

(No Model.)

2 Sheets—Sheet 1.

C. GOODYEAR, Jr.
ELECTRIC ARC LAMP.

No. 572,539.

Patented Dec. 8, 1896.

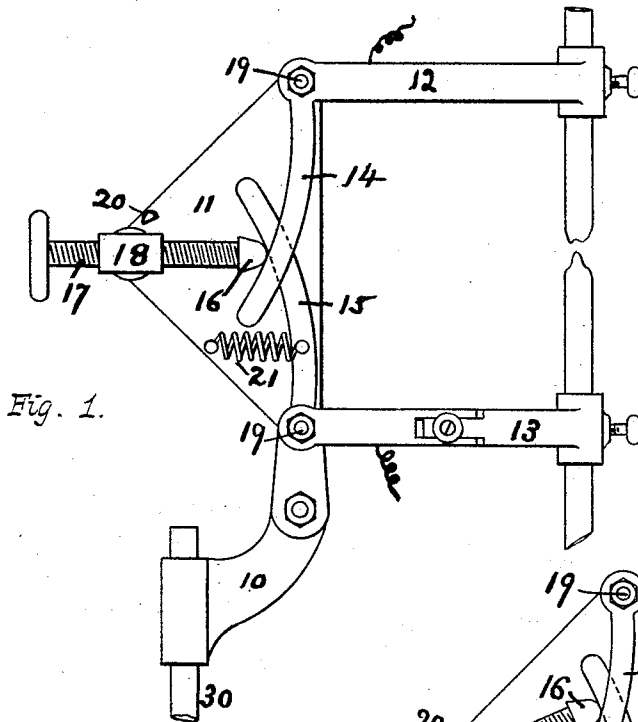


Fig. 1.

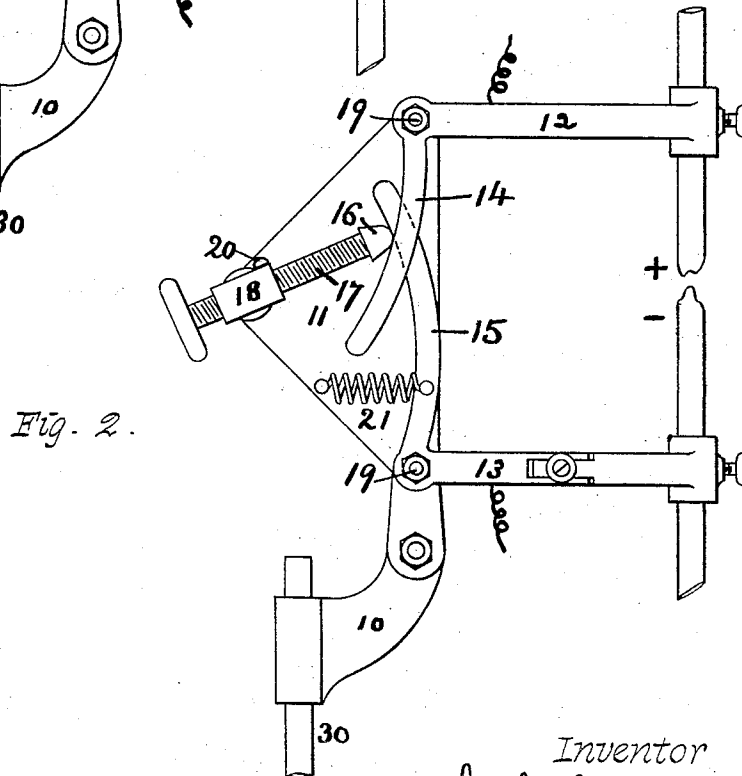


Fig. 2.

