

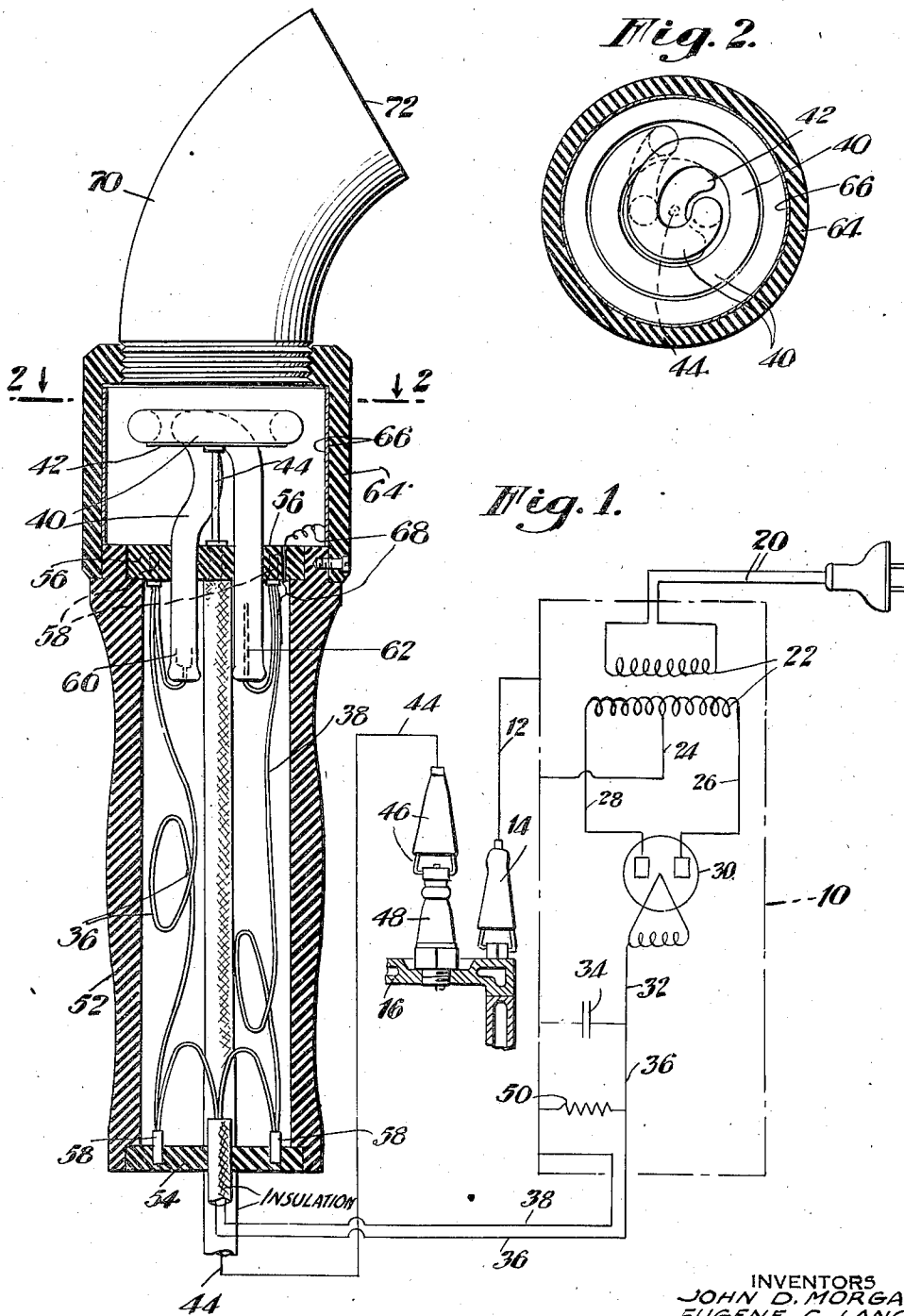
March 21, 1944.

