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3,244,086

DEVICE FOR PHOTOGRAPHING PERSONS DESTROYING MARKER SIGNS

Filed Oct. 9, 1963

2 Sheets-Sheet 1

FIG. 1

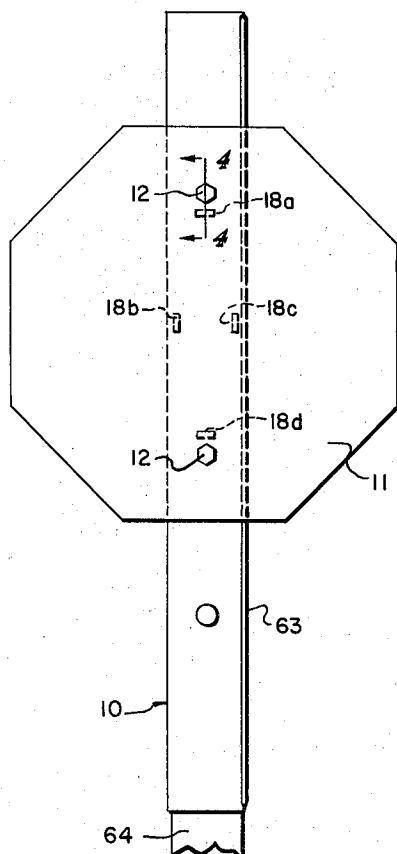


FIG. 2

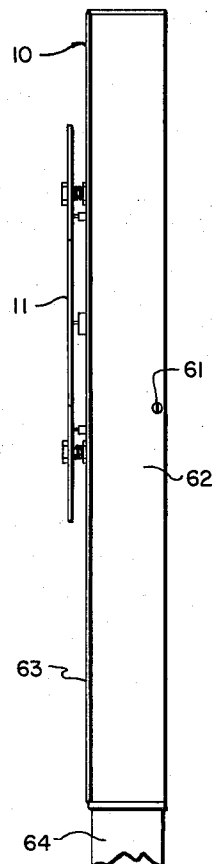


FIG. 8

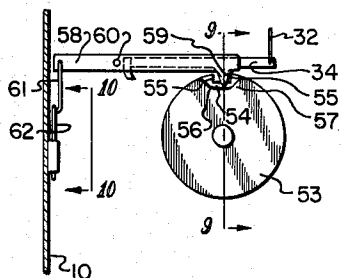


FIG. 9

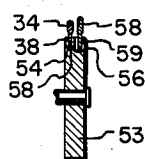
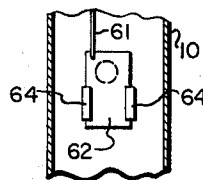


