Aug. 30, 1949. M. J. FEIN 2,480,290

LUMINOUS TIME LAPSE TRAFFIC SIGNAL

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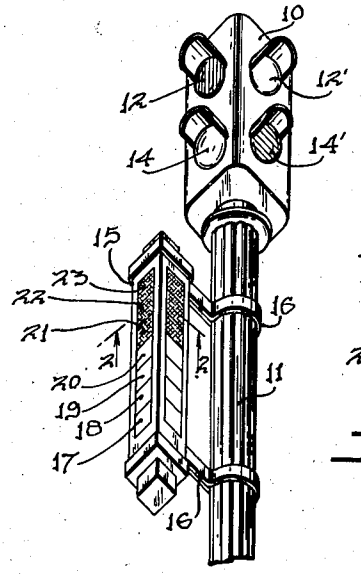


FIG. 1.

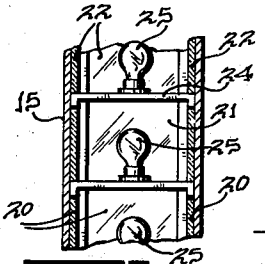


FIG. 2.

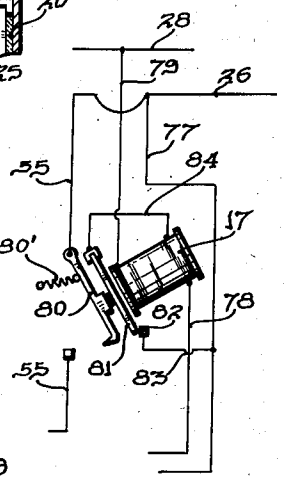


FIG. 4.

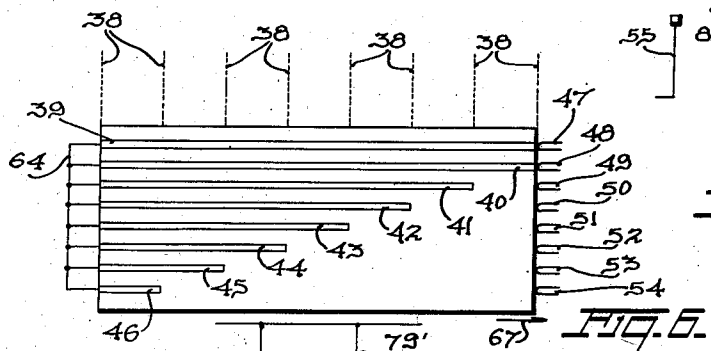


FIG. 6.

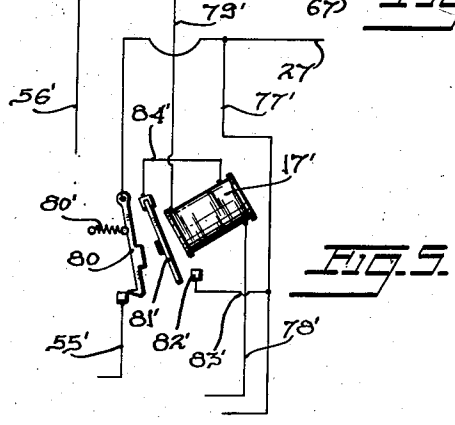


FIG. 5.

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LUMINOUS TIME LAPSE TRAFFIC SIGNAL

