

June 17, 1941.

R. E. HOBBS

2,246,208

TRAFFIC SIGNAL APPARATUS

Filed March 20, 1940

2 Sheets-Sheet 1

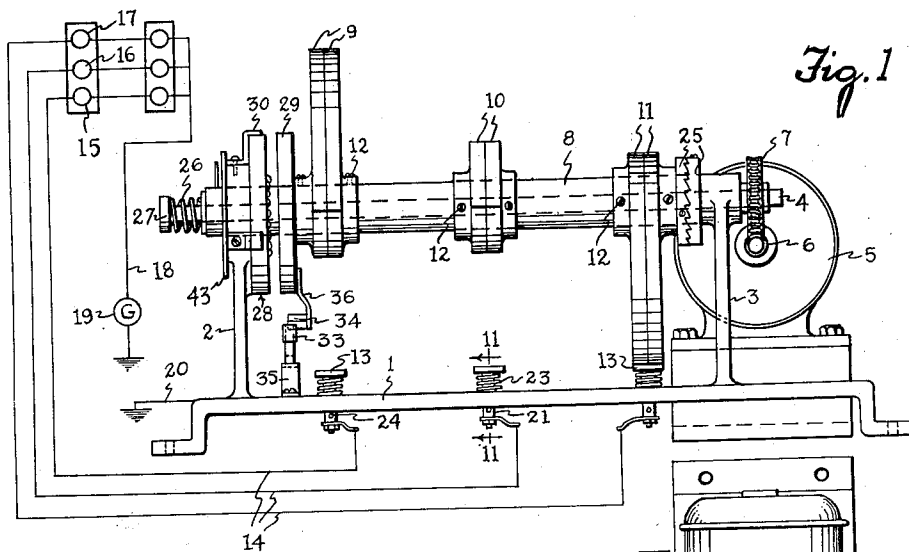


Fig. 1

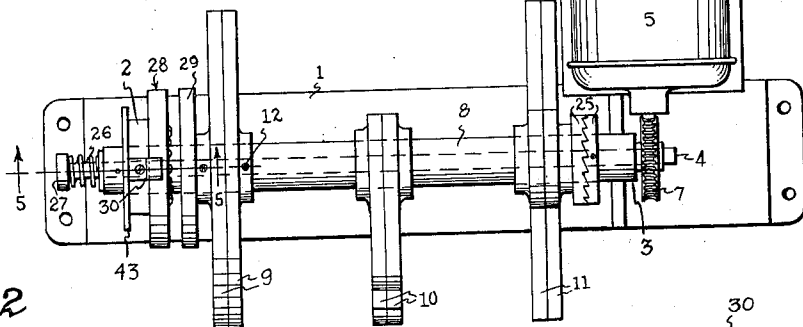


Fig. 2

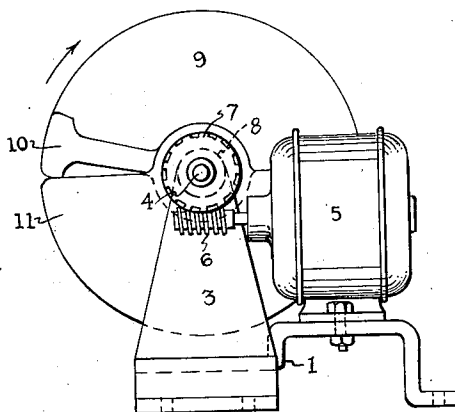


Fig. 3

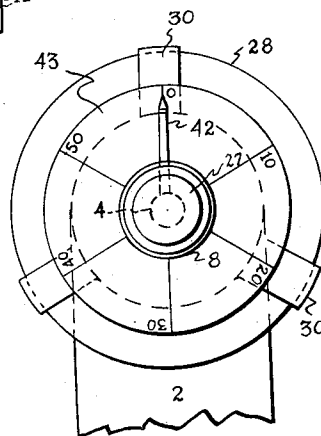


Fig. 4

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2 Sheets-Sheet 2

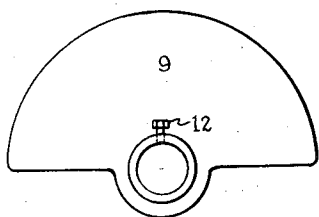


Fig. 7

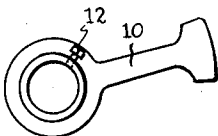


Fig. 8

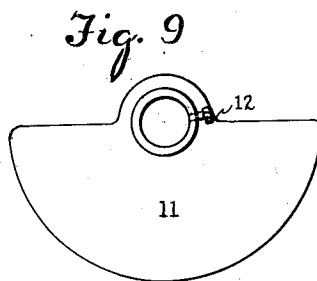


Fig. 9

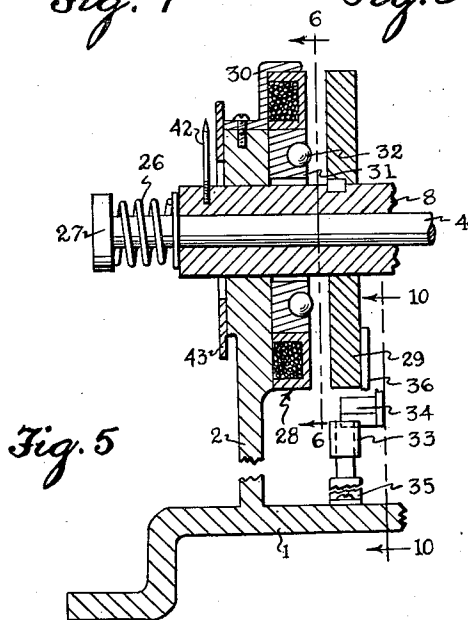


Fig. 5

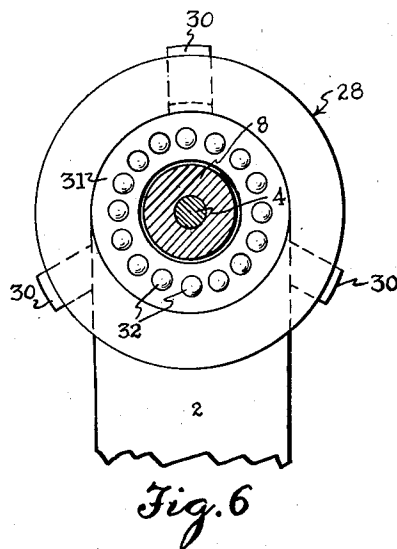


Fig. 6

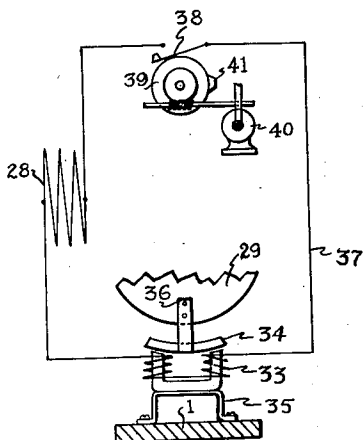


Fig. 10

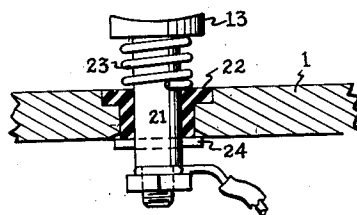


Fig. 11

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UNITED STATES PATENT OFFICE

2,246,208

TRAFFIC SIGNAL APPARATUS

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4 Claims. (Cl. 177—337)

This invention relates to electrical traffic signals and particularly to automatic control apparatus for such signals.

An object of the invention is to provide a rotary circuit-controlling apparatus serving to relatively time periods of illumination of a set of coordinated traffic signals, and further affording regulation of each such period independently.

Another object is to provide for periodically and automatically correcting any deviation from a proper setting of rotating parts of an electrical timing apparatus.

A further object is to effect said periodic automatic correction through a control which may be remote from the affected apparatus.

A further object is to subject a plurality of similar apparatuses, exercising timing control of corresponding sets of electrical signals, to a concurrent and periodic remote control to effect any such correction as may be required to maintain proper coordination of said apparatuses.

