Feb. 17, 1959 H. E. DOUGLASS ET AL 2,874,270

PORTABLE WORK LIGHT

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FIG. 1.

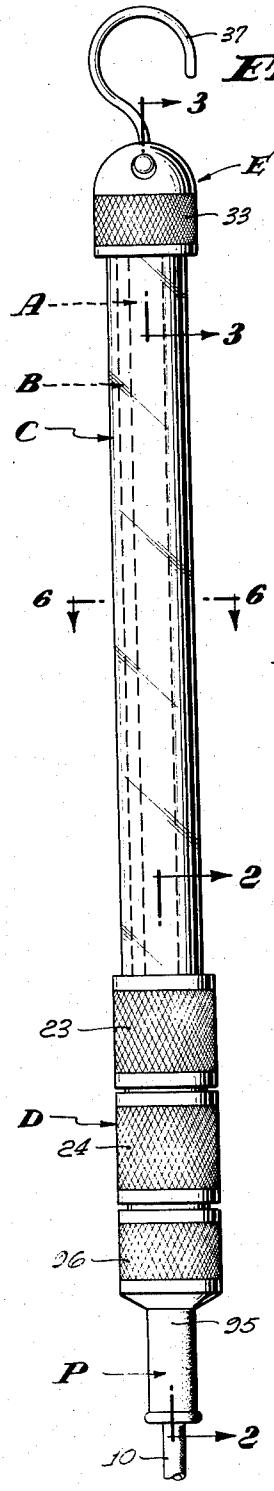


FIG. 2.

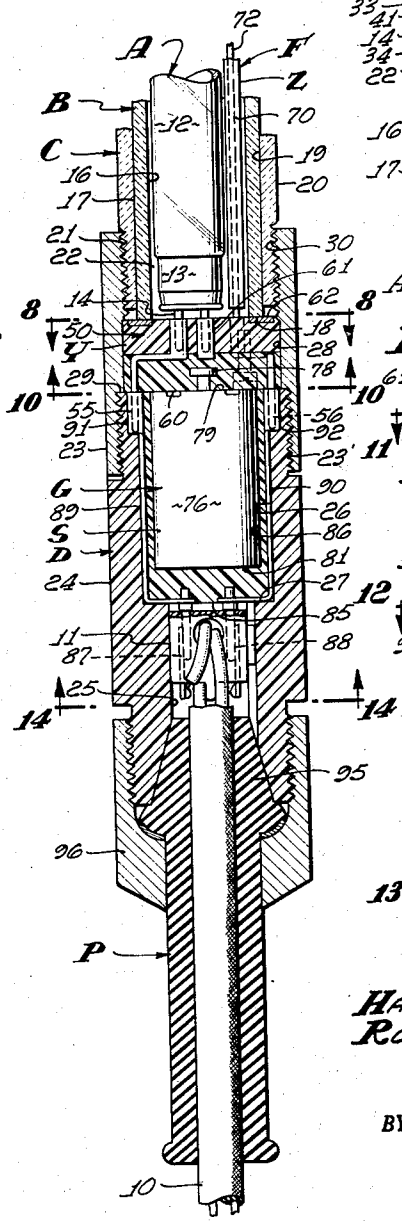


FIG. 3.

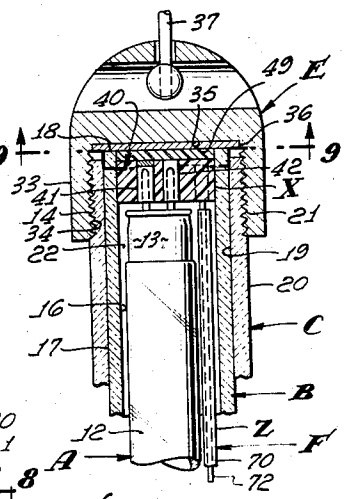


FIG. 4.

