Oct. 11, 1960 J. C. HAMRICK 2,955,586

ANGULAR ADAPTER FOR ATTACHMENT TO GUN BARREL

Filed Feb. 5, 1959

Fig-1

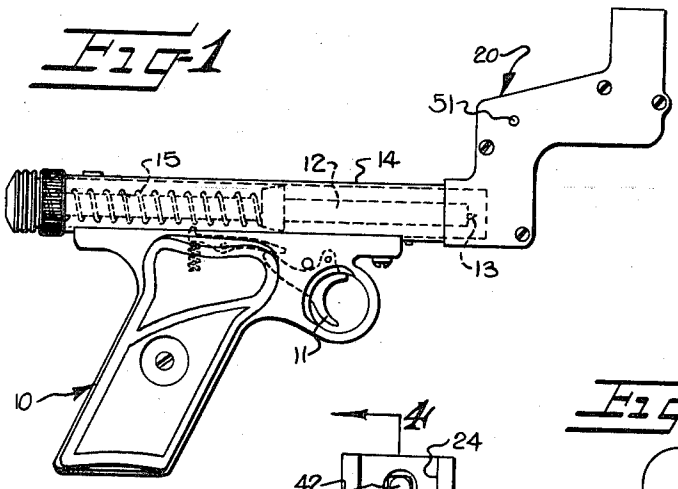
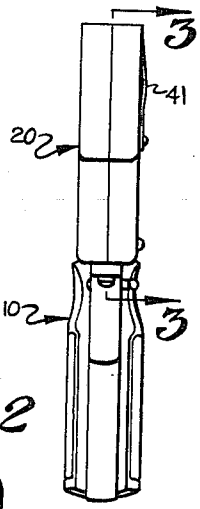


Fig-2



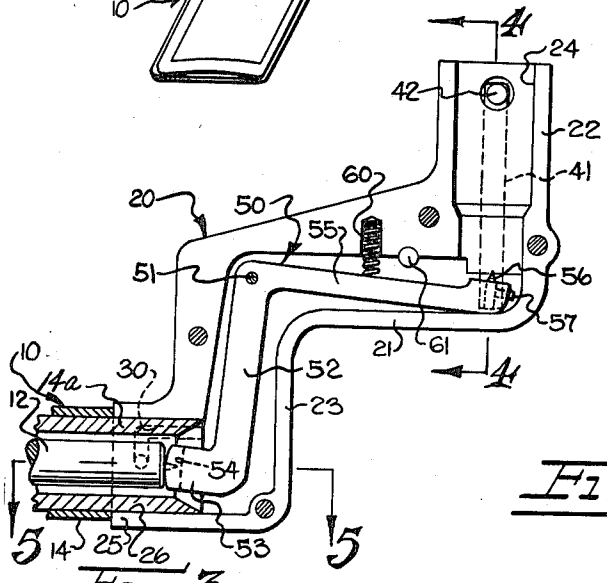


Fig-3

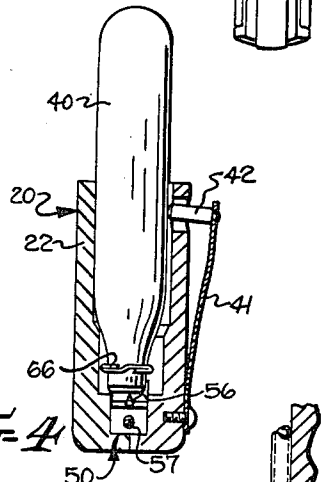


Fig-4

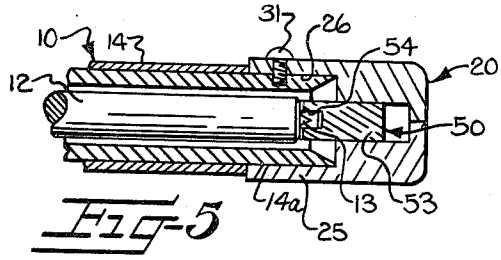


Fig-5

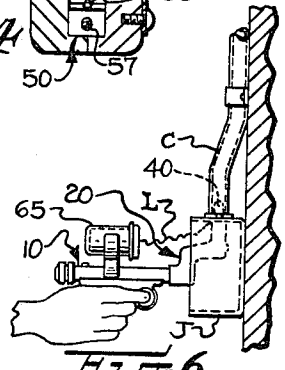


Fig-6

INVENTOR:
JAMES C. HAMRICK

BY Eaton, Bell, Hunt & Deltzer

ATTORNEYS

United States Patent Office

2,955,586

Patented Oct. 11, 1960

2,955,586

ANGULAR ADAPTER FOR ATTACHMENT TO GUN BARREL

James C. Hamrick, Charlotte, N.C., assignor to Jet Lines Products Company, Inc., Charlotte, N.C., a corporation of North Carolina

Filed Feb. 5, 1959, Ser. No. 791,416

2 Claims. (Cl. 124—30)

This invention relates to an angular adapter for attachment to the barrel of a gun so as to permit the firing of a cartridge projectile by the gun in a direction angularly disposed with respect to its barrel. More particularly, the present invention is concerned with an angular adapter to be used as an attachment for an apparatus employed in passing a guide line through a conduit, such apparatus being of the type disclosed in my co-pending United States patent application 774,715 filed November 18, 1958.