These and various other objects the invention attains by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevational view of the improved apparatus, together with a diagram of a traffic signal circuit.

Fig. 2 is a top plan view of said apparatus.

Fig. 3 is an end view of the apparatus.

Fig. 4 is a fragmentary view of the other end of the apparatus, drawn to an increased scale.

Fig. 5 is a longitudinal vertical sectional view of an end portion of the apparatus taken on the line 5—5 of Fig. 2.

Fig. 6 is a cross section taken on the line 6—6 of Fig. 5.

Fig. 7 is a side view of a rotary cam for controlling the circuit of a green signal light.

Fig. 8 is a similar view of a control cam for an amber light.

Fig. 9 is a similar view of a control cam for a red light.

Fig. 10 is a cross section of the apparatus, taken on the line 10—10 of Fig. 5 and diagrammatically showing two electromagnets and their circuit.

Fig. 11 is a sectional detail of a yieldable contact button, the section being taken on the line 11—11 of Fig. 1.

In these views, the reference character 1 designates a base plate rigidly carrying a pair of standards 2 and 3 at its ends. Horizontally journaled in such standards is a shaft 4, adapted to be driven at a quite gradual speed from an elec-

tric or other motor 5, through a drive connection formed by any suitable train of reduction gears 6, 7, said motor and drive connection being such as to drive the shaft at a substantially uniform speed. Freely mounted on the shaft 4 is a sleeve 8 carrying three segmental cams 9, 10, and 11, each comprising duplicate laterally adjoined parts independently secured on the sleeve by set-screws 12 or the like. By relatively adjusting the duplicate parts rotatively, the cam surface jointly formed thereby may be angularly increased or reduced. During predetermined fractions of each revolution of the cams, their peripheries engage yieldable contact buttons 13, one for each cam, such buttons having individual electrical connections 14 (see Fig. 1) to the green, amber, and red lights 15, 16, and 17 of one or more traffic signals. The other terminals of said lights have a common electrical connection 18 to one terminal of a current source 19 have its other terminal grounded. By providing also a ground connection 20 for the base plate 1, an energizing circuit through any of the lights 15, 16, and 17 is completed when its corresponding contact button 13 is cam-engaged.

As best appears in Fig. 11, each contact button surmounts a shank 21 slidable vertically in an insulating bushing 22 inserted in the base, said shank being upwardly urged by a coiled spring 23 seating on such bushing. A pin 24 on each shank limits its response to the corresponding spring.

A releasable drive from the shaft 4 to the sleeve 8 is established by a pair of clutch members 25 fixed respectively on one end of said sleeve and on the shaft, and normally held in driving engagement by a coiled spring 26 compressed between the other end of the sleeve and an abutment 27 on the shaft. For periodically declutching the shaft and sleeve, there is secured to the standard 2 an annular electro-magnet 28, coaxial with the shaft and sleeve and coacting with a disk-shaped armature 29 fixed on the sleeve. The securing means for the magnet may be of any suitable type and, as illustrated, comprises a set of circumferentially spaced brackets 30. Normally the spring 26 holds the sleeve and armature predeterminedly spaced from the magnet 28, the spring being overcome when the magnet is energized. An anti-friction thrust bearing 31 comprising an annular set of balls 32 minimizes friction when the armature is attracted to the magnet, said balls projecting sufficiently to take the thrust.

The purpose of periodically declutching the shaft and sleeve is to afford an angular correction on the position of the sleeve, in case such correction is necessary. The correcting means is an electro-magnet 33 coacting with an armature 34 fixed on the sleeve. As illustrated (see Fig. 10), the magnet 33 is carried on the base 1 by a bracket 35, and the armature is rigidly secured by an arm 36 to the armature 29. The orbit of the armature 34 is such as to afford it the minimum required clearance in passing the magnet 33, said armature and the magnet poles being arcuately conformed to said orbit. Fig. 10 shows the two electro-magnets 28 and 33 as included in a common circuit 37 controlled by a switch 38, and further shows a provision for periodically closing the switch, consisting of a gradually rotating cam 39 driven by a motor 40 and having a tooth 41 acting on the switch once in a revolution.