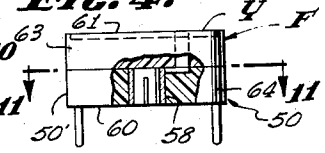
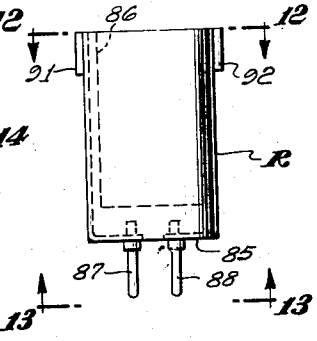


FIG. 5.



HARRY E. DOUGLASS
RODNEY B. HECOX
INVENTORS.

BY H. Maxwell
AGENT.

Feb. 17, 1959 H. E. DOUGLASS ET AL 2,874,270

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FIG. 6.

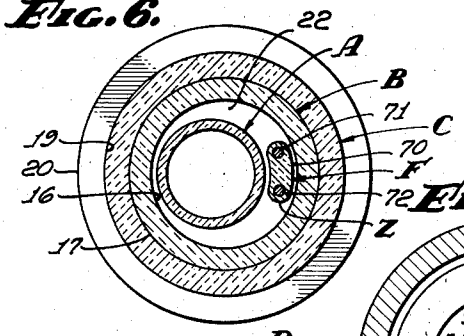


FIG. 7.

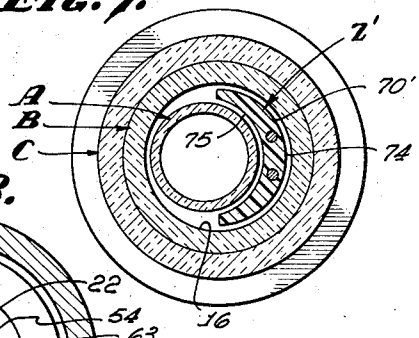


FIG. 8.

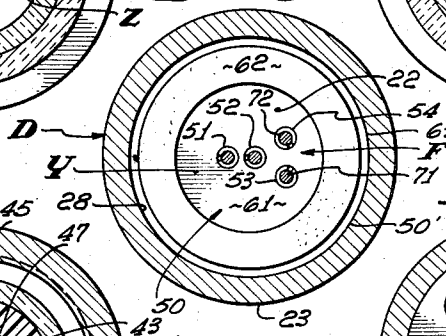


FIG. 9.

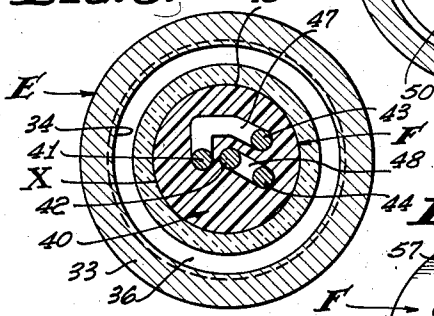


FIG. 10.

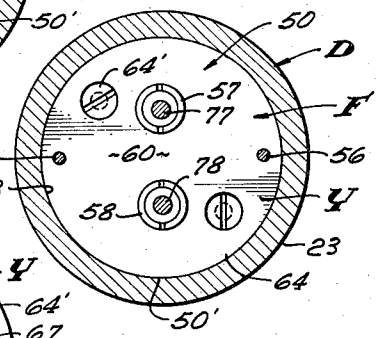


FIG. 11.

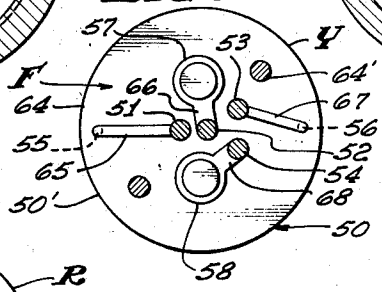


FIG. 12.

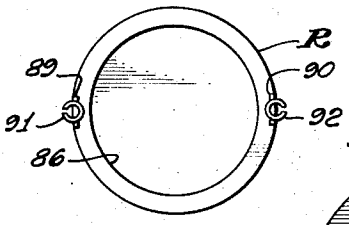


FIG. 13.

