This invention relates to spring motor operated electric current generating apparatus of the portable or so-called pocket flashlight type. The objects of the invention are to provide a device of this nature which will be small in size and convenient for carrying, which will provide a continuous light over a considerable period, which will be simple and inexpensive in its design and construction and adapted to be manufactured at low cost.

Other objects of the invention and the novel features of construction, combinations and relations of parts by which the various objects are attained will be apparent or are set forth in the following specification, broadly covered in the claims and illustrated in the accompanying drawing.

Fig. 1 is a broken longitudinal sectional view of a pocket flashlight incorporating features of the invention.

Figs. 2, 3, and 4 are cross-sectional views as shown substantially the planes of lines 2-2, 3-3 and 4-4 respectively of Fig. 1.

The casing of the lamp shown, comprises simply the two generally cylindrical tubular sections 8 and 9, shown as of substantially the same diameter and one, the handle section 8, having a telescopic sliding engagement at 7, over the other, forward, generator containing section 9.

The generator is of special unusually compact design, making it suitable for a casing of particularly small diameter.

As shown in Figs. 1 and 2, this structure comprises longitudinally spaced laminated pole pieces 13, 14, having radially extending polar projections carrying the current generating windings 10, 11, and cooperating longitudinally extending permanent bar magnets 12, carried by a spider 13, on shaft 14, between the two polar assemblies. The permanent bar magnets 12, are shown in Fig. 1, as extending over the ends of the polar projections and Fig. 2 shows how these magnet bars may be arcuate in cross-section to be substantially concentric with the arcuate pole tips.

The supporting spider 13, may be of aluminum or other relatively light non-magnetic material and the permanent bar magnets may be secured as by setting them in correspondingly shaped seats 15, in the rim of this member with screws 16, to hold them in these seats.

The pole piece laminations are shown secured by tubular rivets 17, to the centers of supporting discs 18, and these latter are indicated as connected in properly spaced relation by bars 19, having notched edges at 20, forced into notches 21, in the edges of the supporting discs. This forms a unit cage assembly which can be slipped into the cylindrical casing member 19, and there be secured by a screw or screws 22, engaged with one or more of the spacing bars 19.

The magnet shaft is shown as having reduced end portions 23, journaled in bearing bushings 24, which are forced into the tubular assembly rivets 17, with layers of lubricating felt or equivalent 25, therebetween.

The relatively rotatable handle section 6, of the casing is shown as having a central screw seat 26, at the end of the same engaged over the correspondingly screw-threaded end of the tubular winding shaft 27. This shaft is shown as having a bearing at its inner end in a transverse partition in the main casing section and as carrying at the inner side of that partition a ratchet 28, engaged by a spring actuated dog or pawl 29, mounted on the inner face of that same partition.

Rotatably engaged on the winding shaft 27, is a spring barrel 30, shown slotted at 31, to receive and hold the outer ends of spiral springs 32, whose inner ends are angled at 33, into holding engagement in a slot 34, in the winding shaft. The end heads of this spring barrel are shown as having rotatable bearing on the winding shaft at 35, and the inner one of these heads is shown as carrying a ratchet gear 36, engaged in the first drive pinion 37, on a shaft 38, journaled between first and second partitions in the main casing section.

The partitions referred to are of special construction, the first comprising a flat bearing disc 39, and a cupped disc 40, with a felt oil pad 41, confined therebetween and the second comprising a flat bearing disc 42, and a companion cupped disc 43, with felt oil pad 44 therebetween. The securing of the companion discs together and the holding of the two assemblies in desired spaced relation is all effected in the present illustration by the spacing studs 45, Fig. 4, having the ends of the same headed over as rivets 47, Fig. 1.

This unit assembly of the two spaced mounting plates or partitions is secured in the main casing section, in the present disclosure by forcing it down in that section until the first partition rests against the internal shoulder 47, at the reduction in the end of that section designed to telescopically receive the rotating handle section. The cupped plate 43, of the second partition is shown as having an annular flange 48, making a friction fit within the casing sleeve and this flange is shown in Fig. 1 as notched at 49, to receive the
ends of the spacer bars 18, of the generator assembly. Thus the generator assembly keeps and holds the partition assembly in definitely located relation in the main sleeve portion of the casing.

