealing action between the seating 16 and the collar 18, whilst yet affording play for adjustment of the gun for direction and elevation, comprises a coiled compressed spring 20 interposed between a flange 21 on the rear end of the tube 5 and a flange 22 on the rear end of a bearing sleeve 23. This bearing sleeve 23 slidably supports the tube 5, and the front end of the tube 5 has threaded thereon a collar 24 adapted to form an abutment against the front end of the bearing sleeve 23 when the spring 20 reasserts itself as the whole blast tube is being removed. The collar 24 is locked in position by a spring ring 24*a* carrying a pin 24*b* which trips into aligned holes in the collar 24 and the tube 5.

The bearing sleeve 23 is threaded as at 25 into the rear end of the main body part tube 4, and is suitably notched as at 26 to receive a C spanner for threading it into and out of the tube 4. It is preferred to fit a hard metal ring 27 into the rear end of the tube 4 to take the threaded part 25, and this ring can be welded or otherwise fixed in the tube 4. A spring ring 25*a* with a projecting pin 25*b* engages in aligned holes in the ring 27 and sleeve 23.

The supporting the front end of the blast tube is effected by a nose cap 14 which has a bayonet joint form of connection with the housing 6. The nose cap 14 has an integral sleeve 15 within which is secured by a screw 12 a ring 13 which retains it on the front end of the blast tube. The sleeve 15 fits snugly into the housing 6 and has a diametrically opposed pair of L shaped slots 11 therein to receive a pair of diametrically opposed pins 10 fixed in the housing 6. The extremity of the blast tube has a ring 9 riveted or otherwise fixed thereon, with a part spherical thickened front end 9*a* which bears against a correspondingly radiused part spherical abutment part 14*a* inside the nose 14, the spring 20 affording the requisite axial pressure between the parts 9*a* and 14*a* to obtain the sealing action combined with freedom of angular adjustment for the front end of the blast tube. The nose cap 14 and blast tube are withdrawn and replaced as a unit.

For the purpose of preventing ingress of rain, dust and other foreign matter liable to injure the gun mechanism the nose cap 14 can be closed by a cap such as shown in Fig. 5, such temporary closure device comprising a dished disc or shallow cylinder 28 of rubber or other suitable material of a resilient nature. The periphery of this closure member is formed with a groove 29 into which trips the inner edge 14*b* of the nose cap 14, the cylindrical part of this cap 28 fitting snugly within the front end of the blast tube 4. By this means each gun ready for firing can have its blast tube closed in a sealed manner at its front end, but when the gun is fired the resilient cap 28 will be blown off the blast tube.

When it is required to close the front end of the housing for the blast tube when the gun and blast tube are not mounted, a closure device such as shown in Fig. 4 can be adopted, this device being adapted to replace the nose cap 14. It comprises a cylindrical tubular member 30 adapted to fit snugly within the housing 6 and to abut at its rear end edge preferably stiffened by a liner 31, against an annular ledge forming the inner edge of a ring 32 (see Fig. 2) fixed in the inner end of the housing 6. Axially slidable for a limited amount within the tubular member 30 is a dished nose cap 33 fixed about the flanged periphery of a disc 34 bolted or otherwise suitably secured at its centre to the flanged front end of a central tubular stem 35. When the tubular member 30 is inserted in the housing 6 and the rear end of this tubular member abuts against the ring 32 the nose cap 33 can be displaced inwardly of the tubular member 30 against the influence of spring means and locked by engaging the beforementioned pins 10 in an opposed pair of bayonet joint slots 36 formed in the cylindrical periphery of the nose cap 33, freedom of access of the pins 10 to the front elbow parts of the slots 36 being obtained by extending the L shaped slot 36 through the tubular member 30 and also slotting the member 30 as at 36*a*. The spring means yieldingly opposing this relative axial movement of the nose cap 33 and tubular member 30 can be a coiled compression spring 37 disposed about the stem 35 and interposed between the flanged front end of such stem and a collar 38 slidably guiding the stem 35 and forming the centre of a plate 39 united at its periphery to the interior of the tubular member 30. A diametrically disposed bolt 40 is passed through the central collar 38 and a slot 41 in the stem 35 to prevent complete separation of the nose cap 33 and the other parts of the closure device.