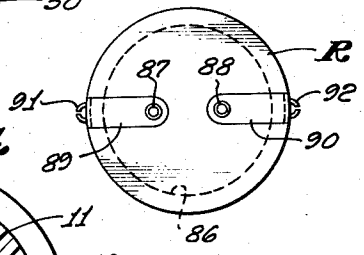


FIG. 14.

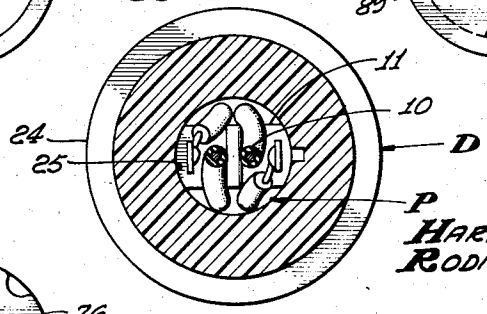
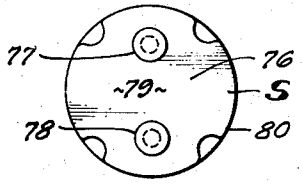


FIG. 15.



HARRY E. DOUGLASS
RODNEY B. HECOX
INVENTORS.

BY Wm. H. Maxwell

AGENT.

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2,874,270

PORTABLE WORK LIGHT

Harry E. Douglass, Glendale, and Rodney B. Hecox, Bakersfield, Calif.

Application July 12, 1956, Serial No. 597,496

4 Claims. (Cl. 240—11.4)

This invention has to do with a portable work light, it being a general object of the invention to provide a simple and practical explosion-proof light that is safe to use and that is economical to maintain. This invention is particularly concerned with a fluorescent work light of the elongate tubular type, and provides for the protection of the tubular lamp that is employed.

In various industries it is necessary to provide portable lighting to be used by the workmen in carrying out their duties. For example, in the construction of aircraft, or in any other construction work, the available ambient lighting is inadequate, thus requiring additional lighting in order to see in inclosed places, or in recesses and compartments, and the like. In many instances the nature of the construction and the work involved requires an explosion-proof lighting device that is of substantial construction so that the danger of igniting the surrounding and possibly explosive atmosphere is reduced to a minimum. Heretofore, lighting devices of the type under consideration have not been altogether satisfactory since they are generally vulnerable to breakage, in which event there is likely to be ignition of the surrounding atmosphere. That is, breakage of lighting devices of the type under consideration, exposes the electrical elements thereof, rendering the devices extremely dangerous.

An object of this invention is to provide a portable work light that is of such construction as to be explosion-proof, even under abnormal working conditions. That is, the light that we provide is so constructed as to be extremely durable and not subject to breakage, thus eliminating the danger of exposed electrical elements and possible ignition of the surrounding and possibly explosive atmosphere.

It is an object of this invention to provide a portable work light that houses the illuminating lamp in a chamber that is sealed from the outside atmosphere. The assembly of parts that we provide completely incloses the lamp in a chamber, there being seals at the closures of the chamber that insure positive isolation of the lamp from the surrounding atmosphere.

Another object of this invention to provide a portable work light of the type under consideration that includes means for receiving and relating a starter switch to the other electrical elements of the structure, so that the lamp is illuminated by the current supplied through a cord.

It is still another object of this invention to provide a portable work light of the type under consideration that includes means for receiving and sealing around an electrical supply cord to anchor the cord with the light, and to isolate the interior of the light from the surrounding atmosphere.

It is also an object of this invention to provide a work light of the type under consideration that is assembled from components that simply press together in order to eliminate time consuming and costly assembly of parts. With the structure that we provide, the elements are provided with socket type contacts and pins that register and

fit together on assembly, in order to establish the desired electrical connections and circuitry.