Witnesses

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Frederick H. Davis

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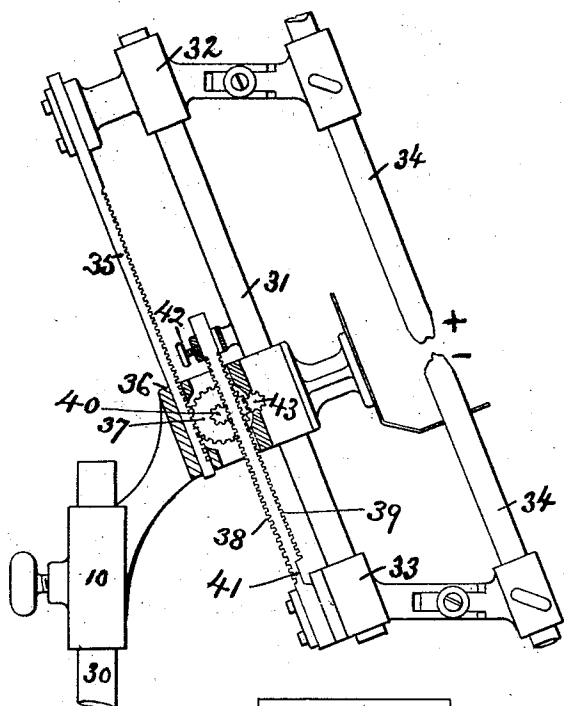


Fig. 3.

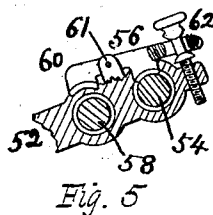


Fig. 5.

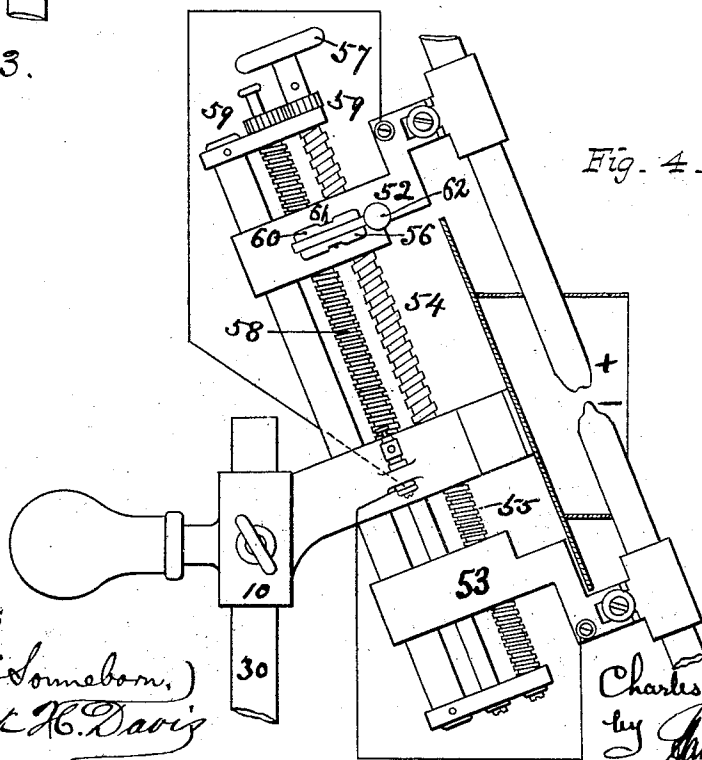


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES GOODYEAR, JR., OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 572,539, dated December 8, 1896.

Application filed October 16, 1895. Serial No. 565,871. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GOODYEAR, Jr., of New York, in the State of New York, have invented a new and useful Improvement in Convertible Alternate and Constant Current Feed Mechanism for Arc-Lamps, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

When an arc-lamp is supplied with direct or constant current, the positive carbon is consumed approximately twice as fast as the negative carbon. When an alternating current is used, however, the two carbons burn away at very nearly the same rate. In hand-fed lamps, where it is desirable to keep the light at a fixed point, it is clear that the feed mechanism which would feed the carbons properly for an alternating current would not feed them properly adjusted in the same manner if the carbons were supplied with a direct or constant current.

It is the object of the present invention to produce a mechanism which, when operated by hand, will preserve the arc in approximately the same position as the carbons are consumed, whether a constant or alternating current is employed. The mechanism is readily convertible, so that it may be instantly adapted to one or the other current at will.