To facilitate an initial accurate setting of the apparatus and permit any deviation from such setting to be readily observed, if desired, a pointer 42 projecting radially from one end of the sleeve 3 travels in proximity to a dial 43 having suitable radial calibrations, as best appears in Fig. 4.

In use, the described apparatus may control any desired number of the triple signals 15, 16, and 17 in unison, as where it is desired to simultaneously start or stop all traffic along a certain section of street or highway having signals at various points. Signals in the next adjoining sections of such street or highway would in common practice be differently timed so as to minimize traffic stops. Serious difficulty is experienced, in present practice, in maintaining proper coordination of the differently timed signals, with result that traffic is held up unduly at certain signals. Under ideal conditions, the change from red to green in a given section occurs as traffic moving at a reasonable rate, approaches such section. In the improved traffic system which will incorporate the disclosed apparatus, one of the latter will maintain proper timing of the signals of each street or highway section, and the circuit shown in Fig. 10 may take effect on any desired number of such apparatuses to periodically correct any deviation from a correct coordination.

The automatic correction provision presupposes that any deviation from correct timing will be slight. This can be assured by effecting the correction at sufficiently frequent intervals. The master timing device 39, 40, 41, must, however, be strictly accurate to give reasonable value to the system. The switch-closing position of the cam 39 must be reached at one of the regularly recurring time intervals when the armature 34 of each apparatus should be squarely above its control magnet 33. If said armature is about thirty degrees or less ahead of or behind its proper place, the momentary energization of the magnet 33 will act through the corresponding armature to establish the correct position of the sleeve 3 and the cams, while the magnet 28 maintains the sleeve declutched from the shaft. The correction could be accomplished through an angle materially greater than thirty degrees, but in practice deviations are quite unlikely to exceed fifteen degrees. It is to be understood that the size of the clutch teeth has been great-

ly exaggerated in the drawing for sake of clearness. In practice it will be desirable to employ a clutch having quite numerous and small teeth so that closing of the clutch following deenergization of the two magnets will not disturb the angular relation of shaft and sleeve.

Employment of the described automatic correction device will permit a traffic control system, however extensive, to be properly coordinated at all times. As distinguished from present systems, the described system requires strictly accurate uniformity of drive only as regards a single master control apparatus, avoiding the difficult and practically impossible problem of maintaining constant strict uniformity in numerous control mechanisms each dominating a certain traffic section.

It will be understood, of course, that a single master controller may dominate only such apparatuses as operate at substantially the same speed. If a city or other district has systems of apparatuses differing as to the driving speed, either several master controllers will be necessary, or a single controller must act upon several switches closing same at periods suited to the different systems.

The invention is presented as including all such changes and modifications as come within the scope of the following claims.

What I claim is:

1. An automatic resetting device comprising coaxial, rotative driving and driven members, a pair of clutch members establishing a releasable drive connection between the driving and driven members, means yieldably maintaining engagement of the clutch members, an armature substantially fixed upon and substantially coaxial with the driven member, electro-magnetic means disposed substantially symmetrically with respect to the axis of the driven member and effective on the driven member through said armature to release the clutch, electro-magnetic means tending to establish the driven member in a definite rotative position, when the clutch is released, and a circuit adopted to energize both of said electro-magnetic means.

2. An automatic resetting device, as set forth in claim 1, the first mentioned electro-magnetic means being an annular electro-magnet surrounding the driven member.

3. In an automatic resetting means as set forth in claim 1, anti-friction means limiting movement of said armature toward the corresponding electro-magnetic means and increasing the freedom of response of the driven member to electro-magnetic rotative actuation of the driven member.

4. In an automatic resetting device, a shaft, a sleeve, rotatively mounted on the shaft, a clutch establishing a releasable drive connection from the shaft to one end of the sleeve, a spring reacting between the shaft and the other end of the sleeve to yieldably close the clutch, an armature mounted substantially rigidly on the sleeve, an electro-magnet effective on the sleeve through said armature to release the clutch, anti-friction means engaged by the armature upon its attraction toward the magnet, and electro-magnetic means effective on the sleeve when the clutch is released to establish the sleeve in a predetermined rotative position.

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