The various objects and features of our invention will be fully understood from the following detailed description of the typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side view of the portable work light embodying the features of the present invention. Figs. 2 and 3 are enlarged longitudinal section views taken as indicated by lines **2—2** and **3—3** in Figs. 1, respectively. Figs. 4 and 5 are views of parts shown in Fig. 2 of the drawings and showing the parts separate from the inclosing structure. Fig. 6 is an enlarged transverse sectional view taken as indicated by line **6—6** in Fig. 1. Fig. 7 is a transverse sectional view similar to Fig. 6 and showing a modified construction. Fig. 8 is an enlarged transverse sectional view taken as indicated by line **8—8** in Fig. 2. Fig. 9 is a transverse sectional view taken as indicated by line **9—9** in Fig. 3. Fig. 10 is an enlarged transverse sectional view taken as indicated by line **10—10** in Fig. 2. Fig. 11 is an enlarged sectional view taken as indicated by line **11—11** in Fig. 4. Figs. 12 and 13 are enlarged end views of the part shown in Fig. 5, and taken as indicated by lines **12—12** and **13—13** in Fig. 5. Fig. 14 is an enlarged transverse sectional view taken as indicated by line **14—14** in Fig. 2, and Fig. 15 is an enlarged end view of the starter switch shown in Fig. 2 of the drawings.

The portable work light of the present invention is a rod shaped illuminating device which may vary in diameter and length as circumstances require. The structure is particularly adapted to employ fluorescent lamps, although it will be readily apparent that it is useful in connection with any shape and type of lamp by simply proportioning the structure as required. As illustrated, and as hereinafter described, we prefer to proportion the structure for use with a fluorescent lamp which requires the use of a starter switch.

The structure of the present invention, as shown throughout our drawings, involves generally, a lamp A, a transparent body, B, a transparent case C, a base D, a cap E, lamp exciting means F including upper and lower receptacles X and Y and a connector Z, lamp starting means G including a starter switch S and an adapter R, and power supply means P. The lamp A is an elongate tubular lamp and is carried within the body B. The case C surrounds the body and extends between the base D and cap E, the parts being made so that the body B seals with the base and cap. The lamp exciting means F involves the receptacles X and Y that are carried in the cap E and base D respectively, and involves the connector Z which electrically joins the receptacles. The lamp starter means G is carried in the base D and joins electrically with the receptacle Y, which involves circuitry that properly relates the electrical elements of the structure. The power supply means P provides the electrical current and involves a cord **10** that enters the base D and a plug **11** that joins the cord to the circuitry of the structure.

The lamp A that we have illustrated involves an elongate envelope **12** that is made of transparent material, such as glass or the like, the ends of the envelope being closed by metal fitting **13**. In accordance with the usual lamp construction, a pair of spaced parallel pins **14** project axially from each fitting **13**, there being pairs of pins **14** at each end of the lamp A. Further, the lamp A is filled with a suitable gas and has electrodes coupled with the pins to the end that the lamp A is illuminated when electrically excited.

The transparent body B is provided to house and protect the lamp A, which by itself is a fragile part. The body B is an elongate cylindrically shaped tubular ele-

ment, having an inner wall **16** and an outer wall **17**. In accordance with the invention, the body B has end faces **18** in planes normal to the axis of the structure and in practice is made of a tempered glass having considerable structural strength. The material that we prefer to employ is "Pyrex" which is heat-treated annealed glass. By employing said material and by forming the body B with substantial wall thickness, as shown, there is no danger of the structure failing from internal explosion. For example, the lamp A, if it explodes, will not cause bursting of the body B. The body B is substantially coextensive with the lamp A and the end faces **18** are flat faces that are trued, as by grinding, in order to seal with facings as later described.

The transparent case C is provided to encase and protect the glass body B, which could possibly be damaged or broken by a sharp blow from the exterior of the structure. The case C, like the body B, is an elongate cylindrically shaped tubular element having an inner wall **19** and an outer wall **20**. In accordance with the invention, the case C has threaded end portions **21** for coupling the case to the base D and the cap E as later described. In practice, the case C is made of a so called plastic material that is tough and shock-resistant. The material that we prefer to employ is "Lucite," which is a tough shock-withstanding material. The inner wall **19** of the case slideably receives the outer wall **17** and of the body B, and is coextensive with and surrounds the body B to the end that the body B is protected from external abuse. The tubular concentric elements B and C encase and protect the lamp A so that neither external abuse nor internal explosion will cause breakage or failure of the body B. Thus the body B maintains a closed protective chamber **22**.