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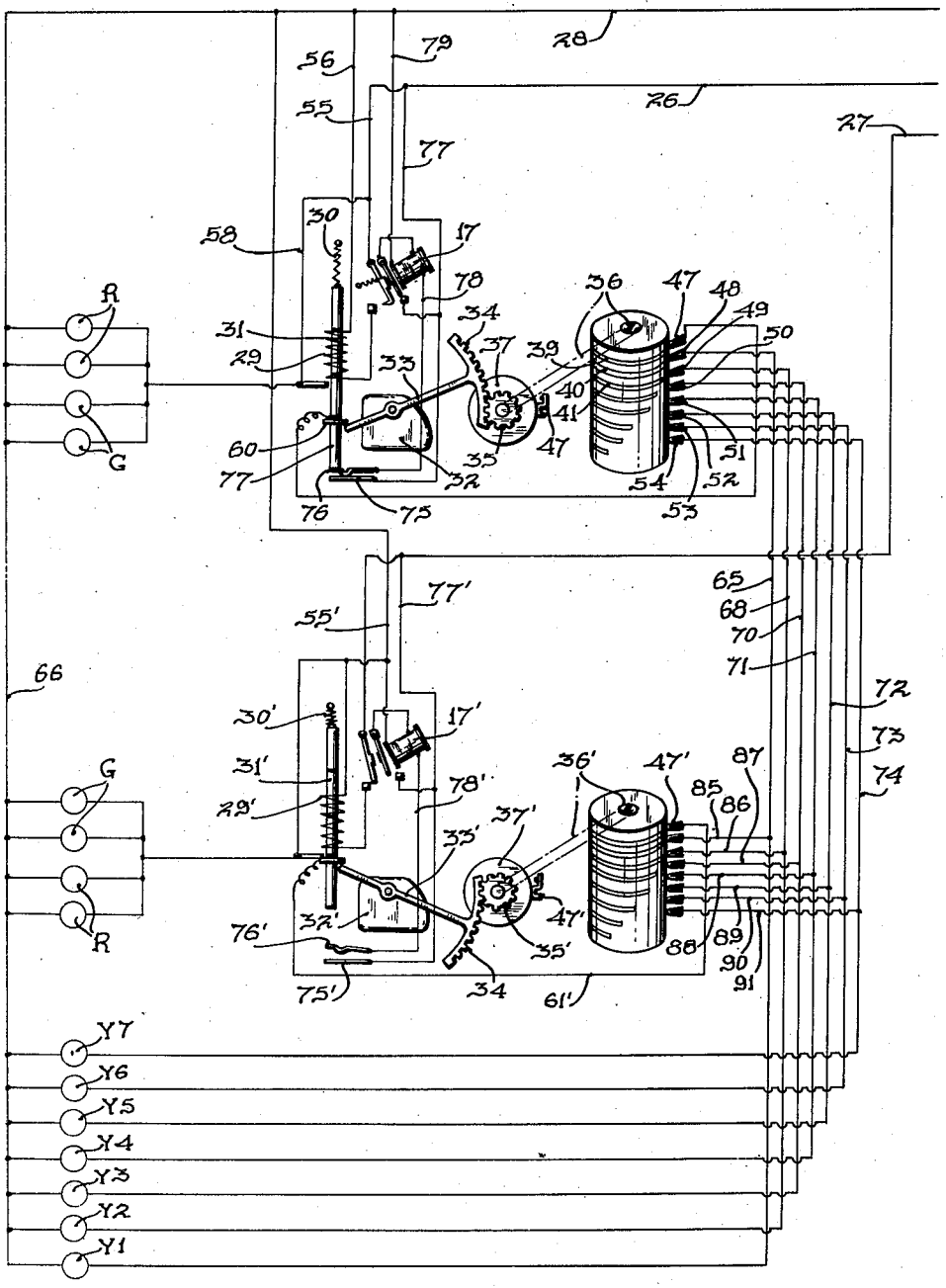


FIG. 3.

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LUMINOUS TIME LAPSE TRAFFIC SIGNAL

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2 Claims. (Cl. 177—337)

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This invention relates to new and useful improvements in traffic-control signalling devices.

Such devices are used at busy street and road intersections, and as now generally employed incorporate Stop and Go signals, usually electrically operated from a control station centrally functioning relative to all the devices in the system. For predetermined periods or cycles of time, the Go and Stop signals, commonly respectively colored green and red, are alternately displayed relative to a certain path of traffic movement; and in such manner that while the green signals are giving the right of way to traffic headed in either of the two directions in which such signals face, the red signals are displayed to arrest traffic which otherwise would travel in the two directions faced by the red signals and which intersect the two former directions.