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2,344,518

HIGH POWER NEON TIMING LAMP

Filed Aug. 19, 1941



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2,344,518

HIGH POWER NEON TIMING LAMP

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Application August 19, 1941, Serial No. 407,458

8 Claims. (Cl. 176—122)

This invention relates to improvements in high power neon timing lamps of the stroboscope type and more particularly to such lamps used for studying and analyzing the actions of mechanical parts in motion.

The improved timing lamp of the present invention is particularly adapted for use in the timing of internal combustion engines.

Various forms of stroboscopic lamps have been used in many arts and some of the uses for such lamps are described in Patent No. 2,102,185, of which one of the present applicants is a joint patentee. While the improved neon lamp of the present invention is particularly adapted for use as a timing lamp, it nevertheless may be employed for various purposes in the arts.

The primary object of the present invention is to provide an improved high power neon lamp of the stroboscope type in which a very intense short flash of light is developed.

Another object of the invention is to provide an improved stroboscopic lamp which is particularly adapted for hand use and which is constructed in such a manner as to greatly facilitate its use at close range and under normally impractical conditions for most stroboscopic lamps.

A further object of the invention is to provide an improved stroboscopic lamp in which a neon lamp tube is used, having a definite relationship between its diameter and the pressure of the gas with which it is filled.

The improved neon timing lamp of the present invention is described in connection with the accompanying drawing, and more particularly defined in the claims.

In the drawing:

Fig. 1 is an elevational view partly in section with parts broken away in which the electrical circuits are shown and in which certain parts are shown relatively enlarged with respect to other parts.

Fig. 2 is a horizontal sectional view looking down on the line 2—2 of Fig. 1 showing the arrangement of the neon lamp tube.

Referring to the drawing, in which the improved timing lamp is illustrated in connection with the testing of a spark ignition internal combustion engine, the wiring and auxiliary equipment of the instrument are contained in a metal case 10, which may be portable and which is preferably grounded to the engine or other equipment under test by a wire 12 and spring clip 14 attached to the head of a bolt on an engine 16. This connection serves to ground the case 10 and certain parts therein, as referred to hereinafter.

The instrument is connected through a pair of leads 20 and a plug to a source of alternating current, for example 115 volt, 60 cycle current. This voltage is impressed upon the primary winding of a transformer 22. The center tap 24 of the transformer secondary is grounded to the case 10 and the high voltage ends are connected through lead wires 26 and 28 to the plates of a rectifier tube 30. The full wave rectified voltage between the rectifier tube filament and ground is fed through lead 32 and ground to a condenser 34, which stores an electric charge on its plates. A discharge path for the condenser is provided through insulated leads 36 and 38 and through a neon lamp tube 40. A trigger electrode 42 mounted externally of, but in close contact with the lamp tube 40, is connected through a heavily insulated lead wire 44 and a spring clip 46 to a spark plug 48 of the engine 16 under test. At the instant the plug fires, the electrostatic field set up at the trigger electrode 42 breaks down the gas in the neon lamp tube. The condenser 34, which is previously charged, instantly dissipates its energy in the neon lamp and produces an intense flash of light. This light flash is very sharp and of very short duration because the resistance of the discharging circuit is extremely low. The capacity of the condenser and the voltage charging the condenser are of sufficient magnitude to generate a relatively brilliant flash of light.

When the instrument is disconnected as by removing the plug of the leads 20, the voltage on leads 36 and 38 and on all other apparatus connected thereto will continue to exist for some time. To protect against possible contact with this voltage, a high resistance 50 is connected across the condenser thereby providing a small leakage path for the dissipation of the condenser charge. This leakage path is small enough not to interfere with the normal operation of the instrument. The resistance 50 preferably consists of a 2 watt element having a resistance of about one-half megohm.

