June 7, 1955 H. D. FORSE 2,710,390

TRAFFIC CONTROL SYSTEM

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FIG. 1

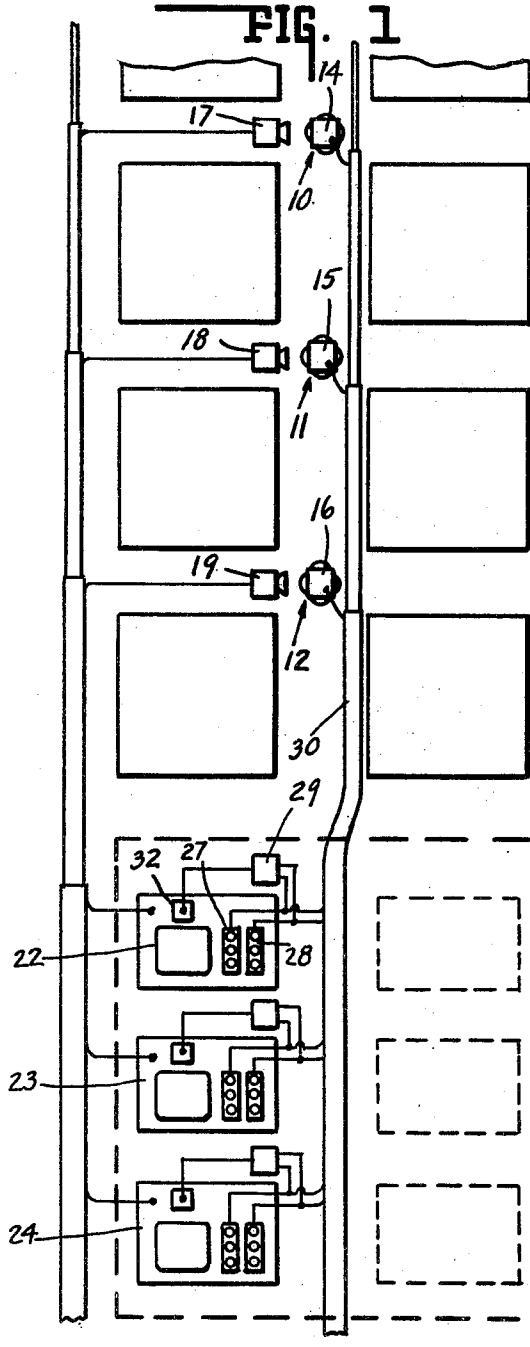

FIG. 2

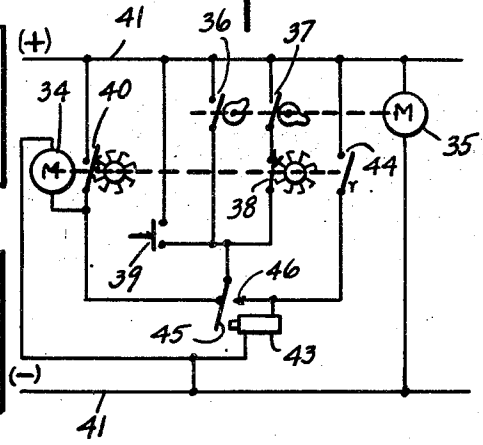

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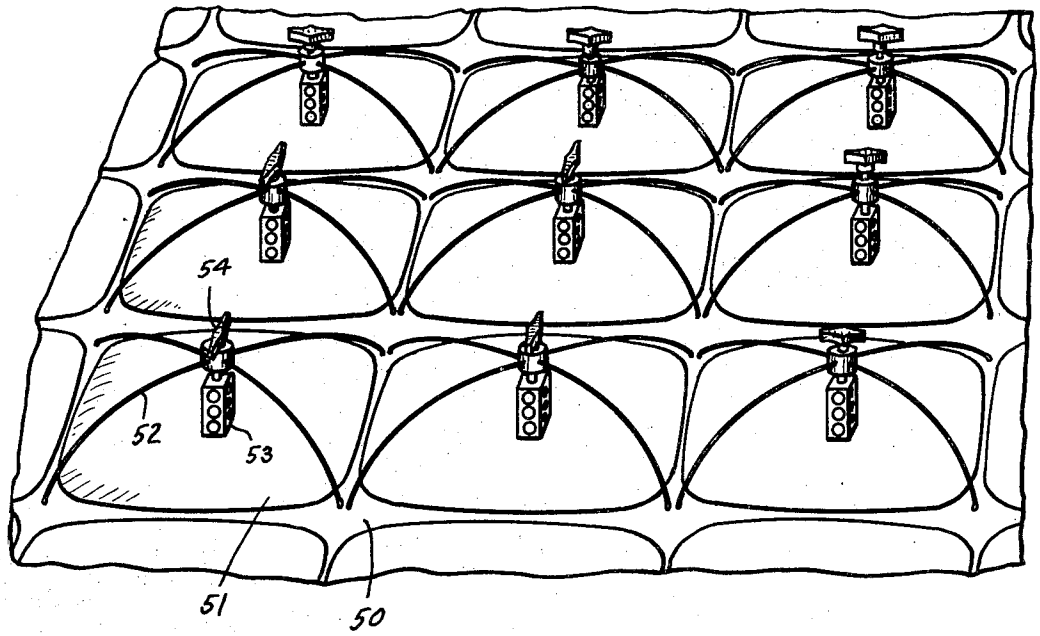
FIG. 3



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TRAFFIC CONTROL SYSTEM

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4 Claims. (Cl. 340—40)

This invention relates generally to traffic control systems, and more particularly to a combined television and traffic light system for controlling vehicular traffic.

Conventional traffic control light systems include timing mechanism for switching traffic lights between stop and go indications at fixed time intervals. Consequently, traffic can flow through a given intersection at a predetermined maximum rate in either direction. That is, the rate of north-south flow of traffic is fixed with respect to the rate of east-west flow of traffic. If the north-south flow of traffic exceeds a predetermined maximum with respect to the east-west flow of traffic, the conventional traffic light system continues to operate at its fixed periodicity, whereby the north-south traffic becomes congested. The most usual remedy for this condition is to have a traffic officer at the crowded intersection to discontinue the automatic control of the traffic light and to control the change of lights manually, thereby to adapt the periodicity of the traffic light to the flow of traffic. This condition exists in many large cities during rush hours and requires the presence of traffic officers at a large number of intersections for a relatively short period of the day.

Accordingly, it is the principal object of this invention to provide apparatus operable at a central point to observe flow of traffic at a plurality of remote street intersections and to supervise operation of traffic lights at those intersections so that maximum flow of traffic may be obtained at each intersection.