Early in the development of such signalling devices, a third signal was used, this an amber or yellow one, to signify caution. Following the termination of each giving of red or green signals relative to traffic at a road or street intersection, and before reversal of the signals to change the directions of traffic flow, the caution signals were displayed. Practice apparently proved, however, that the use of such caution signals was not advantageous. With signalling devices as now generally used and having only red and green signals, the change-over from a Go to a Stop indication, and vice versa, is abrupt and sudden, and of considerable inconvenience and even hazardous to pedestrians.

According to the present invention, there is added to a signalling device having Go and Stop signals, an auxiliary signalling means for progressively changing to give notification of the time remaining before said signals will reverse; that is, to give notice, to pedestrians particularly, of the time remaining in which to make a safe crossing. Its purpose is to reduce pedestrian accident hazard by enabling pedestrians to judge whether or not there is ample time for crossing before traffic resumes transverse to their intended path of crossing, and in this way to reduce the likelihood of being caught part way in such path, with the consequent danger of serious accident. The notification proposed will also serve to reduce the accident hazard so far as motorists are concerned.

Various suggestions have previously been made for adding to a Stop and Go signalling device some means of giving notification of the time remaining before a given cycle or period of permissible movement of a then prevailing movement of traffic will terminate.

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The cardinal object of the present invention, however, is to provide an improved means for giving such a warning notification of relative time-elapse, and one such that it is not only luminous but of exceptionally high visibility, both day and night, but also readily understood because it is self-explanatory to all pedestrians and motorists.

Another object is to provide a relatively simple, highly efficient and practicable governing means for the warning notification, yet a governing means practicably actuable from the central station aforesaid.

A further object is to provide a warning notification without moving parts, and one the functioning elements of which comprise solely a plurality of incandescent bulbs or the like, in combination with dependable means for energizing the same one after another in such manner that first one of said lamps or the like will be energized, next said lamp and another will be energized, next three of them will all be energized, and so on, until all of them are energized at the start of the last predetermined fraction of the period or cycle of Stop and Go signalling which then prevails.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a perspective view showing a traffic signalling device pursuant to the invention.

Fig. 2 is a fragmentary vertical section, taken substantially on the line 2—2 of Fig. 1.

Fig. 3, partially an electrical diagram, shows a now favored arrangement of mechanisms and associated electric circuit connections for operating the device according to the invention.

Fig. 4 is an enlarged fragmentary view, illustrating more clearly certain of the parts of Fig. 3, and particularly a sticking magnet in self-locking condition.

Fig. 5 is a similar view, illustrating more clearly certain other parts of Fig. 3, these parts identical in nature with the parts of Fig. 4, but with the magnet deenergized.

Fig. 6 is a development of the circuit-modifying circumferential periphery of one of a pair of like commutators shown in perspective in Fig. 3.

Referring to the drawing in detail, and first to Figs. 1 and 2, the illustrated device is shown as conventionally including a signal box 10 at the top of a pedestal or column 11, such box having four sides in planes 90° apart; each such side, as shown in the case of the two thereof seen in Fig. 1, having an upper signal 12 or 12' which when operative signifies Stop and a lower signal 14 or 14' which when operative signifies Go.

In the type of signalling device illustrated, the four Stop signals are flashed on by the energization of an incandescent bulb for each, behind a pane of red glass; and when such red signals are off, the four Go signals are flashed on by the energization of an incandescent bulb for each, behind a pane of green glass. Thus, in said box 10 are eight incandescent bulbs, each suitably pocketed from the others; these bulbs being shown in Fig. 3, where those for giving Stop signals are marked R and those for giving Go signals are marked G.

The lapsed-time signalling means of the invention is shown as in an auxiliary vertically elongated coating 15, secured by brackets 16 to the column 11. Said casing, like the box 10, is shown as square in horizontal section; so that said casing has four like sides, two of which can be seen in Fig. 1.

Each of the said sides presents a vertically columnar signalling area, longitudinally subdivided into a plurality of sections one above another. In the present case, there are, for example, at each of the four sides of the casing 15, seven of said sections, all alike in size, and marked 17, 18, 19, 20, 21, 22 and 23 in the case of the signalling area to the left in Fig. 1.

