H. M. BAKER, Jr.

AUTOMATIC ELECTRIC ARC CONTROL MECHANISM.

APPLICATION FILED OCT. 21, 1914.

1,239,759. Patented Sept. 11, 1917.

Fig. 1

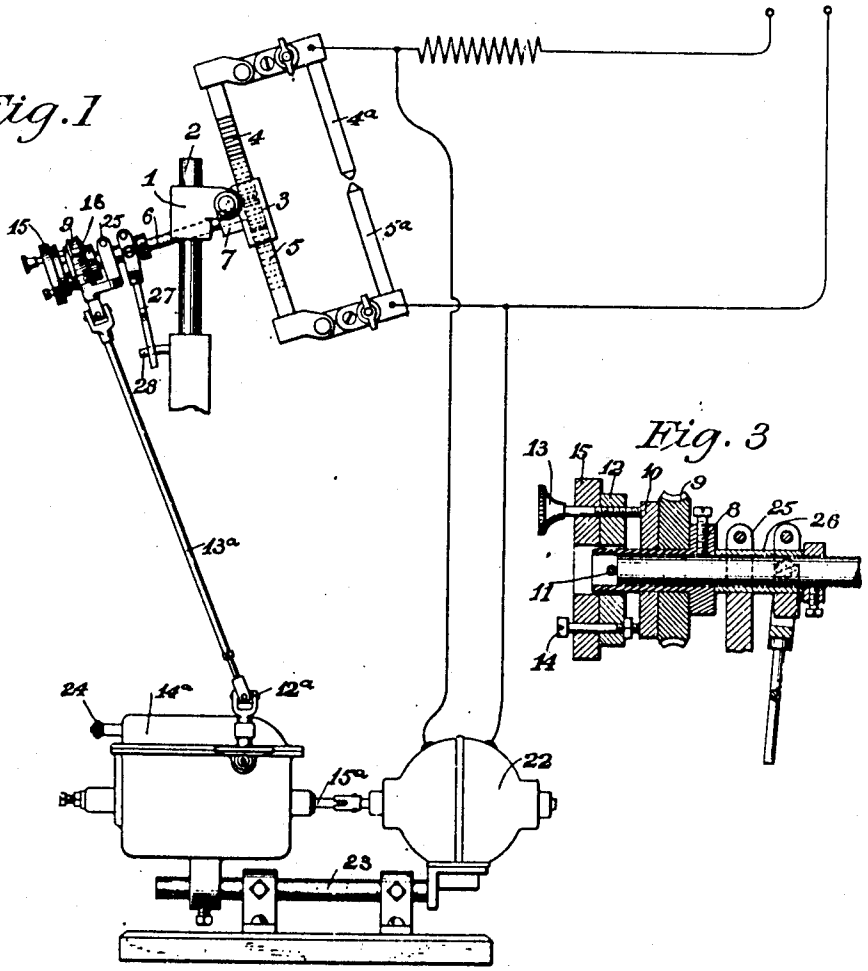
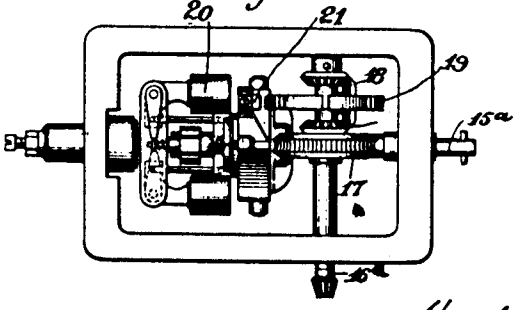


Fig. 3

Fig. 2



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AUTOMATIC ELECTRIC-ARC-CONTROL MECHANISM.

1,239,759. Specification of Letters Patent. Patented Sept. 11, 1917.

Application filed October 21, 1914. Serial No. 867,773.

To all whom it may concern:

Be it known that I, HAYDN M. BAKER, Jr., a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Automatic Electric-Arc-Control Mechanism, of which the following is a specification.

This invention relates to automatic electric arc control mechanism designed to provide a device for feeding the carbons of the arc toward each other to compensate for the material burned away in the production of the arc.