The base D and cap E are provided to close the ends of the body B in order to maintain the said closed chamber **22**. The normal operating position of the portable work light is vertical, in which case the base D closes the lower end of the body, while the cap E closes the upper end of the body. The base D is coupled to the lower end portion of the case C, and carries parts of the lamp exciting means F, and also carries the lamp starting means G.

The base D is a cylindrical element that is joined to the lower end of the case C by means of a coupler **23** to depend from the lower end of the body and case assembly. As best illustrated in Fig. 2 of the drawings, the base D involves an elongate vertically disposed shell **24** and the coupler **23** forms an upward continuation of the shell. A bore **25** enters the lower end of the shell **24** to receive elements of the power supply means P, while a counterbore **26**, larger in diameter than bore **25**, enters the upper end of the shell **24** to receive the lamp starting means G. There is an upwardly faced shoulder **27** where the bore **25** and counterbore **26** adjoin.

The coupler **23** is releasably connected to the shell **24** by means of threads **23'** and has an inner bore **28** larger in diameter than the counterbore **26** to receive the receptacle Y of the means F. The shell terminates in an upper end face **29** in a plane normal to the vertical axis of the structure, thus forming a seat for supporting the receptacle Y. As shown, the coupler **23** has internal threads **30** at the upper end portion thereof, somewhat smaller in diameter than the bore **28**. The threads **30** couple with the threaded lower end portion **21** of the case C, and being smaller in diameter than the bore **28**, retain the recetpacle Y in working position.

The cap E is a closure element that is joined to the upper end of the case C to overlie the upper end of the body and case assembly. As best illustrated in Fig. 3 of the drawings, the cap E involves an inverted cup shaped part **33** that has a bore **34** with a bottom **35**. The part **33** is releasably connected to the case C and as shown, the bore has internal threads that couple with the threaded upper end portion **21** of the case C.

The bottom **35** of the part **33** is a plane normal to the axis of the structure and, in accordance with the invention, is provided with a facing **36** adapted to seal with the upper end face **18** of the body B. In practice the facing **36** may be a layer of lead, or the like, that will seal tight with the end face **18**. As shown, the facing **36** may be a disc shaped facing co-extensive with the bottom **35**. Further, the cap E may include means for supporting the portable work light that we provide, and as illustrated in Figs. 1 and 3 of the drawings, there is provided a swivelly mounted suspension hook **37**. The hook **37** is rotatably carried by the part **33** and projects upwardly therefrom for engagement with a supporting object or structure.

It will be apparent from the foregoing and from Figs. 2 and 3 of the drawings, that the base D and cap E close the ends of the body B and case C, forming the closed chamber **22** in the body. In carrying out the invention, the case C is made slightly shorter than the body B, so that the ends **18** of the body are brought into contact with the seals, as shown. It will be understood how the cap E and coupler **23** are rotated relative to the case C in order to create a tight seal at the ends **18** of the body B.

The lamp exciting means F is provided to electrically connect the lamp A with the power supply means P, and with the lamp starting means G when employed. As shown throughout the drawings, the means F involves generally the upper and lower receptacles X and Y and the connector Z that extends between the receptacles. When employing a fluorescent type lamp A, it is necessary to electrically excite both the upper and lower ends of the lamp, and it is also necessary to make provisions for a starting circuit. The means F that we have illustrated incorporates features adapted to handle a fluorescent lamp and therefore includes means to excite both ends of the lamp and also includes a starting circuit.

The upper receptacle X of the means F is best illustrated in Figs. 3 and 9 of the drawings, and involves a body **40**, a pair of lamp contacts **41** and **42**, and a pair of connector contacts **43** and **44**. The body **40** is made of insulating or dielectric material and is shaped to enter into the upper end of the body B. The body **40** has an outer wall **45** that is slideably received in the inner wall **16** of the body B and has bearing engagement with the facing **36**.