Said signalling-area sections, and simultaneously the corresponding ones at the other three sides of the casing 15, are effective when illuminated to show, for instance, an amber or yellow color, by virtue of the casing 15 being subdivided by horizontal partitions 24 into seven compartments one above another, with each of the four sides of each compartment carrying as indicated in Fig. 2 a pane of yellow glass suitably secured in place, and by virtue of there being in each such compartment an incandescent bulb 25. As will be understood, there are seven of such bulbs, these indicated respectively at Y^1, Y^2, Y^3, Y^4, Y^5, Y^6 and Y^7 in Fig. 3.

Referring now to said Fig. 3, a system is shown for automatically operating the four lights R, the four lights G, and the seven lights of the Y series, in accordance with mere reversals of a master controller of simple-switch type (not shown) at some central station for the various signalling devices in the traffic control system.

From such central station merely three wires 26, 27 and 28 extend to each signalling device. The wire 28 is a return wire, while the wires 26 and 27 are for alternate use in supplying current.

Such current through the wire 26 is for energizing the two R lamps and the two G lamps in the upper group thereof in Fig. 3, and for effectuating a cycle of operations during the period of energization of said four R and G lamps, these operations being relative to the lamps of the Y series, and in such manner that during the first one-seventh of the time interval allotted for energization of said R and G lamps, the lamp Y^1 will be energized, during the next one-seventh of said time interval, the Y^1 and Y^2 lamps will be energized, and so on, until, during the last one-seventh of said time interval, all the lamps of the Y series will be energized.

Similarly, the current supply through the wire 27 is for energizing the two R lamps and the two G lamps in the lower group thereof in Fig. 3, and for effectuating during this period of energization of said four R and G lamps the same sequence of progressive energization of more and more of the lamps of the Y series as explained in the paragraph preceding.

Interposed in the wires 26 and 27 are, respectively, a solenoid 29 and a solenoid 29', each served by a spring 30 or 30' for restoring its armature 31 or 31' to the position shown for the latter when such solenoid is deenergized (immediately, as hereinafter explained) following energization thereof by change of current supply from the wire 26 to the wire 27 or vice versa.

Like inexpensive clockwork timers 32 and 32' are of a familiar type, such, for instance, as are multiply used in the are of coin-operated amusement apparatus; each having a lever 33 or 33' which, when released after being forcibly quickly fractionally rotated in a direction to wind up a spring in the timer, is by said spring slowly rotated in the reverse direction back to normal position.

The lever 33' is shown as in said normal position, while the lever 33 is shown as having just completed its forcibly effected fractional rotation, by thrust of the armature 31 consequent upon energization of the solenoid 29.

Now the energization of solenoid 29 or 29' is merely for a fraction of a second, consequent upon change of current supply from the wire 26 to the wire 27 or vice versa, and this despite continued current flow through the wire responsible for said energization, will be, as just said, explained later; the means for accomplishing this being the holding relays M and M' of Figs. 3, 4 and 5.

At an end of each lever 33 or 33' is a gear segment 34 or 34', meshing with a pinion 35 or 35' fixed to a suitably journalled shaft 36 or 36' on which also is fixed a controller drum 37 or 37'; the parts being so proportioned and arranged that during slow timer-spring effected movement of a lever 33 or 33' from the position shown for the former to the position shown for the latter, the controller drum 37 or 37' rotate through 360°.

The solenoids, the timers, and the operative connections between the latter and the commutators are duplicates, as are the controller drums. Therefore, it will suffice to describe only the controller drum 37, in which connection attention is directed to Fig. 6.

In Fig. 6, the eight vertical dotted lines 38 subdivide the circumference of the controller drum into seven equal parts. The two upper contact rings 39 and 40 are each unbroken and continuous all around the controller drum. Below the ring 40, each of six contact segments 41, 42, 43, 44, 45 and 46, as they progress downward, is shorter than the segment immediately above by one-seventh of such circumference.

Separate brushes 47, 48, 49, 50, 51, 52, 53 and 54 engage, respectively, the contact rings 39 and 40 and the contact segments 41, 42, 43, 44, 45 and 46.