The improved neon lamp unit, shown in enlarged detail at the left of Fig. 1 comprises a hollow tubular handle portion 52 of thick insulating material which is shaped outside to form a suitable handle grip as shown. The ends of the hollow handle are provided with closure disks 54 and 56 which may be secured in place in any suitable manner, not shown. The lead wires 36 and 38 extend through the disk 54 and are secured in looped fashion to the inside of the disk by retaining members 58. The wires are similarly secured to the disk 56 by members 58, and sufficient inter-

vening wire is provided so that the disks 54 and 56 may be removed for repairs or inspection. The ends of the wires 36 and 38 are respectively connected into a cathode and an anode of the neon lamp tube 40, the ends of which extend around the trigger electrode 42 in the manner shown, the cathode being indicated at 60 and the anode at 62.

The neon tube 40 as shown in Figs. 1 and 2 comprises a substantial length of tubing bent into a substantially horizontal spiral above the disk 56. The tubing is preferably 8 mm. in diameter and composed of thin walled soft glass. The cathode of the neon lamp tube comprises a nickel cylinder or clip coated inside with barium-strontium powder and insulated outside with "Isolan-tite" which is a ceramic dielectric material understood to be a magnesium aluminum silicate. The lead wires 36 and 38 inside the handle or casing 52 are preferably protected by glass sleeve insulation, the joints of which are cemented together by a suitable insulation cement. The 8 mm. neon lamp tube is preferably filled with pure neon to 20 mm. pressure, although other equivalent gases may be used.

The neon tube 40 is surrounded by an illuminating head section consisting of a substantially cylindrical casing 64 secured to the handle 52 by any suitable means such as screws, as shown. This illuminating head casing is preferably lined with a cylindrical metal shield 66 of copper or other suitable metal, which is grounded by means of a wire 68 passed through the disk 56 and connected into the lead wire 38. The illuminating head also includes as a special feature a curved methyl methacrylate plastic lens or projector 70 which is secured into the casing 64 by a threaded connection as shown. The resin or polymer lens comprises a solid curved section having a plane circular face 72 which is at an angle of 60° to the plane of the neon tube spiral. The angle or arc may vary from 60° to 90°.

In the operation of the apparatus shown in the drawing, for example in checking the ignition timing of a spark ignition engine, with the hook-up illustrated, the engine is operated at the desired speed or at various speeds while the operator directs the light from the neon lamp onto a moving part of the engine, as for example, the flywheel which may be provided with a reference mark. In this operation, the neon lamp is energized by the ignition impulse transmitted through conductor 44 to the electrode 42 which initiates the discharge of the condenser 34 to produce an intense flash in the neon lamp tube 40. This intense flash of light is transmitted through the lens 70 and projected onto the moving part of the engine. The condenser 34 which is a two microfarad condenser and which has a voltage potential of 1000 volts, is continuously charged from the transformer 22 and tube 30, the transformer preferably delivering a voltage of approximately 525 volts through each of the leads 26 and 28. The discharge of the condenser gives a very intense short flash of light from the neon lamp and the condenser is recharged immediately so that the full voltage is available for the next flash which is initiated by the impulse from spark plug 48.

The lens 70 of methyl methacrylate polymer known under the trade name of "Lucite" is clear and transparent, and transmits the intense flashes of light around the curve and onto the moving part being examined. The neon lamp with the lens 70 may be used around corners and

without danger of igniting gasoline or other fumes, because the lens is cold. At the same time approximately 90% of the light from the neon coil is transmitted through the lens with very little loss through the side wall. The curved lens permits the projection of light in various directions by mere rotation of the lamp on its axis, so that the lamp may be operated very conveniently.

Where the neon lamp is used for the study of moving parts of mechanism other than spark ignition internal combustion engines, the energizing impulse supplied through the conductor wire 44 may be derived from a source independent of the apparatus being studied, as will be understood by those skilled in the art. Furthermore, those skilled in the art will understand that there is a definite relationship between the spark frequency and the speed of the moving part of the engine, and that in other applications of the invention means may be provided for synchronizing the light flashes with the frequency of rotation or vibration of the mechanical part or device to be studied, so that such parts will appear to be stationary when examined or photographed under the light from the neon lamp.