The lamp contacts **41** and **42** are spaced parallel pin receiving contacts that are carried in the body **40** and are axially disposed to receive the pins **14** that project from the upper end of the lamp A. The connector engaging contacts **43** and **44** are also spaced parallel pin receiving contacts that are carried in the body **40** and are positioned laterally to one side of the contacts **41** and **42** to receive pins that project from the connector hereinafter described. The contacts **41** and **42**, and the contacts **43** and **44**, are spring type contacts that frictionally engage with the pins that are received therein. As shown in Fig. 9, the contacts **41** and **43** are joined by a bar **47** while the contacts **42** and **44** are joined by a bar **48**. The elements of the receptacle X are accommodated in suitable recesses in the body **40** and are held in place by an insulating cover **49**.

The lower receptacle Y of the means F is best illustrated in Figs. 2, 4, 8, 10, and 11 of the drawings and involves a body **50**, a pair of lamp contacts **51** and **52**, a pair of connector contacts **53** and **54**, a pair of power contacts, **55** and **56**, and a pair of starter contacts, **57** and **58**. The body **50** is made of insulating or dielectric material and is shaped to enter into the bore **28** in the coupler **23**. The body **50** has an outer wall **50'** that is slideably received in the bore **28** and has a flat lower end **60** that has bearing engagement with the upper end face **29** of the shell **24**. In the preferred form of the invention, the body **50** has a flat upper end **61** in a plane normal to the axis of the structure and in accordance with the invention, is provided with a facing **62** adapted

to seal with the lower end face **18** of the body B. In practice the facing **62** may be a layer of lead, or the like, that will seal tight with the end face **18**. As shown, the facing **62** may be a ring shaped facing inserted into the periphery of the upper end **61** of the body **50**. It will be apparent how the facings **36** and **62** seal with the end faces **18** to close the chamber **22** within the body B.

The pairs of contacts above referred to are carried in the body **50**, the contacts **51** and **52**, and contacts **53** and **54** being located at the upper end **61** of the body, while the contacts **55** and **56**, and contacts **57** and **58** are located at the lower end **60** of the body. In the preferred construction the body **50** is a sectional unit of construction made up of upper and lower disc shaped elements **63** and **64**, suitably held together by fasteners or the like. We have shown screws **64'** carried in element **64** threaded into openings in the element **63**. The element **63** carries the upper contacts that engage with the lamp A and connector Z, while the element **64** carries the lower contacts that engage with the power supply means P and the starter switch S. There are bars later described that electrically connect the contacts, the contacts and bars being carried in recesses in one of the disc shaped elements. We have shown recesses in the lower element **64** that accommodate said bars.

The lamp contacts **51** and **52** are spaced parallel pin receiving contacts that are carried in the upper element **63** of the body **50** and are axially disposed to receive the pins **14** that project from the lower end of the lamp A. The connector engaging contacts **53** and **54** are also spaced parallel pin receiving contacts that are carried in the upper element **63** of the body **50** and are positioned laterally to one side of the contacts **51** and **52** and are axially disposed to receive pins that project from the connector hereinafter described. The contacts **51** and **52**, and contacts **53** and **54** are spring type contacts that frictionally engage with pins that are received therein. As shown in Fig. 11, the contacts **51** and **55** are joined by a bar **65**, while the contacts **52** and **57** are joined by a bar **66**. The contacts **53** and **56** are joined by a bar **67**, while the contacts **54** and **56** are joined by a bar **68**. The contacts **57** and **58** are spaced parallel pin receiving contacts that are carried in the lower element **64** of the body **50** and are disposed axially to receive pin contacts later described. The contacts **55** and **56** are pin type contacts that project axially of and depend from the lower end **60** of the body **50**.