The coil of the solenoid 29 at one end is connected to the wire 26, and through the contacts of holding relay M by a lead 55, and its other end is connected by the lead 56 to the return wire 28. The corresponding connections, for the solenoid 29', are a lead 55' from the wire 27 and

through the contacts of holding relay M', and a lead 56' to said return wire.

Also from the wire 26 a lead 58 goes to a fixed contact 59, the corresponding lead and contact in the case of the supply wire 27 being respectively marked 58' and 59'. The contact 59 or 59' is for engagement with a contact 60 or 60', being these on the lower ends of the armatures of the solenoids 29 and 29'. From the contact 60 a lead 61 extends to the brush 47 for the contact ring 39 of the controller drum 37; while from the contact 60' a lead 61' extends to the corresponding brush of the controller drum 37'.

In the case of the solenoid 29, for instance, the energization thereof to snap the lever 33 to the position shown, although this is effective to rotate the commutator 37 in a direction opposite to that of the arrow marked thereon, is ineffective to energize the brush 47, because the contacts 59 and 60 are separated. However, immediately on deenergization of said solenoid, and consequent fly back of the armature 31 to the position shown for the armature 31', said contacts 59 and 60 are again brought together. All these comments apply to what happens on and subsequent to energization of the solenoid 29'.

Immediately the contacts 59 and 60 are thus brought together, following momentary energization of the solenoid 29 consequent upon the beginning of current supply through the wire 26, and substantially simultaneously with the beginning of rotation of the controller drum 37 in the direction of the arrow marked thereon, a circuit for the Y series lamps is closed; such circuit including the wire 26, the leads 55 and 58, the contacts 59 and 60, the lead 61, the brush 47, the contact ring 39, a conductive bridge 64 inside the commutator from said ring to the segment 40, said segment, the brush 48, a lead 65, the lamp Y^1, and a lead 66 to the return wire 28.

With the controller drum 37 rotating in the direction of the arrow shown thereon in Fig. 3, the development of Fig. 4 may be considered as moving in the direction of the arrow 67 there shown. During the first seventh part of such rotation, by way of the circuit just detailed, only the lamp Y^1 will be energized. During the next seventh part of commutator rotation, the brush 49 interposes a parallel circuit including a lead 68 going to the lamp Y^2, and so during this part of the cycle of current supply to the wire 26, both the lamps Y^1 and Y^2 will be energized. Similarly, and by progressive coming into play of the brushes 50 through 54, the lamps Y^3 to Y^7, inclusive are successively and cumulatively energized, each through its own parallel circuit including one of the leads 70 through 74, respectively, during the succeeding seventh parts of said cycle, first the three lamps Y^1, Y^2 and Y^3 being energized, next the four lamps Y^1 through Y^4, next the five lamps Y^1 through Y^5, next the six lamps Y^1 through Y^6, and next all the seven lamps of the Y series.

If the period during which both the upper group of two R lights and two G lights of Fig. 3, and the lower group of such R and G lights in that view, are to be alternately energized, is, for instance, two minutes and twenty seconds, then the Y^1 lamp only will be energized during the first twenty seconds of said period, while the other lamps of the Y series will seriatim be energized, the energization of each starting twenty seconds later than the last one thereof previously energized.

When throw-over of current supply from the wire 26 to the wire 27 is effected, the operation of the parts associated with the wire 27, having the same reference characters as the parts associated with the wire 26 except for the addition of primes, should be clear from what has already been stated.

At such a throw-over, for instance, from the wire 26 to the wire 27, the solenoid 29 will be as shown in the case of the solenoid 29' (this because of means described in the paragraph next following), and, the energization of the Y series lamps having just previously to such throw-over been terminated, the lever 33 has been returned to the position shown for the lever 33'.

Referring now to the M and M' relays, these are as aforesaid for terminating energization of a solenoid 29 or 29' immediately following energization thereof by a throw-over as above, the arrangements auxiliary to and the circuit connections for the relay M only will be described, as the corresponding elements in regard to the relay M' will then be readily understood from the drawing.