5 The gear train carried by the spaced mounting plates, comprises in the illustration, the first pinion 31, previously referred to, carrying on its shaft 32, the gear 55, in mesh with a pinion 51, on shaft 52, journalled between the lubricant carrying mounting plates and provided with a gear 53, meshing a pinion 54, on shaft 55, which carries gear 56, meshing a pinion 57 on a shaft 58, which carries gear 59, in mesh with the final pinion 60, on the generator shaft 14.

10 The hollowed mounting plates containing the oil pads 41, 44, and the bearing bushes 24, with the oil pads or rings 25 therebetween, provide complete and long lasting lubrication for the entire train of gearing and the rotor of the generator. The necessary lubricant may be put in these pads at the time of assembly of parts: sufficient practically to last the life of the device.

The cup flange 48, at the rim of the mounting plate 43, engaged by the adjoining head of the generator assembly assures a definite spacing between the generator and gearing and in this space, a governor is shown, consisting of a disc 61, fixed on the rotor shaft and having pivoted thereon at 62, the centrifugally acting weight leaves 63, carrying brake pads 64, for engagement with the interior of flange 48, and connected by pivoted link 65, and spring 66, said link being slotted at 61, to pass the rotor shaft. For controlling stopping and starting of the generator, a slide button is shown at 68, Fig. 1, frictionally held by spring 69, against a slotted containing guard 70, and projecting inwardly through a slot 71, in the main casing section and brake flange 48, into position for holding engagement with the back of the governor disc 61.

A lamp is shown at 72, supported in a reflector 73, seated in the end of the main section of the casing. The current generating coils are suitably connected usually in series relation and may have a terminal connection at one end as shown at 74, Fig. 1, with the generator frame and hence with the casing and connection at the opposite end as at 75, with an insulated spring terminal on the generator head, engaging the center contact of the lamp bulb.

The parts of the device are relatively simple to manufacture and readily assembled, or if necessary, easily taken apart. The permanent magnets in the straight bar form disclosed, may be made from strip stock rolled to the desired accurate cross-section and, constructed of cobalt steel or the like and properly magnetized, these bar magnets in cooperation with the field structure, will form an exceptionally efficient small diameter generator.

While two springs are shown, it will be evident that only a single spring or a greater number than two springs may be used and that in case of a number of springs, they may be connected in series or in parallel relation for driving the generator. The spring barrels with the spring or springs engaged therein, the gear units with the winding shafts projecting therefrom and the generator units may be all made up separately in unitary form and then easily assembled in the casing sections.

What is claimed is:

1. A portable flashlight, comprising relatively rotatable tubular casing sections, a generator comprising spaced end plates to fit within one casing section, bars holding said end plates in fixed spaced relation, pole pieces secured to and supported by said end plates and having radially projecting poles with current generating windings thereon, a shaft journalled between the end plates, a spider on said shaft between said end plates, bar magnets carried by said spider and projecting oppositely from said spider into cooperation with said radial poles, means for securing said generator unit in said casing section, a gear unit in said casing section and including an end element in driving relation to said shaft, a winding shaft journalled in said gear unit, a spring barrel rotatable about said winding shaft and having a driven relation to the first gear element of said gear unit, a spring connected between said winding shaft and spring barrel and a winding connection between the second casing section and said winding shaft.

2. A generator for a portable flashlight or the like, comprising spaced end plates, means for supporting the same in fixed definitely spaced relation, bearings carried by said end plates, a shaft journalled in said bearings and projecting from one end plate, a spider carried by said shaft between said bearings, permanent bar magnets carried by said spider and projecting oppositely therefrom toward said end plates, pole pieces carried by said end plates and having radially projecting poles opposed to the opposite ends of said bar magnets, current generating windings on said poles, a drive element on the projecting end of said shaft and driving means associated with said drive element.

3. A generator for a portable flashlight or the like, comprising spaced end plates, means for supporting the same in fixed definitely spaced relation, bearings carried by said end plates, a shaft journalled in said bearings and projecting from one end plate, a spider carried by said shaft between said bearings, permanent bar magnets carried by said spider and projecting oppositely therefrom toward said end plates, pole pieces carried by said end plates and having radially projecting poles opposed to the opposite ends of said bar magnets, current generating windings on said poles, a drive element on the projecting end of said shaft, driving means associated with said drive element, said bearings including tubular members extending through the end plates and pole pieces and securing the same together.

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