Another object of this invention is to provide a television system adapted to show at a central point the flow of traffic at a number of connected street intersections.

Still another object of this invention is to provide a traffic light system controllable from a central point for providing maximum flow of traffic at a plurality of connected street intersections.

In accordance with this invention there is provided a traffic control system for supervising traffic at a plurality of connected street intersections comprising a television system for viewing said street intersections and reproducing pictures thereof at a central station, and a traffic light system including traffic control lights at each of said intersections and manually controllable switching apparatus at said central station for energizing said traffic lights to provide maximum flow of traffic at each of said intersections.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims

Fig. 1 is a circuit diagram illustrating the combined television and traffic light systems for controlling the flow of traffic at a plurality of intersections.

Fig. 2 is a circuit diagram of a conventional control circuit for traffic lights.

Fig. 3 is a perspective view illustrating a traffic control table having a plurality of television receiving tubes.

Fig. 1 illustrates a plurality of street intersections **10**, **11** and **12**, and at each intersection there are conventional traffic control lights **14**, **15** and **16**. Also disposed at each intersection are television transmitters including cameras **17**, **18** and **19** which have been illustrated schematically, but it should be understood that each camera should be so arranged and supported that it will scan or view each of the streets at the particular intersection for a substantial distance back into each block. The purpose of this arrangement is to transmit a picture of each intersection which will show the number of automobiles passing along each street at a given time.