The object of my invention is to provide a mechanism which will be responsive to minute variations in the current occasioned by the varying distance between the carbons to automatically restore them to their positions of maximum brilliancy. My invention is designed particularly for use in connection with the arc lamps employed in motion picture and stereoscopic apparatus and designed to perform the work of the hand adjustment commonly used in such lamps, and is arranged so as to permit either the hand adjustment or the power adjustment of the carbons.

My improved control device is designed to be extremely sensitive and to perform minute adjustments impossible to obtain by manual skill thereby producing a far steadier light than is obtainable with the constructions now on the market.

In the accompanying drawings I have illustrated a preferred form of my invention. In the said drawings,

Figure 1 represents a side elevation of the entire device;

Fig. 2 shows the governor device which will be later described; and

Fig. 3 is a detail view showing the connecting mechanism between the control device and the adjusting shaft.

Referring now to Fig. 1, 1 represents the supporting bracket of the carbon holders of an arc light such as employed in projection lamps, which bracket is supported in the usual manner on a standard 2. Swiveled to the bracket is a holder 3 also of usual construction which provides guides for the rack bars 4 and 5 respectively, carrying the upper and lower carbons 4^a and 5^a of the light. The teeth of the rack bars 4 and 5 engage the opposite sides of a pinion carried by the shaft 6 rotatably mounted in a sleeve 7 projecting from the rear face of the part 3.

The mechanism so far described is the construction commonly used in lights of this character. In such apparatus a knob is attached to the shaft by which it may be rotated by hand when desired to adjust the carbons toward or away from each other, according to the direction of rotation.

My automatic control mechanism operates through the shaft 6 to adjust the carbons and comprises a sleeve 8 fixedly attached to the shaft 6 and formed with a friction collar at its inner end. Freely mounted on the sleeve 8 with its face in frictional engagement with the collar is a worm gear 9, and engaging the opposite face of the worm wheel is a loose disk 10 capable of sliding movement on the shaft.

The sleeve 8 projects beyond the end of the shaft 6 and mounted on its projecting end on a cross pin 11 is a disk 12 having a slight rocking movement, as will be obvious from an inspection of Fig. 3, and connected to the disk 12 by two screws 13, 14, is a milled knob 15 for hand adjustment. The screw 13 is provided with a milled head for hand adjustment to effect the clutching of the worm wheel 9 against the collar of the sleeve 8 when the power adjustment is used and permit the disengagement of the worm wheel for hand adjustment. Both screws are threaded in the disk 12 and bear against the disk 10, the screw 14 being provided with a nut whereby it may be clamped in adjusted position. By loosening the screw 13 the disk 12 will tilt sufficiently to also relieve the pressure of the screw 14, and when tightened both screws press equally on the disk.

The worm gear 9 is driven by means of a worm 16 rotatably mounted in a bracket 25 away from the shaft 6. The bracket 25 is clamped to a sleeve 26 loose on the shaft adjacent the sleeve 8. The sleeve 26 is held against rotation by means of a fork 27 pivotally connected to the sleeve and engaging a fixed projection 28 at its lower end.

The worm 16 is driven through a universal joint from a shaft 13^a formed of two telescoping parts and connected at its lower end through a second universal joint with

the driven shaft of the speed control device 14ª. This device per se forms no part of the present invention being covered by my co-pending application, Serial No. 829,779, filed April 6, 1914, but for the sake of clearness I have shown its essentials in Fig. 2. As shown in Fig. 2 and more in detail in the drawings in said copending application, 15ª represents the driven shaft to be constantly driven and 16ª represents the driven shaft which is connected to the driving shaft to drive the clutch whenever the speed of the driven shaft exceeds a predetermined maximum. To effect this connection the driving shaft is provided with a worm, not shown, but driving the worm gear 17 loose on the driven shaft and provided with a beveled gear which connects through a planet gear 18 with a second beveled gear fast to the shaft 16ª. The planet gear 18 is supported by a cage 19 which is free to rotate on the shaft 16ª except when it is locked against rotation by a centrifugal mechanism driven from the driving shaft. This mechanism comprises centrifugal weights 20 whose outward movement upon the excessive speed of the shaft thrusts a pawl 21 into engagement with locking projections carried by the cage 19. When the pawl is disengaged the cage 19 revolves idly around the shaft 16ª without driving the shaft, but when the cage is locked by the excessive speed of the driving shaft, the pinion 18 acts as an idler for transmitting the full power of the shaft 15ª to the shaft 16ª, as will be readily understood. As explained in my co-pending application above referred to, this mechanism is extremely sensitive to the slightest change in speed of the shaft 15ª, and the device can be adjusted to vary the critical speed at which the driving connection takes place. For combining this mechanism with an electric arc I connect the shaft 16ª as described to the carbon adjusting shaft and the driven shaft 15ª to the shaft of an electric motor 22 preferably supported as shown on the rod 23 carried in a suitable base plate and providing a support for the casing of the speed controller 14ª, whereby the motor shaft and control shaft may be maintained in alinement.