By means of the embodiment of the present invention as above described a separate tool for affixing or removing the nose cap 14 and the blast tube or temporary sealing device shown in Fig. 4 or Fig. 5 is eliminated. The affixing is safe and effected momentarily, and the gun is normally protected from ingress of foreign harmful substances through the front end of the blast tube.

In the embodiments shown in Figs. 6 to 8*a* inclusive a simplified construction and arrangement of supporting means for the ends of the blast tube is provided, the rear end of the inner tube 5 instead of carrying a cupped or dished flange being formed with a bead or roll 5*a* which bears against the part spherical collar 17 threaded or otherwise fixed on the gun cooling tube 3 or the barrel. A coiled compression spring 20 interposed between a flanged collar 5*b* fixed on the inner tube 5 and a sleeve 40 closing the rear end of the outer tube 4 presses the bead or roll 5*a* in a sealing manner against the collar 17.

The sleeve 40 can be a light sheet metal tube with concentric inwardly bent parts 41 which

slide closely upon the inner tube **5**, the ends of the sleeve being flanged as at **40***a* and **40***b* to seal the annular space between the two tubes **4** and **5**, and the rear flange being thicker than the remainder of the metal of the sleeve to enable a step **40***c* to be formed therein to close the rear end of the tube **4**. A rivet **42** can secure the sleeve **40** to the tube **4**.

The front end of the blast tube effects adequate sealing engagement with the cap **6** without the necessity of forming a cupped seating in the cap **6** to be engaged by a part spherical head on the tube **4**, and this is effected by welding or otherwise fixing a flange **43** on the front end of the tube **5** and shaping the periphery of this flange to arcuate section, thus affording a part spherical surface **43***a* engaging the interior of the cap **6** and angularly adjustable in relation to such cap.

The blast tube is held in position by the action of the coiled compression spring **20** which presses the tube **4** forwardly so that the front end or rim of the flange **43** abuts against a short radial pin **44** in the cap **6**.

The blast tube is removed by twisting it about its axis to align a narrow gap **45** in the flange **43** with the pin **44**, so that the spring reasserts itself and urges the tube **4** forwardly. Normally, the flange **43** is restrained against uncontrolled movement likely to align the gap **45** and the pin **44**, by inclined ridges **46** opposite sides of the gap **45**. The removal is effected by a tool shaped to engage in the front end of the tube **4**, a suitable tool for this purpose being shown in Fig. 9. The tool comprises a barrel **47** shaped to fit easily in the tube **4** and formed with a circumferential coned protuberance **48** which seats firmly in a correspondingly tapered inner surface of the front end of the tube. A radial rib **49** on the protuberance **48** engages in a corresponding notch in the inner surface of the front end of the tube **4**, hence a turn on the barrel **47** will force the appropriate ridge **46** over the pin **44** and the blast tube is released. A central stem **50** with a handle **51** at its free end is fixed to the barrel **47** to form the means for twisting the tool.

The foregoing blast tube (and tool for use therewith) is adapted for machine guns totally enclosed within the wing or the like, but for use with machine guns which project beyond the wing or the like as shown in Fig. 7 the beforesaid collar **5***b* forming an abutment for the cited compression spring is dispensed with and the rear end of the spring abuts against the bead **5***a* at the rear end of the tube **5**. This is desirable because of the shorter axial dimension of the blast tube for gun mountings of this character.

With the latter form of short blast tube the tool shown in Fig. 9 would not be suitable, and therefore a tool as shown in Fig. 12 can be adopted which comprises a barrel **52** open at both ends to slip easily over the gun barrel. The barrel **52** is shaped peripherally to engage with and turn the front end of the blast tube in the same manner as that shown in Fig. 9, but the means for turning it comprises two or more radiating and rearwardly inclined arms **53**.