In order to provide centralized control of the traffic at the plurality of street intersections viewed by cameras **17**, **18** and **19**, the system includes a central station **20** wherein a plurality of television receivers corresponding to the number of intersections being controlled are mounted on a panel board to provide simultaneous pictures of traffic at the intersections being controlled. For example, television receivers **22**, **23** and **24** may be connected by means of a cable **25** to the television cameras **17**, **18** and **19**, respectively. Other television receivers have been indicated in station **20**, but the control circuits and apparatus which would be associated therewith are omitted for the sake of clarity.

In order to show the sequence of operation of each of the traffic lights at the central station, television receiver **22**, for example, has associated therewith telltale red, amber, green lamp group **27** and a similar telltale lamp group **28** connected to a conventional synchronous control switch **29** which in turn may be connected to traffic light **14** by means of the multi-conductor cable **30**. Group **27** of the telltale lamps may be connected to controller **29** to reproduce the north-south red, amber, green traffic signals of light **14**, while group **28** may be arranged to reproduce the east-west red, amber, green signals produced by light **14**. Detailed connections of groups **27** and **28** to the controller **29** are not shown as they will be obvious to those skilled in the art. It will be understood that each television receiver is provided with telltale lamp groups as shown in Fig. 1.

In order to provide manual control of each of the traffic lights **14**, **15** and **16** when flow of traffic in one or all four directions demands such control, controller **29** is provided with a manual control switch **32** which is so connected (as will be described subsequently) as to disable the automatic control switch so that traffic light **14** may be manually switched to move traffic in a particular direction for whatever time period may be required to permit adequate flow of traffic in that direction. Similar telltale groups of lamps, automatic control switches, and manual control switches are illustrated as being associated with television receivers **23** and **24**, whereby the traffic lights **15** and **16** may be manually controlled as described above in connection with traffic light **14**. It is intended that the other television receivers at the central station **20** should be similarly equipped with telltale groups and control switches, but detailed illustration of this equipment is omitted for the purpose of avoiding unnecessary duplication.

In operation, a central station operator may simultaneously view the flow of traffic at all of the street intersections scanned by the television transmitters and receivers associated therewith. When he sees increased flow of traffic in a particular direction at one or more of the intersections, which requires manual control of the traffic lights at those intersections, he may disable the automatic control switches by operating the manual switches **32**, whereby he may cause traffic to flow for longer periods in one direction or in several directions at each intersection, thereby to prevent congestion in these particular directions.

Fig. 2 illustrates a conventional synchronous controller for operating a traffic signal light through the well known sequence of red, amber and green signals. This circuit

is disclosed as typical of conventional controllers, and it will be obvious to those skilled in the art that any controller which may be operated manually or automatically may be adapted for operation in the traffic control system disclosed herein. The controller comprises a cam unit motor 34, the general purpose of which is to open and close the energizing circuits (not shown) of the red, green and amber lamps of a traffic control signal. For timing the operation of a cam motor 34 and determining the duration of the respective red, amber and green signals, there is provided a synchronous timer motor 35. Cam motor 34 may be energized through a pair of contacts 36 and 37 operated by cams on the shaft of timer motor 35. In series with contact 37 is a contact 38 operated by a cam on the shaft of motor 34. A manual switch 39 is connected in shunt to the contacts 37, 38 and 39 for providing manual closure of the circuit for motor 34. In order to hold the motor circuit closed, motor 34 includes a cam for operating contact 40 which is connected directly in series with motor 34, whereby it may be energized by the power lines 41. For the purpose of automatically stopping motor 34 after it has effected a change of lights, there is provided a control relay 43 connected across the lines 41 by means of a contact 44 closable by a cam on the shaft of motor 34. Relay 43 operates its armature 45 to break the circuit between motor 34 and contacts 36, 37 and 38, and also to provide a holding circuit through contact 46.