In an apparatus of the type described in said co-pending United States patent application 774,715, the size and shape of the hand tool or gun which is adapted to launch or fire a cartridge projectile having a line attached thereto poses a problem whenever the open end of the conduit through which the projectile and accompanying line are to be passed is located in a relatively inaccessible place, as for example, when the open end of the conduit is connected to a junction box. In such instances, the confined space within the junction box or in other cramped locations prevents the placing of the hand tool or gun in a position for accurately alining the cartridge projectile with the open end of the conduit. Where the above condition is present, the projectile cannot be introduced into the conduit by use of the hand tool or gun alone.

It is an object of the present invention to provide an angular adapter for attachment to the barrel of a hand tool or gun, the adapter having a chamber therein for reception of a cartridge projectile and auxiliary firing means operable in response to the operation of the firing mechanism of the gun so as to fire the projectile in a direction angularly disposed with respect to the barrel of the gun. Thus, it becomes unnecessary to have a space sufficiently large to accommodate the hand tool or gun for alining the projectile with the open end of a conduit. The angular adapter may be inserted in the confined area, while the gun is held in a location permitting the projectile receiving chamber of the adapter to be properly alined with the open end of the conduit.

It is another more specific object of this invention to provide in an apparatus for passing a guide line through a conduit including a gun having a barrel provided with a firing pin, a line supply, and a projectile to which one end of the line from the line supply is attached; an angular adapter attached to the barrel of the gun and having a projectile receiving chamber extending in a direction angularly disposed with respect to the barrel of the gun, a pivotal lever mounted therein and having an auxiliary firing pin on the end thereof adjacent to the chamber, the lever pivoting in response to the firing of the gun to cause the auxiliary firing pin to strike the projectile which is positioned in the chamber, whereby the projectile begins its flight in a direction angularly disposed with respect to the barrel of the gun.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevational view of a hand tool or gun having the angular adapter embodying the present invention attached to the barrel thereof, portions of the gun being shown in phantom lines for purposes of clarity;

Figure 2 is an end elevational view of the hand tool or gun with the angular adapter attached thereto, looking from the right-hand end of Figure 1;

Figure 3 is an enlarged fragmentary vertical sectional view taken along line 3—3 of Figure 2;

Figure 4 is an enlarged vertical sectional view of the upper extension of the angular adapter taken along line 4—4 of Figure 3, illustrating the projectile receiving chamber with a cartridge projectile mounted therein;

Figure 5 is a fragmentary longitudinal sectional view taken along line 5—5 of Figure 3; and

Figure 6 is a schematic view of the hand tool or gun with the angular adapter attached thereto, illustrating the manner in which the angular adapter permits a projectile to be fired through a conduit connected to a junction box.

Referring more specifically to the drawings, Figure 1 illustrates a hand tool or gun **10** having a firing mechanism which includes a trigger **11** for releasing a spring-urged plunger **12** provided with a firing pin **13** on its forward end. The gun **10** includes a barrel **14** having a central bore in which the plunger **12** is received. The gun **10** may be of the same type illustrated and described in my co-pending United States patent application, Serial Number 774,715, reference being directed thereto for details of the firing mechanism of the gun **10**. For purposes of description in this application, it suffices to say that the plunger **12** is slidable within the barrel **14** between retracted and extended positions. When the gun **10** is cocked for firing, the plunger **12** is in retracted position and upon pulling the trigger **11**, the plunger **12** moves forward within the barrel **14** under the biasing force of the spring **15** into extended position in order to permit its firing pin **13** to actuate a cartridge projectile normally positioned adjacent thereto.

Under normal circumstances, the cartridge projectile is located with its longitudinal axis in alinement with the axis of the plunger **12**, and upon pulling the trigger **11** of the gun **10**, the firing pin **13** on the plunger **12** punctures the rear end of the projectile causing it to be launched or fired in a direction substantially in alinement with the barrel **14** of the gun **10**. Thus, in using the gun **10** in the manner described, it is necessary to have sufficient space to position the gun **10** with its barrel **14** in substantial alinement with the open end of the conduit through which the projectile is to be fired. The size and shape of the gun **10** make this condition impossible to fulfill in instances where the available space is limited, such as when the projectile must be launched within a junction box in alinement with the open end of a conduit connected thereto. To overcome the obstacle presented by space limitations which prevent the location of the hand tool or gun **10** in a position alining the projectile with the open end of a conduit through which it is to be fired, the present invention contemplates the use of an angular adapter as an attachment to be removably secured to the barrel **14** of the gun **10**.