The accompanying drawings show several forms of device embodying my invention in its broadest aspect, though certain of these forms are more perfect and preferable.

In the drawings, Figure 1 is a side elevation showing crudely a simple form of my convertible lamp as adjusted for alternating current. Fig. 2 shows the same lamp as adjusted for constant current. Fig. 3 shows a modification which is more perfect mechanically and which serves the same purpose. Fig. 4 shows my preferred construction; and Fig. 5 is a detail view, partly in section, showing the mechanism by which the feed is changed from an alternating current to a constant current, or vice versa.

Throughout the drawings like figures of reference indicate like parts.

In Figs. 1 and 2, 10 is a stationary support carrying the adjustable frame 11, which carries the feed mechanism of the lamp. The carbons are mounted in the bell-crank levers

12 and 13, which have the crossed or overlapping arms 14 and 15. These arms 14 and 15 bear against the rounded head 16 of a hand-screw 17, which is carried and threaded through the pivotal mounting 18. When the screw 17 is in the central position shown in Fig. 1, the advancing or withdrawing of the screw will cause the carbons to move toward or from each other at the same rate, because the arms 14 and 15, as measured from the fulcrums 19 to the point of contact with the head 16, are always of equal length. When, however, the screw 17 is turned to the position shown in Fig. 2, the head 16 bears upon the arms 14 and 15 at such a point that the length of the arm 14 bears a ratio to the length of the arm 15 of one to two, and consequently the upper carbon carried by the arm 12 will be moved by the screw 17 at a rate of approximately double that of the lower carbon, which is carried by the arm 13.

At 20 is shown a stop against which the pivotal bearing 18 strikes when the screw 17 is turned to the position shown in Fig. 2 and the lamp adapted to constant-current work. The weight of the upper carbon and the arm 12 are sufficient to cause the arm 14 to press against the head 16, but in the case of the lower arm 13 a spring 21 is needed to raise the arm 13 as the screw 17 is withdrawn.

It will be understood that the arms 12 and 13 are of course insulated from each other, or that the carbons are insulated from these arms and the current supplied directly to these carbons. These are matters of detail which will be clear to those skilled in the art.

In the modification shown in Fig. 3 the support 10, which is adjustable vertically upon a rod 30, carries a slide or guide 31, upon which slide the carbon-holding arms 32 and 33, to the outer ends of which the carbons 34 are secured. I make no mention and I do not show, either in this figure or the other figures of the drawings, the electrical apparatus for drawing or striking the arc, as that does not strictly concern the present invention, and to set forth such details at length would obscure rather than make clear the more essential features.

The feeding mechanism of the lamp is constructed and operated as follows:

The arm 32 is provided with a rack 35, which

runs through guides 36 in the support 10 and which meshes with the pinion 37, which is turned by hand. The arm 33 of the lower carbon 34 is provided with the double rack 38 39. The rack 38 meshes with the small pinion 40, mounted upon the same axis and turning with the pinion 37 and of approximately one-half the size and number of teeth. The rack 38 may be kept in engagement with the pinion 40 by the slight spring action of the metal, which may be cut away to facilitate this yielding or spring effect, as at 41. It is clear that when the pinions 37 and 40 are turned the upper carbon 34 will be fed by means of the rack 35 at twice the rate at which the lower carbon 34 is fed by means of the rack 38. At 42 is shown a guide for the double rack 38 39 and a thumb-screw for shifting the position of the rack within the guide. That is to say, when the screw 42 is turned the racks 38 and 39 may be displaced laterally against the action of the spring 41 until the rack 39 engages the pinion 43, which is set opposite the pinion 40 and which engages and turns with the pinion 37. It is apparent that when the rack 39 engages with the pinion 43 the movement of the rack 39 is precisely the same as if it engaged with the pinion 37, so that the two racks 35 and 39 and the corresponding arms 32 and 33, with the two carbons, are fed at exactly the same rate. Therefore by means of the screw-adjustment 42 the lamp may be quickly converted from a hand-feed alternating-current lamp to a hand-feed constant-current lamp, or the reverse.