The contacts **41** and **42**, and contacts **51** and **52** are located approximately centrally of the structure so that the lamp A is substantially centered with the longitudinal axis of the structure. In practice, however, the said contacts are located somewhat off-center in order to gain room for the connector Z that occupies the chamber **22** laterally of and to one side of the lamp A. The connector Z extends between the receptacles X and Y and involves a shield **70** and a pair of busses **71** and **72** that join the connector contacts of the receptacle. The busses **71** and **72** are elongate rod like elements with pin like projections at the ends thereof that are carried in spaced parallel relationship by the elongate shield **70**. The buss **71** extends between and has pin shaped end portions that connect with the contacts **43** and **53**, while the buss **72** extends between and has pin shaped end portions that releasably join with the contacts **44** and **54**.

In Figs. 2, 3, and 6 of the drawings, the shield **70** is shown of minimum cross section and formed of a transparent material so that light may pass therethrough with the least amount of obstruction, in which case the busses are the only obstruction. In Fig. 7 we have shown a modified construction wherein the connector Z' involves an elongate shield **70'** is of substantial width in cross section. In the latter form of the invention, the shield **70** is arcuate in cross section and extends circumferentially of the lamp A to substantially cover one side thereof. The outer wall **74** of the shield **70** is curved to fit within the wall **16** of the body B, and the inner wall **75** is curved to act as a reflector and may be suitably coated with a layer of reflecting material, as circumstances require. It will be apparent how the connector Z' joins the receptacles X and Y and acts as a shield and/or a reflector when desired.

The lamp starting means G is preferably carried within the base D and joins electrically with the receptacle Y and involves a starter switch **76**. The counterbore **26** in the base B is provided to receive and accommodate the starter switch **76**, the switch having pins **77** and **78** that are releasably engaged in the contacts **57** and **58** respectively. We have shown a common ordinary starter switch **76** that is contained in an elongate cylindrical container and which involves the pins **77** and **78** that project upwardly from the top **79** of the container, which container has an outer wall **80** and a bottom **81**. The wall **80** is received in the bore **26** with clearance and the bottom **81** is positioned by the shoulder **27** so that the pins **77** and **78** extend into engagement with the contacts **57** and **58**. It will be apparent how the starter switch **76** is electrically related to the power means P and lamp means A through the relationship of contacts and bars above described.

The power supply means P is provided to energize the electrical circuit and lamp A and conducts electrical current from the cord **10** through the plug **11** and to the pin contacts **55** and **56**. The means P involves the plug **11** and the adapter R, the adapter R being varied as circumstances require. That is, the adapter may handle a two line circuit as shown, or it may handle a **4** line circuit, all as circumstances require. As shown throughout the drawings, the starter switch **76** is carried in the base D, in which case a two line circuit is all that is necessary. However, if the starter switch **76** is to be carried remote from the portable work light structure, a four line circuit will be necessary. In the case illustrated, the adapter R is a cup shaped sleeve like part slideably carried and seated on the shoulder **27** in the bore **26**, and is provided with a socket or recess **86** that slideably receives the starter switch **76** to hold it in working position. The bottom **85** of the adapter R is recessed and carries a pair of pins **87** and **88** that engage with the plug **11**. Conductor bars **89** and **90** extend from the pins **87** and **88** to pin receiving contacts **91** and **92** that are located in the top end of the adapter R. The conductor bars **89** and **90** are carried in longitudinal recesses in the side wall of the sleeve. The contacts **91** and **92** engage with the contacts **55** and **56**, above described. Included in the power supply means P is a transformer (not shown) that delivers the proper voltage for operation of the particular lamp A that is employed.

The power supply means further includes means for anchoring and for sealing around the cord **10**. As shown, a resilient gland **95** is provided that yieldingly grips the exterior of the cord **10**. The lower end portion of the bore **25**, in the base D, is tapered and the gland **95** is shaped to substantially fit the tapered portion of said bore. The gland **95** is in the nature of a sleeve of resilient rubber like material and has an enlargement that is engaged by a screw cap **96** threaded on to the lower end of the base D. It will be apparent how operation of the screw cap **96** acts to compress the enlargement on the gland **95** to seal and grip the cord **10**.