The angular adapter, as illustrated in the drawings, may be termed a right angle adapter and comprises a split housing **20** formed from two identical pieces, the housing **20** having an elongated central portion **21** provided with an upper extension **22** and a lower extension **23** projecting substantially perpendicular to the central portion **21** from its opposite ends. The two pieces forming the split housing **20** are secured together by suitable fastener means. A projectile receiving chamber **24** is formed in the upper extension **22** of the housing **20**, while the lower extension **23** is provided with a laterally extending tubular connector **25** having a central bore **26** for receiving

the forward end of the barrel **14** of gun **10** in a manner to be presently described. The elongated central portion **21** and the lower extension **23** comprise a hollow substantially L-shaped bridging portion extending between the projectile receiving chamber **24** in the upper extension **22** and the barrel receiving bore **26** of the tubular connector **25**.

The means for removably securing the housing **20** of the angular adapter on the barrel **14** of the gun **10**, as shown in the drawings, may comprise an end portion **14***a* of reduced diameter on the barrel **14** having an L-shaped or bayonet slot **30** formed in the forward end thereof. As shown in Figure 3, the reduced end portion **14***a* of the barrel **14** is telescopically received within the bore **26** of the tubular connector **25**. It will be noted that the tubular connector **25** of the angular adapter is provided with a screw **31** which protrudes into the central bore **26** thereof, as shown in Figure 5. To attach the angular adapter to the gun **10**, the screw **31** is alined with the open end of the bayonet slot **30** and thereafter guided along the bayonet slot **30** to the closed end thereof.

Instead of positioning the cartridge projectile in axial alinement with the barrel **14** of gun **10**, this invention contemplates that the chamber **24** formed in the upper extension **22** of the angular adapter will receive the cartridge projectile, Figure 4 illustrating a cartridge projectile **40** mounted in the chamber **24**. The cartridge projectile **40** may be of the type described in my co-pending application 774,715 which contains a gaseous propellant substance, such as compressed carbon dioxide. The projectile **40** upon being punctured relies upon the release of the gaseous substance contained therein to exert a forward thrust thereto.

Means are provided to releasably retain the cartridge projectile **40** in the chamber **24** of the angular adapter, this means taking the form of a leaf spring **41** which is secured at one end to the external surface of the upper extension **22**. The opposite free end of the leaf spring **41** is provided with a projection or lug **42** thereon which extends inwardly through an aperture provided in the wall of the upper extension **22**, as illustrated in Figure 4. The projection **42** protrudes within the chamber **24** and is adapted to resiliently engage the cartridge projectile **40** to releasably retain the projectile within the chamber **24** preparatory to the launching thereof.

The housing **20** of the angular adapter contains auxiliary firing means in the form of a substantially L-shaped lever **50** pivotally mounted as at **51** in the hollow L-shaped bridging portion defined by the elongated central portion **21** and the lower extension **23** of the adapter housing **20**. The lever **50** includes a first lever arm **52** extending within the lower extension **23** and having a lateral in-turned leg **53** protruding within the barrel receiving bore **26** of the tubular connector **25**. It will be observed in Figures 3 and 5 that the lateral leg **53** formed on the first lever arm **52** includes a vertically extending slot **54** in the face thereof opposed to the forward end of the plunger **12** within the barrel **14** of the gun **10**. As shown in Figure 5, the slot **54** accommodates the firing pin **13** on the forward end of plunger **12** to prevent injury thereto upon firing the gun **10**.

The lever **50** also includes a second lever arm **55** extending at a right angle with respect to the first lever arm **52** and having its end remote from the first lever arm located adjacent the projectile receiving chamber **24** provided in the upper extension **22** of the adapter housing **20**. An auxiliary firing pin **56** having a longitudinal axis substantially parallel to the axis of the chamber **24** is adjustably mounted in the end of the second lever arm **55** located adjacent to the chamber **24** by means of a set screw **57**.

The firing pin **56** is normally maintained outside of the chamber **24** by means of a retraction spring **60** seated at one end in a suitable vertical bore provided in the central portion **21** of the adapter housing **20** and engaging the second lever arm **55** at its opposite end to bias the lever **50** about its pivot point **51** in a clock-wise direction, as viewed in Figure 3.