In Fig. 4 my most preferred form of invention is shown. The feed in this instance is accomplished, when the lamp is used as a constant or direct current lamp, by means of a single screw extending through the carbon-carrying arms 52 and 53. This screw has two differently-threaded portions 54 and 55, one being of double the pitch of the other and reversed in direction. The lower carbon-holding arm 53 is permanently threaded to the screw 55, and therefore travels when the screw is turned. The upper arm 52 is provided with a clutch 56, which may be made to engage the screw-threads 54. When so engaged, the upper carbon may be fed at twice the rate of the lower carbon and the lamp be employed with constant current by turning the screw-threaded rod 54 55 by means of the hand wheel or knob 57. Parallel with the screw-threaded rod 54 and 55 and extending through the arm 52 is the screw 58. Gears 59 transmit the rotation of the handle 57 and the screws 54 and 55 to the screw 58. The clutch 60, mounted in the arm 52, may be made to engage with the screw-threads 58, so that when the clutch is so engaged the arm 52 will be moved by means of the screw 58. The gears 59 and the screw-threads 58 are so proportioned that the rate of travel of the arm 52 will be equal to that of the arm 53 when so adjusted and the lamp be therefore adapted to alternating currents.

The details of the clutches 52 and 56 are clearly shown in Fig. 5, wherein it is seen that these two clutches are formed of a single piece pivoted at 61 and controlled by means of the thumb-screw 62. These clutches are so arranged that one will be disengaged before the other is engaged with its rack, and therefore the danger of stripping the teeth from the racks or from the clutches is obviated, and in addition there is one position at which neither clutch is engaged, and therefore the arm 52, carrying the upper or positive carbon, may be slid at will up and down the screws 54 and 58 and the proper clutch then engaged at any position.

It will be seen that many modifications may be made without in any way altering the action and principles of my invention. For instance, the threading on the screws 58 and 55 may be of the same pitch and the gears 59 be both of the same size, or the gears 59 may be of different sizes and the pitch of the screw-threads 55 and 58 proportioned accordingly. So also in connection with Fig. 3 the precise form of the adjustment by which the lamp is converted from an alternating to a constant current lamp may be modified without changing the character of the construction.

What I claim, and desire to secure by these Letters Patent of the United States, together with such modifications as may be made by mere skill in the art and with only the limitation and restrictions as expressed or by law implied in view of the related art, is as follows:

1. An arc-lamp comprising two carbon-holders, feeding mechanism having two adjustments, the one feeding the carbons substantially uniformly and the other feeding them differentially or at different rates, and means for changing from one adjustment to the other at will, whereby the said lamp may be converted at will to alternating-current or constant-current operation, substantially as set forth.

2. In combination in a hand-feed for arc-lamps, mechanical connections for feeding one of the carbons, two cooperating connections for feeding the other carbon at two different rates of feed, and means for connecting either of the said cooperating connections at will, whereby the lamp may be converted into an alternating or a direct current lamp, substantially as set forth.

3. In combination in feed mechanism for arc-lamps, and with the carbon carriers or holders, a feed-screw giving travel to one of the said holders, two cooperating screw connections of different pitch for the other of the said holders and means for connecting one or the other of the said screw connections to give travel to the second of said holders, substantially as set forth.

4. In combination in feed mechanism for arc-lamps and with the carbon carriers or holders therefor, two parallel screw-threaded

rods geared together, a pair of clutches for
one of the said carbon-holders, means for
causing the said clutches to engage with either
of the said screw-threaded rods, and a screw-
5 threaded continuation of one of the said rods
threaded into and giving travel to the other
of said carbon-carriers, substantially as set
forth.

In testimony whereof I have hereunto set
my hand, at the city of New York, this 14th 10
day of October, A. D. 1895.

CHARLES GOODYEAR, JR.

In presence of—

ISAAC P. HUBBARD,
HAROLD BINNEY.