It is desirable to be able to readily close the cap **6** when the aircraft is being used without contemplated use of the gun and for this purpose the device shown in Figs. 10 and 11 can be adopted. It comprises a plug in the form of a hollow cylinder **54** closed at one end with a wall **55** shaped to lie in continuity with adjacent parts of the wing of an aeroplane or the like and accommodating means to distend it within the front end of the blast tube or equivalent compartment.

The metal cylinder **54** is preferably coated with a stout lining **56** of rubber or other suitable cushioning material so that it can be firmly seized within the appropriate compartment and thereby will afford adequate means to prevent vibration and noise. Likewise, by using an outer rubber jacket highly effective sealing is obtained.

The metal cylinder **54** is split longitudinally at one or more points, the preferred arrangement being to split it longitudinally as at **57** along its deepest point parallel with its axis. On opposite sides of this split is provided a pair of abutments **58** between which is interposed a cam **59** so that by rotating the cam the metal cylinder **54** is distended so as to wedge its rubber jacket firmly within the appropriate compartment.

It is preferred to form along the interior of the cylinder **54** adjacent to a wall part a small diameter tube **62** open at its front end and supporting a rotatable pin **60** having a square or other suitable front end **61** to receive a key. The front end of the tube can be slightly larger in diameter as at **63** than the remainder of the tube to accommodate a flange **64** on the pin **60**, this flange preventing rearward translative movement of the pin. The rear end of the pin is fitted with a collar abutting against the rear end of the tube, and this collar can comprise the cam **59** which engages the two abutments. The two abutments can be sheet metal segments or suitable blocks welded or otherwise fixed within the cup and presenting opposed parallel faces engaging opposite sides of the cam.

The rubber jacket of the cylinder **54** is preferably flanged as at **65** where it covers the front end of the cup, the flange overlapping the rim of the front of the blast tube or equivalent compartment. Alternatively, the cylinder itself can be flanged and the metal flange lined with rubber, or fitted with a suitable washer.

The longitudinal split **57** in the cylinder **54** can extend the full length of the cylinder, and a transverse split or circular aperture can terminate the front end of the longitudinal split.

The key to engage over the square end **61** of the pin **60** can be a socket member **66** on the free end of a centre pin **20***a* of the tool shown in Fig 9.

One or more distance pieces, such as L section collars **4***a* can be carried by the tube **5**, and the distance piece nearer the sleeve **40** prevents separation of the tubes **4** and **5** when the blast tube is extended by the spring **20**.

I claim:

1. In an aeroplane wing or other hollow body accommodating a gun, a detachable blast tube surrounding the gun barrel, blast tube supporting elements on the gun and in the wing or hollow body, co-operating supporting elements on the blast tube engaging the beforesaid supporting elements, and sealing means with said supporting elements, preventing ingress of air or gases to the wing or hollow body around the blast tube, said sealing means comprising opposed seatings with the said supporting and co-operating elements, spring means urging said seatings against each other.

2. Means for shielding or screening the interior of an aeroplane wing or hollow body accommodating a gun, from air pressure and gases around the barrel of the gun comprising a telescopic blast tube adapted to surround the gun

barrel, abutments affixable to the gun and to the wing or hollow body for the ends of the blast tube, spring means tending to extend the blast tube so as to urge its ends against said abutments, and means to readily free the front end of the blast tube from engagement with the appropriate abutment to free the blast tube for removal.

3. Means for shielding or screening the interior of an aeroplane wing or hollow body accommodating a gun, from air pressure and gases around the barrel of the gun comprising a telescopic blast tube adapted to surround the gun barrel, abutments affixable to the gun and to the wing or hollow body for the ends of the blast tube, spring means tending to extend the blast tube so as to urge its ends against said abutments, said blast tube being adapted to be rotated about its axis at its front end relative to the abutment in the wing or hollow body to free it from its normal operative position.