It will also be understood that various modifications may be made in the improved neon lamp without departing from the spirit and scope of the present invention as defined by the claims.

Having thus described the invention in its preferred form, what is claimed as new is:

1. A high powered neon timing lamp comprising a hollow handle portion and an illuminating head portion attached thereto, a removable dividing wall separating said portions, a soft glass neon filled tube coiled in said illuminating head portion with both ends of the tube extending through said wall into the handle, an electrode in said head portion adjacent the tube coil, insulated lead wires in said handle portion connected respectively to said electrode and to electrodes mounted in the ends of said tube, a methyl methacrylate plastic lens mounted in the illuminating head over said tube coil therein, and high powered electrical charging means connected to said lead wires to supply the power for producing intense light flashes in said tube.

2. In a high powered stroboscopic lamp, a heavy insulated handle portion and an illuminating head portion of heavy insulating material attached thereto, a removable dividing wall separating said portions, a thin soft glass tube filled with neon to a pressure of approximately 20 mm. coiled in said illuminating head portions with both ends of the tube extending through said wall into the handle, an electrode in said head portion adjacent the tube coil, glass insulated lead wires in said handle portion connected to a cathode and anode respectively mounted in the ends of said tube, a clear transparent methyl methacrylate plastic lens mounted in the end of the illuminating head over said tube coil therein, and high powered electrical charging means connected to said lead wires to supply the power for producing intense light flashes in said tube.

3. In a high powered neon stroboscopic lamp for hand operation, a cylindrical illuminating head of heavy insulating material having a grounded metal lining on the cylindrical wall, a coiled neon tube in said cylindrical head and spaced from said lining, a transparent light transmitting lens of methyl methacrylate plastic secured in one end of said head over said

neon lamp, said lens being relatively long and curved to form an arc of approximately 60° whereby light flashes from said lamp are transmitted through said lens and projected in a direction at approximately said angle to the axis of said cylindrical head.

4. In a high powered neon stroboscopic lamp for hand operation, a cylindrical illuminating head of heavy insulating material having a grounded metal lining on the cylindrical wall, a coiled neon tube in said cylindrical head and spaced from said lining, a transparent light-transmitting lens of methyl methacrylate plastic secured in one end of said head over said neon lamp, said lens comprising a rod of substantial length and being curved with respect to the axis of said cylindrical head.

5. In a stroboscopic lamp, a cylindrical head portion including a neon-filled lighting tube and a methyl methacrylate plastic lens mounted in one end of the head over the tube, said neon tube comprising an 8 mm. diameter thin-walled soft glass tube filled with pure neon gas to a pressure of about 20 mm., and said lens being of substantial length and curved substantially with respect to the axis of said head.

6. In a stroboscopic lamp, a cylindrical illuminating head portion including a neon-filled lighting tube mounted therein, and a solid methyl methacrylate plastic lens secured into one end of the head over the tube, said lens

being of substantial length and being curved into an arc of approximately 30° with respect to the axis of said head.

7. In a stroboscopic lamp, a cylindrical illuminating head of heavy insulating material having a grounded metal lining on the cylindrical wall, a flat neon tube spiral mounted in said head with the spiral in a plane at right angles to the axis of the head, said tube being made of approximately 8 mm. diameter thin-walled soft glass tubing and containing neon under a pressure of approximately 20 mm. absolute, and a light-transmitting plastic lens of substantial length secured into one end of said head directly over said flat tube spiral and curved substantially with respect to the axis of said head.

8. In a stroboscopic lamp, a cylindrical illuminating head of heavy insulating material, a flat coiled neon tube mounted in said head with the coil in a plane at right angles to the axis of the head, and a light-transmitting lens of methyl methacrylate plastic secured onto one end of said head directly adjacent said coiled tube, said lens extending beyond said head a substantial distance and being curved with respect to the axis of said head to the extent that the light transmitting face of the lens is at an angle of from 60° to 90° with respect to the plane of said flat coiled neon tube.

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