The electric motor 22 is connected as a shunt across the terminals of the lamp, or to the wires thereto. Assuming operating conditions, a certain size of arc—or gap between the carbons—will impress a certain voltage on the motor terminals resulting in a certain speed of the motor, a larger gap increasing this voltage and motor speed, a smaller one reducing the same.

The adjusting screw 24, as described in my previous application which projects from the end of the cover of the controller, regulates the critical speed of the latter, which may be set to represent the motor speed which will be produced by any desired size of arc.

The operation of the mechanism will be understood from the foregoing description. As the carbons burn away in the production of the light and the gap of the arc gets larger the resistance through the carbons will be increased thereby causing more of the current to be shunted through the electric motor with a corresponding increase in speed of the motor. As the normal speed of the motor is just below the critical speed of the controlling device, the slight increase in speed will cause the weights 20 to fly out and operate the pawl 21 thereby connecting the driven shaft of the device to the shaft 16ª, rotating the shaft in the direction to turn the adjusting shaft through the connection described to bring the carbons nearer together. Bringing the carbons closer together of course reduces the resistance through the arc which will reduce the current through the motor so that the speed of the motor falls and when the carbons are back to their position of maximum brilliancy the speed of the motor shaft will once more be below the critical speed of the speed controlling device, and the locking pawl will release the cage thereby disconnecting the adjusting mechanism from the motor shaft leaving the carbons in their properly adjusted position.

As explained above the mechanism of the speed controller is very sensitive in operation, so that an increase of resistance of the arc, imperceptible to the eye, will cause the adjusting mechanism to respond and give a slight movement to the carbons.

As described in my copending application above referred to my improved speed control mechanism may be "double acting" in its operations, that is, it may be designed to connect the power shaft to the driven shaft for reverse operation upon the speed of the power shaft falling below a predetermined minimum, which double acting mechanism while not necessary for an arc light under ordinary conditions would be useful to prevent the carbons being brought too close together through accidental fluctuations in the current not under the control of the operator.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In electric arc control mechanism, the combination comprising a pair of electrodes adjustable toward and from each other, gearing for adjusting said electrodes, a normally stationary shaft for actuating said gearing, means for operating said gearing by hand, including a sleeve fixedly mounted upon said shaft and having a frictional collar at its inner end, a worm gear loosely

mounted on said sleeve, adapted to frictionally engage with its lateral face the lateral face of said collar, a disk member also loosely mounted on said sleeve and slidable thereon, arranged to normally engage the opposite lateral face of said worm gear, a second disk member capable of limited rocking movement but incapable of longitudinal movement, mounted on said sleeve beyond the first disk member, a single adjusting screw for frictionally connecting and disconnecting said disk members operatively with said worm gear, and means for actuating said shaft by hand when said disk members are operatively disconnected from said worm gear.

2. In electric arc control mechanism, the combination comprising a pair of electrodes each provided with a rack-bar, a pinion for relatively adjusting the said electrodes, a normally stationary shaft for actuating said pinion in circuit with said electrodes, a shaft for operating said pinion and provided with a fixed sleeve having a friction collar at its inner end, a worm loosely mounted on said sleeve and adapted to frictionally engage with its lateral face the lateral face of said collar, a disk member also loosely and slidably mounted on said sleeve arranged to normally engage the opposite lateral face of said worm, a second disk member capable of limited rocking movement, but incapable of slidable movement, mounted on said sleeve beyond the first disk member, a single adjusting screw for frictionally operatively connecting, and disconnecting the said disk members with said worm and means for actuating said shaft by hand when said disk members are operatively disconnected from said worm.

Signed at New York, in the county of New York and State of New York, this 19th day of October, 1914.

HAYDN M. BAKER, JR.

Witnesses:
L. E. JOHNSTON,
M. E. EVELAND.