FIG. 10



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FIG. 4

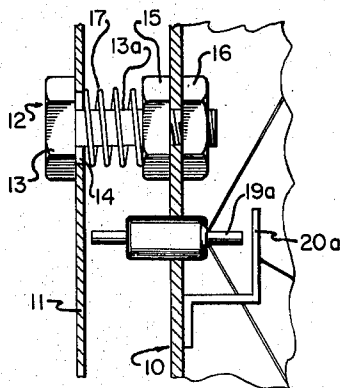


FIG. 5

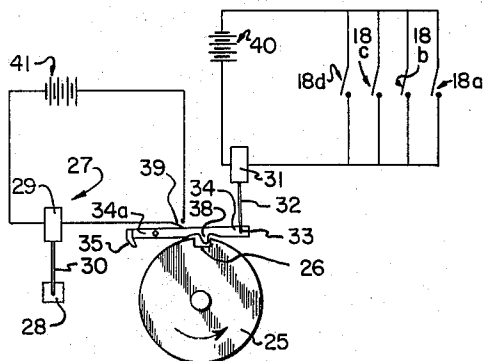


FIG. 6

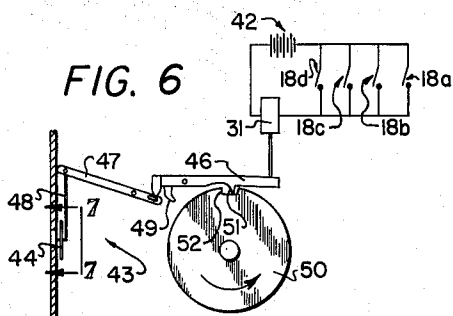


FIG. 7

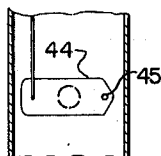
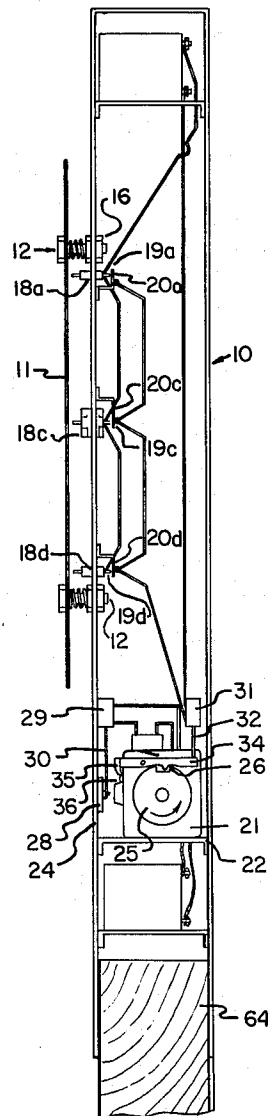


FIG. 3



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DEVICE FOR PHOTOGRAPHING PERSONS DESTROYING MARKER SIGNS

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11 Claims. (Cl. 95-11)

This invention relates to devices for photographing vandals who damage traffic and other marker signs, thereby imposing large repair and replacement costs on federal, state and local governments, and in some instances, on private owners.

The cost of maintaining marker signs is very high. A state government, for example, may have to spend thousands of dollars annually just to repair and replace traffic signs destroyed by hunters and target shooters who fire at the signs as they drive or walk past. Apprehension of persons causing this type of damage has heretofore been extremely difficult owing to the remote locations of many of the signs and the difficulty in identifying the persons doing damage that is usually discovered long after the vandalism took place.

It is a principal object of this invention to provide a device that will furnish irrefutable and long lasting photographic evidence of the identity of persons destroying signs, thus greatly aiding in their apprehension. It is a further object to provide a device that is durable and capable of being transported from place to place for use in curbing prevalent vandalism, while having a natural appearance that will not warn the vandal that he is being photographed.

Since in many instances the signs are destroyed by persons shooting at them from moving automobiles, it is a still further object of the invention to provide a device capable of photographing rapidly moving vehicles and of making a permanent record of their license plate numbers. With this information, and through a trace of the vehicle registration, the occupants of the vehicle can generally be easily discovered and apprehended.

Features of the invention that combine to achieve the foregoing objects include a steel housing of sign post configuration; a steel backing plate to which signs are fastened; means resiliently mounting the backing plate on the housing; switch means actuated by impact on the backing plate; a protective shutter covering a hole in the housing; a movie camera positioned in the housing to take pictures through the hole; a control circuit, including a source of power to open the protective shutter and start the camera in response to actuation of the switch means; and means to stop operation of the camera and close the protective shutter after the desired pictures have been taken.

There is shown in the accompanying drawings specific embodiments of the invention representing what are presently regarded as the best modes of carrying out the generic concepts in actual practice. From the detailed description of these presently preferred forms of the invention, other more specific objects and features will become apparent.

FIG. 1 is a fragmentary front elevation of the invention;

FIG. 2, a similar side view;

FIG. 3, a fragmentary side elevation of one form of the invention; with the access door removed;

FIG. 4, a fragmentary section taken on line 4-4 of FIG. 1;

FIG. 5, a schematic showing of the control circuit and protective shutter operator of the form of the invention shown in FIG. 3;

FIG. 6, a similar view of another embodiment of the invention;

FIG. 7, an elevation view of the protective shutter taken on line 7-7 of FIG. 6;

FIG. 8, a schematic showing of the control circuit and protective shutter of still another form of the invention; FIG. 9, a view similar to FIG. 7, taken on line 9-9 of FIG. 8; and

FIG. 10, a vertical section taken on line 10-10 of FIG. 9.