From the foregoing it will be apparent that we have provided a relatively simple and extremely durable portable work light of the type under consideration. The lamp A is not only protected from blows from the exterior of the structure, but is isolated within a closed chamber. With the structure that we provide, the chamber is positively sealed at the ends thereof, and the transparent body which form the chamber is protected by being inclosed within a case of shock resistant material. It is to be observed that the ends of the shock

resistant case are coupled to the base and cap of the structure, respectively, and when the structure is assembled, the body B is put under direct compression, insuring a tight seal at the facings 36 and 62. Further, it is to be observed that the electrical elements are characterized by receptacle type elements and pins that are engaged therein to the end that assembly of the structure is facilitated. That is, the parts and elements of the structure are merely pressed together, and when the case C is coupled between the base D and cap E, the structure is ready for operation.

Having described only typical preferred forms and applications of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to ourselves any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described our invention, we claim:

1. A work light of the character described, including, an elongate tubular body, a base of insulating material closing one end of the body, a cap closing the other end of the body, an elongate lamp carried within the body, there being a bore in the body, and lamp exciting means including, receptacles releasably engaged with opposite ends of the lamp, each receptacle having a pair of lamp contacts and a pair of contacts laterally offset therefrom, one of the receptacles having a pair of starter contacts, a connector extending between the receptacles and releasably engaged with said offset contacts, a cylindrical adapter of insulating material carried in the bore in the base, and a starter switch slideably received in the adapter and releasably engaged with said starter contacts, there being electrical conductors carried between the bore and adapter and connected with a power supply and connected with the receptacle having the starter contacts.

2. A work light of the character described, including, an elongate tubular body, a base of insulating material closing one end of the body, a cap closing the other end of the body, an elongate lamp carried within the body, there being a bore in the body, and lamp exciting means including receptacles releasably engaged with opposite ends of the lamp, each receptacle having a pair of lamp contacts and pair of contacts laterally offset therefrom, one of the receptacles having a pair of starter contacts, a connector extending between the receptacles and releasably engaged with said offset contacts, a cylindrical adapter of insulating material carried in the bore in the base, and a starter switch slideably received in the adapter and releasably engaged with said starter contacts, there being elongate electrical conductors coextensive with the adapter and carried between the bore and adapter, and a plug connected with a power supply,

said electrical conductors having terminal ends adapted to have releasable sliding contact with said one receptacle and with said plug.

3. A work light of the character described, including an elongate tubular body of transparent high strength material, a tubular case coextensive with and surrounding the body and of transparent shock resistant material, a base closing the body and case at one end, a cap closing the body and case at the other end, an elongate lamp carried in the body and with terminal end fittings and each having an electrical contact, and electrical means exciting the lamp at said base and cap, and including, a receptacle with an electrical terminal engaged with a contact at one end of the lamp and supported by a shoulder in the base, an axially disposed facing of sealing material on said receptacle, a receptacle with an electrical terminal engaged with a contact at the other end of the lamp, and a connector extending between the receptacles, an axially disposed facing in the cap, said case being engaged with the base and cap and under tension to hold the body under pressure between the facings and sealed therewith.

4. A work light of the character described, including, an elongate tubular body of transparent high strength material, a tubular case coextensive with and surrounding the body and of transparent shock resistant material, a base closing the body and coupled to the case at one end, a cap closing the body and coupled to the case at the other end, an elongate lamp carried in the body and with terminal end fittings and each having an electrical contact, and electrical means exciting the lamp at said base and cap, and including, a receptacle with an electrical terminal engaged with a contact at one end of the lamp and supported by a shoulder in the base, an axially disposed facing of sealing material on said receptacle, a receptacle with an electrical terminal engaged with a contact at the other end of the lamp, and a connector extending between the receptacles, an axially disposed facing in the cap, said case being engaged with the base and cap and under tension to hold the body under pressure between the facings and sealed therewith.

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