4. Means for shielding or screening the interior of an aeroplane wing or hollow body accommodating a gun, from air pressure and gases around the barrel of the gun comprising a telescopic blast tube adapted to surround the gun barrel, abutments affixable to the gun and to the wing or hollow body for the ends of the blast tube, spring means tending to extend the blast tube so as to urge its ends against said abutments, said blast tube being adapted to be rotated about its axis at its front end relative to the abutment in the wing or hollow body to free it from its normal operative position, a flange-like enlargement on the front end of the blast tube, a tubular member open at both ends mounted in the wing or hollow body and containing said latter abutment and forming a sealing engagement with said flange-like enlargement, and a slot in said enlargement adapted to be aligned with the latter abutment to effect said freeing of the blast tube.

5. Means for shielding or screening the interior of an aeroplane wing or hollow body accommodating a gun, from air pressure and gases around the barrel of the gun comprising a telescopic blast tube adapted to surround the gun barrel, abutments affixable to the gun and to the wing or hollow body for the ends of the blast tube, spring means tending to extend the blast tube so as to urge its ends against said abutments, said blast tube being adapted to be rotated about its axis at its front end relative to the abutment in the wing or hollow body to free it from its normal operative position, a flange-like enlargement on the front end of the blast tube, a tubular member open at both ends mounted in the wing or hollow body and containing said latter abutment and forming a sealing engagement with said flange-like enlargement, a slot in said enlargement adapted to be aligned with the latter abutment to effect said freeing of the blast tube, a convex section periphery to said enlargement concentrically engaging said tubular member, and raised abutments opposite sides of said slot normally preventing said slot from aligning with said latter abutment.

6. Means for shielding or screening the interior of an aeroplane wing or hollow body accommodating a gun, from air pressure or gases around the barrel of the gun, comprising a pair of telescopic tubes forming a blast tube, means urging the two tubes away from each other, abutments for the outer ends of the two tubes limiting said movement so as to secure the blast tube in operative position about the gun barrel, sealing means at the ends of the blast tube preventing ingress of air or gases to the wing or hollow body, a sleeve interposed between the inner ends of the two tubes, and concentric inwardly bent parts in the sleeve forming annular channels, the inner parts of which engage the periphery of the inner tube, the periphery of said sleeve engaging the outer tube, one of said tubes being fixed to said sleeve and the other sliding upon the sleeve.

7. Means for shielding or screening the interior of an aeroplane wing or hollow body accommodating a gun, from air pressure or gases around the barrel of the gun, comprising a pair of telescopic tubes forming a blast tube, means urging the two tubes away from each other, abutments for the outer ends of the two tubes limiting said movement so as to secure the blast tube in operative position about the gun barrel, sealing means at the ends of the blast tube preventing ingress of air or gases to the wing or hollow body, a sleeve interposed between the inner ends of the two tubes, an arcuate section rear edge to the blast tube, and a substantially part spherical fixed abutment on the gun against which said rear edge abuts.

8. A device for closing the open front end of a gun barrel encircling blast tube comprising a split resilient tubular member, a pair of abutments therein, and a key actuated rotary member between said abutments to expand and contract the split tubular member.

9. A blast tube for use with guns in aeroplane wings and other hollow bodies comprising a coaxial pair of telescopic tubes adapted to encircle the gun barrel, abutments on the tubes, a coiled compression spring between said abutments, a sliding bearing effecting a seal between the two tubes, abutments and seatings at the front and rear ends of the blast tube affording a limited angular adjustment of the blast tube and a sealing action against ingress of air or gases to the interior of the wing or hollow body, and means to effect relative rotation of opposed abutments at the front end of the blast tube to effect release of the blast tube.

10. In an aeroplane wing or other hollow body accommodating a gun, a detachable extensible blast tube surrounding the gun barrel, blast tube supporting elements on the gun and in the wing or hollow body, co-operating supporting elements on the blast tube engaging the beforesaid supporting elements, resilient means tending to extend the tube maintaining such engagement, and sealing devices at the ends of the tube preventing ingress of air or gases to the wing or hollow body around the blast tube.

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