Referring to the drawings:

In the embodiment of the invention illustrated in FIGS. 1-4 a steel housing 10, shaped like a signpost, has a steel backing plate 11 resiliently mounted thereon. Backing plate 11 is preferably shaped to conform to the dimensions of a sign to be mounted on its face and is here shown octagonal in the form of a standard traffic "stop" sign. Both the housing and the backing plate are made of heavy gauge steel to withstand the impact of bullets and to protect the camera and controls inside the housing from damage.

Bolts 12, including heads 13 and shank 13a, extend through oversize holes 14 (FIG. 3) in the backing plate 11 and are securely clamped to housing 10 by lock nuts 15 and 16 threaded thereon at opposite sides of the housing wall.

Springs 17 surround each bolt between the housing and the backing plate, and hold the backing plate away from the housing and against the heads 13 of the bolts. The springs are quite strong and serve both to stabilize the backing plate against the force of normal winds and other minor blows and to normally hold it away from switches 18a-18d. However, the springs will yield when the backing plate is hit forcefully, as by a bullet or rock.

The oversize holes 14 through the backing plate 11 allow the backing plate to wobble with respect to the bolts. Thus, a sharp impact at any point on the face of the backing plate will move the contacted portion of the backing plate towards the housing, where it will engage and close one or more of the plurality of switches 18a-18d. Similarly, a forceful blow at any point on the back side of the backing plate will cause the backing plate to pivot about the head of a bolt 12 adjacent the point of impact and force a section of the backing plate remote from the point of impact to overcome the resistance of the springs and move into engagement with one or more of the switches 18a-18d.

Switches 18a-18d are fixed to and extend through housing 10 as shown with lock nuts 19 and 20 (FIG. 4), abutting the inside and outside of the housing, respectively, and threaded on the switch bodies to hold them in place. Movable contacts 19a-19d extend through the switch bodies and are biased by means not shown to the open position of FIG. 2. When engaged by the backing plate 11, the movable contacts 19a-19d are forced into engagement with fixed contacts 20a-20d, respectively, to complete a control circuit, as will be further explained. Although four switches are shown arranged in a diamond pattern (FIG. 1), more or less switches can be used. It is necessary, however, that they be spaced in a pattern that will insure engagement of the backing plate with at least one of them when the backing plate is moved sufficiently, regardless of the point of impact on the backing plate.

A spring-wound camera 21 is mounted on support 22 in the housing, with its lense 23 aimed at hole 24 formed through the housing. A cam wheel 25 replaces the usual turning key on the camera and is rotated to wind the camera. As the pictures are taken, this wheel rotates in an unwinding direction, and cam groove 26 (FIGS. 3 and 5) in the wheel provides a means, cooperating with other structure, to stop operation of the camera, as will be further explained.

A protective shutter arrangement 27, comprising a steel

shutter plate 28 for covering hole 24, a solenoid 29, and a connecting rod 30, operates to normally close hole 24. Shutter plate 24 is moved, opening the hole to allow pictures to be taken therethrough whenever camera 21 is actuated.

A second solenoid 31 has an actuator rod 32 pivotally connected at 33 to one end of a pivot bar 34, the other end of which is provided with a protruding nose 35 for engagement with an actuator switch 36 of the camera 21. Pivot bar 34 is journaled intermediate its length on a pivot pin 34 that is fixed to the housing 10.

Cam follower 38 protrudes from pivot bar 34 at a point intermediate the pivot pin 37 and pivot connection 33 and cooperates with cam wheel 25 and cam groove 26 therein to control operation of the camera. The trailing end wall of the cam groove is steep and cooperates with a corresponding abutment face on the cam follower to prevent rotation of the cam wheel.

Another normally open switch 39 controls the circuit powering solenoid 29 to open the protective shutter 27. This switch is positioned to be closed by camera actuating movement of pivot bar 34.