The operation of the angular adapter in cooperation with the hand tool or gun **10** will now be described. Upon securing the adapter housing **20** about the reduced end portion **14***a* of the barrel **14** of gun **10**, it will be observed that the lateral leg **53** formed on the first lever arm **52** presents a face in opposition to the forward end of plunger **12**. Upon pulling the trigger **11** to actuate the firing mechanism of the gun **10**, the plunger **12** is urged forwardly by the spring **15**, and in turn, forces the lateral leg **53** of the first lever arm **52** in a generally forward direction causing the lever **50** to pivot about its pivot point **51** in a counterclockwise direction, as viewed in Figure 3, against the biasing force of spring **60**. It will be apparent that such pivoting movement of the lever **50** thrusts the firing pin **56** into the chamber **24** to puncture the rear end of the cartridge projectile **40**, whereby the projectile **40** is launched or fired in a direction substantially perpendicular to the barrel **14** of the gun **10**. A resilient bumper **61** in the form of a nylon pin may be provided in the internal upper wall surface of the central portion **21** to cushion the counter-clockwise movement of the second lever arm **55** and prevent it from forcibly striking against this internal upper wall surface.

Thus, in instances where space limitations prevent the location of the hand tool or gun **10** so as to aline a projectile with the open end of a conduit through which it is to be fired, the angular adapter may be employed as an attachment for the gun **10** to permit the firing of the projectile through the relatively inaccessible conduit by the use of the auxiliary firing means carried within the adapter and operating as described.

As shown in Figure 6 for example, a conduit C leading away from a junction box J ordinarily creates a space problem so as to render impossible the use of a line passing apparatus employing a hand tool or gun for launching a projectile through the open end of conduit C unless the angular adapter is attached to the gun. Figure 6 illustrates a line supply in the form of a line can **65** mounted on the barrel **14** of gun **10**, the line can **65** having a free end of line L extending therefrom and attached to the trailing end of the cartridge projectile **40** in a suitable manner, such as by tying it about a split ring or circlet **66** frictionally secured to the trailing end of the projectile, as shown in Figure 4. The cartridge projectile **40** is placed in chamber **24** formed in the upper extension **22** of the adapter housing **20** and the angular adapter is attached to the barrel **14** of gun **10**. It can be seen that it is necessary to insert only the upper extension **22** of the angular adapter housing **20** into the confined area within the junction box J for properly positioning projectile **40** for subsequent launching through the open end of conduit C.

Heretofore, workers have been reluctant to install junction boxes until the electrical conductors or wires were already in place within the conduits to be connected to the junction boxes because of the difficulty, above described, in passing a guide line through a conduit connected to a junction box for subsequently allowing the electrical conductors to be pulled through the conduit. The hand tool or gun **10** when equipped with an angular adapter as shown in Figure 6 overcomes this difficulty and makes it practical to install such junction boxes at the convenience of the workers.

Although the angular adapter which has been illustrated and described is a right-angle adapter, it should be distinctly understood that adapters having varying angular relationships with respect to the barrel of a gun and suitable for the purpose herein described fall within the spirit of the present invention.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a

generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. An adapter for attachment to the barrel of a gun, said adapter comprising an open-ended housing having a projectile receiving chamber and a barrel receiving bore at its opposite open ends, a hollow L-shaped bridging portion extending between the projectile receiving chamber and the barrel receiving bore provided in said housing at the opposite ends thereof, said projectile receiving chamber having an axis angularly disposed with respect to the axis of said barrel receiving bore, a substantially L-shaped lever in said hollow connector portion of the housing, said lever comprising first and second lever arms extending angularly with respect to each other, said first lever arm having a lateral leg protruding into said barrel receiving bore and said second lever arm having its end remote from said first lever arm located adjacent said projectile receiving chamber, a firing pin mounted on the end of said second lever arm adjacent said projectile receiving chamber, and means mounting said lever for pivotal movement in said housing at the juncture of said first and second lever arms so as to thrust said firing pin into said chamber, whereby said firing pin may strike a projectile to fire it outwardly of said chamber.

2. An adapter for attachment to the barrel of a gun,

said adapter comprising a housing having an elongated central portion provided with an upper and a lower extension projecting substantially perpendicular to said central portion from its opposite ends, said upper extension defining a projectile receiving chamber, means on said lower extension for receiving the barrel of the gun, a lever pivotally mounted intermediate its ends within said housing at the juncture between said central portion and said lower extension, said lever having first and second lever arms extending from its pivot point through said lower extension and said central portion respectively, at a right angle with respect to each other, said first lever arm having a free end portion adapted to be exposed to the interior of the barrel, firing means projecting from the free end portion of said second lever arm into proximity with the projectile receiving chamber formed in said upper extension, and said lever pivoting in response to the application of force emanating from the barrel of the gun against the exposed free end portion of said first lever arm to thrust said firing means into said projectile receiving chamber, whereby said firing means may strike a projectile to fire it outwardly of said chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,364,141	Harris	Dec. 5, 1944
2,475,527	Stilwell	July 5, 1949