The circuit of Fig. 2 is shown in its normal idle condition with the timer motor 35 rotating its cams to operate contacts 36 and 37 to effect periodic operation of the traffic lights. For example, in normal operation timer motor 35 initially closes contact 37, thereby establishing a circuit through contacts 38 and 45 through motor 34 connecting it to power line 41 to initiate rotation thereof. As motor 34 starts, a cam on its shaft closes contact 40 and holds it closed for a predetermined period. It might be explained that the conventional cam for operating the contact 40 is provided with a number of lobes, for example 16, whereby one cycle of operation of motor 34 consists of 1/16 of a 360 degree rotation of the motor shaft. Contact 44 is simultaneously closed by another cam on the shaft of motor 34, thereby closing the circuit through relay 43, and this relay in turn operates its armature 45 to connect contact 46. The effect of this is to energize relay 43 through contacts 37 and 38, whereby the relay remains energized as long as these contacts are closed. Cam motor 34 continues to rotate until its cams open contacts 38 and 40. When this occurs, motor 34 stops. During this cycle of operation other cams (not shown) on the shaft of motor 34 will have changed a traffic light from a red indication to an amber indication, for example. This indication will be continued until timer motor effects the initiation of a second cycle of operation of motor 34 to provide a succeeding change, for example, to green of the connected traffic light. Contacts 36 and 38 have certain interlocking functions, but explanation thereof is not believed to be essential to provide understanding of this invention.

To effect manual control of the synchronizing controller, the manual switch 39 may be closed, thereby to initiate operation of motor 34 through the contact 45 relay 43. Once motor 34 is started, the various contacts of the circuit are operated as described above to effect a change of indication in the traffic light. By successively closing the switch 39, the traffic light may be operated through its normal cycle at the will of the operator.

From the foregoing description it will be apparent that the synchronous controller 29 and the manual switch 32 shown in Fig. 1 may be utilized to effect manual control of the traffic light 14 at the will of the operator.

Fig. 3 of the drawings illustrates a table 50 within the top of which is supported a plurality of television receiver tubes such for example as tube 51. It is intended that the television tube shall be connected to television transmitting cameras so that the tubes of the table top show

traffic conditions at connected street intersections. In fact, it is contemplated that each television camera may be suspended over a street intersection and may have a wide angle viewing lens whereby cameras at successive street intersections will provide a substantially continuous picture at a central station of one block after another of traffic. Thus, an operator may view a table arrangement of television receiver tubes and thereby see traffic conditions in an area, for example, of ten blocks square. Suspended over each tube 51 by means of a frame work 52 is a miniature traffic light 53 which may be a replica of conventional full sized traffic lights in daily use at traffic intersections. As shown in Fig. 1, each of the traffic lights 53 may be connected to its corresponding light at the traffic intersection and may be controlled by the same automatic control switch. By looking at the miniature lights 53 the central station operator can always ascertain the stop and go signals in both directions at each supervised street intersection.

Operatively associated with each miniature traffic light 53 is a manually operated control switch 54 corresponding to manual control switch 32 shown in Fig. 1. Switch 54 includes an elongated switch handle, the position of which may be adjusted to show the direction in which traffic has a go signal. This serves to aid a central station operator in quickly apprising himself of the direction in which traffic may be flowing at a given moment. It will be understood that frame structure 52 may be tubular or of other suitable form for supporting conductors connecting lights 53 and switches 54 to their associated automatic control switch such as switch 29 shown in Fig. 1.

From the foregoing description of the apparatus illustrated in Fig. 3, it will be apparent that this invention provides a combined television and traffic control signalling system wherein an operator receives a coordinated picture of traffic flow in a series of connected street intersections. Because of the fact that the operator can simultaneously view a large number of intersections, the automatic traffic control system can be manually operated to expedite flow of traffic in those intersections which require special supervision due to abnormally heavy flow of traffic.