The relay M is for breaking the supply of current to the solenoid 29, instantly upon full down stroke of the latter's armature 31 on each initiation of current supply from the wire 26. This is effected by the closing of two normally spaced contacts 75 and 76, momentarily brought together by a non-magnetic-metal lower extension from said armature; thereby to energize the relay M through a circuit including the wire 26, a lead 77, the said contacts 75 and 76, a lead 78, the coil of the relay, and a lead 79 to the return wire 28.

This energization of the relay M breaks the current supply to the coil of the solenoid 29, by attracting, as the armature of the magnet, the movable member 80 of a switch interposed in the lead 55, such switch being normally held closed by a spring 80'.

The relay M is a holding relay, there being between the same and the member 80 a spring metal blade 81, having a resilient set such and being so mounted that normally it lies as indicated in the case of the corresponding blade 81'. On energization of the relay M, however, the parts associated therewith corresponding to the parts associated with the relay M', normally arranged as the latter parts are shown in Fig. 5, become arranged as in Fig. 4; that is, the blade 81 is brought against the contact 82.

Instantly when this occurs, even though at about that instant the contacts 59 and 60 separate due to deenergization of the solenoid 29, and thereby to break the above described energizing circuit for the relay M, a substitute energization circuit for said relay is established; said substitute circuit including the wire 26, the lead 77, a lead 83, the contact 82, the blade 81, a lead 84 to the coil of the magnet, and the lead 79 to the return lead 28.

The relay M' similarly operates, on the start of an impulse of current from the wire 27; as will be clear when it is noted that the parts of Fig. 5 corresponding to those shown in Fig. 4 are given the same reference characters but with primes added.

As will be noted from Fig. 3, the brushes 48 through 54 of the commutator 37 are, by way of the leads 85, 86, 87, 88, 89, 90 and 91, in parallel connection with the brush 47' and the other brushes of the commutator 37'; so that whether the current supply is from the wire 26 or from

the wire 27, with a consequent functioning of the controller drum 37 or 37', the Y series of lamps will be progressively lighted as above described, and will remain so this during continued energization of the upper or lower group of R and G lamps in Fig. 3, according as current supply is then from the wire 26 or the wire 27.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Patent is:

1. In a traffic signal control system, a set of electric main signal lamps, a bank of auxiliary signal lamps in parallel with the main signal lamps, a supply conductor and a return conductor, the latter being connected to one side of both the main signal lamps and the auxiliary signal lamps, a controller drum having a plurality of brushes connected individually to the other side of the auxiliary signal lamps, a conductor from the other side of the main signal lamps to the supply conductor, a switch connected on one side to the conductor from the main signal lamps and on the other side to the controller drum, an electro-magnet having a coil and an armature for operating said switch, biasing means for returning said armature to normal position, a holding relay having sets of normally open and normally closed contacts, an operating circuit for the coil of said electro-magnet from the supply conductor, through the normally closed contacts of said holding relay to the return conductor, a second switch closed by the armature of said electro-magnet in its operated position, and a holding circuit for said holding relay from the supply conductor, through the second switch, the normally open contacts of the holding relay to the return conductor.

2. In a traffic signal control system, two sets of electric main signal lamps, a bank of auxiliary lamps in parallel with the sets of main signal lamps, two supply conductors and a return conductor, the latter being connected to one side of both sets of the main signal lamps and to the auxiliary lamps, a conductor from the other side of the first set of main signal lamps to the first supply conductor, a conductor from the other side of the main set of signal lamps to the second supply conductor, a pair of controller drums each having a plurality of brushes, the respective brushes of one drum being connected in parallel with the brushes of the other drum and individually to the other side of the auxiliary signal lamps, a first switch connected on one side to the conductor from the first bank of main signal lamps and on the other side to the first controller drum, an electro-magnet having an armature for operating said first switch and its coil connected across the first supply and return conductors, a second switch connected on one side to the conductor from the second bank of main signal lamps, a second electro magnet having an armature for operating said second switch and its coil connected across the second supply and return conductors.

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