This invention provides a traffic control system which enables one or more operators at a central station to supervise flow of traffic at any desired number of remotely located street intersections. In present traffic control systems it is necessary to station an officer at those intersections which are known to require manual control at specified hours of the day. While this is a partially adequate answer to the problem, it is not a complete answer due to the fact that the occurrence of special events attracting large crowds of people will cause unpredictable congestion at unpredictable street intersections. According to present practice, about the only answer to this phase of the problem is to have cruising officers checking street intersections throughout the traffic day. Another answer which has been attempted is to have officers fly over the principal traffic intersections of the city and in this way discover unpredicted congestion. This invention eliminates the need for cruising or flying officers and provides constant supervision from the central station of any desired number of street intersections.

The invention claimed is:

1. In combination in a traffic control system: a plurality of traffic light signals arranged at street intersections to be remotely controlled, said traffic light signals comprising at least two different colors, a plurality of television cameras respectively associated with said street intersections to be controlled to pick up the traffic conditions at the respective street intersections, a remote control station remote from said street intersections and comprising a plurality of television receivers arranged visually to indicate traffic conditions picked up by said television

cameras, a plurality of miniature traffic signals comprising the same colors as the traffic signals at said intersections and electrically connected with said traffic signals at said intersections for signaling in the same colors as and in accordance with the signalings of the traffic light signals at said intersections, said miniature traffic light signals being respectively arranged near the respective receivers of said remote control station, and switch means electrically connected to said miniature signals and to said traffic light signals at said intersections and operable jointly and uniformly to control said miniature signals and said traffic light signals at said intersections.

2. In combination in a remote traffic control system: a plurality of multi-color traffic light signals respectively suspended over a plurality of street intersections to be controlled, automatic means associated with said traffic light signals for automatically switching on and off said signals in predetermined sequence and at predetermined intervals, a plurality of television cameras respectively associated with said street intersections for picking up the respective traffic conditions at said intersections, a remote control station remote from said traffic intersections and comprising a plurality of television screens forming part of television receivers and being arranged visually to indicate the traffic conditions picked up by said television cameras, the number of said television screens corresponding to the number of street intersections to be controlled, a plurality of miniature multi-color traffic light signals corresponding to the traffic light signals at said intersections and respectively suspended over substantially the center portion of said screens, electric circuit means connecting the miniature traffic light signals pertaining to each screen with the respective traffic light signals pertaining to each street intersection to be controlled to thereby cause the respective traffic light signals at the respective street intersection and the miniature traffic light signals associated therewith to signal uniformly with each other and in the same respective color, and switch means electrically connected with said circuit means and operable temporarily to make said automatic means ineffective and to control said traffic signals at said screens and at said traffic intersections uniformly at random.

3. A remote control board for use in connection with a remote traffic control system, which comprises in combination: a plurality of television screens forming part of television systems, said screens being arranged visually to indicate traffic conditions at street intersections to be controlled, a plurality of miniature multi-color traffic light systems respectively associated with said screens, electric circuit means connected with said miniature traffic light systems and arranged to be electrically connected with a plurality of actual traffic light systems corresponding in number and type to said miniature traffic light systems and arranged at street intersections to be controlled, and switch means electrically connected to said circuit means for selectively varying the status of energization of said circuit means.

4. In combination in a traffic control system: a traffic signal system comprising at least two different colors and arranged at a street intersection to be remotely controlled, a television camera associated with said street intersection to pick up the traffic conditions there prevailing, a remote control station remote from said street intersection and comprising a television receiver arranged visually to indicate traffic conditions picked up by said television camera, a miniature traffic signal system comprising the same colors as the traffic signal system at said intersection and electrically connected therewith for signaling in the same colors as and in accordance with the signaling of said traffic light signal system at said intersection, said miniature traffic light signal being arranged near said television receiver, and manually operable switch means electrically connected to said miniature traffic signal system and said traffic signal system at said intersection said swicth means being operable jointly and uniformly to control said miniature traffic signal system and said traffic light signal system at said intersection.

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