In operation, the impact of a bullet on either the top face or bottom back of backing plate 11, for example, will move the upper portion of the backing plate into engagement with switch 18a to complete the circuit (seen best in FIG. 5) between battery 40 and solenoid 31, which instantly energizes the solenoid and withdraws actuator rod 32. This action pivots bar 34 about pin 37 and raises the cam follower 38 out of groove 26 while at the same time nose 35 depresses the camera actuator 21a to start camera operation and rotation of cam wheel 25. Simultaneously, pivot bar 37 contacts and closes switch 39 to complete the circuit between battery 41 and solenoid 29, thereby energizing the solenoid and withdrawing connecting rod 30. Withdrawal of connecting rod 30 slides cover plate 28 away from hole 24.

Even though switch 18a is only momentarily closed, bar 24 remains in its pivoted position, and the switch 39 is held closed because cam follower 38 rides on the outer periphery of cam wheel 25 until the cam wheel has revolved to such a point that the cam follower again drops into cam groove 26. At this time switch 29 is opened, the shutter plate 28 closes hole 24, the camera actuator switch 36 is released, and camera operation is discontinued.

With the single camera arrangement shown, persons and objects in front of the sign are photographed, and this would include vehicles rapidly approaching from behind and moving in front of the sign before the shutter has closed. It should be obvious, however, that a similarly arranged camera and housing shutter could be provided to simultaneously take pictures of the area at the rear of the sign, merely by duplicating the camera and protective shutter disclosed, and utilizing the same control circuits.

FIGURES 6 and 7 illustrate a modification of the invention wherein a single battery 42 not only controls actuation of the camera but of the protective shutter 43 as well. In this embodiment one side of the shutter plate 44 of the shutter is pivoted to the housing at 45, and it is rotated by pivot bar 46 acting through reverse pivot rod 47 and connector link 48. Thus, it can be seen that energization of solenoid 31 in response to closing of any of the impact responsive switches 18a-18d will result in pivoting of bar 46. Nose 49 contacts the camera actuating switch (not shown) and starts cam wheel 50 rotating. Cam follower 51 rides on the outer periphery of wheel 50 and holds bar 46 in its pivoted position until the cam wheel has completed a circuit and the cam follower can again drop into the cam groove 52, even though solenoid 31 is no longer energized.

As long as bar 46 is held in its pivoted position, its free end will act to depress the free end of reverse pivot rod 47 and raise the end connected to cover plate 44,

thereby pivoting the cover plate away from the hole in the housing.

When cam follower 51 again drops into cam groove 52, the shutter plate 44 moves back into position covering the hole in the housing.

The embodiment shown in FIGS. 8-10 also utilizes a single battery 53 as a power source for both the camera and the protective shutter. In this embodiment solenoid 31, actuator rod 32, and pivot bar 34, having cam follower 38 thereon, are arranged as in the embodiment shown in FIGS. 3 and 5. Cam wheel 53 is provided with a cam groove 54 having a steep trailing end wall 55 and a configuration like that of cam groove 26, previously described. Cam groove 54, however, extends only partially across the periphery of the cam wheel, another cam groove 56 being formed opposite groove 54 in the remaining portion of the periphery. Cam groove 56 is formed with inclined end walls 57, as shown. A partition 58 separates the two cam grooves, and cam follower 38 is positioned to drop into cam groove 54.

A second pivot bar 58 has a rounded cam follower 59 on one end thereof, which follower is positioned to ride on the periphery of cam wheel 53 and to fall into cam groove 56. Pivot bar 58 is pivoted intermediate its length, and preferably at a point near the end remote from follower 59, on pivot 60 fixed to the housing. The end of pivot bar 58 remote from the cam follower is pivotally connected through link 61 to one side of shutter plate 62 in such a manner that the link will not obstruct the hole through the housing when the plate is moved.

In operation of this embodiment, solenoid 31 is energized as previously disclosed to move cam follower 38 out of cam groove 54 and to initiate operation of the camera. As the cam wheel begins to rotate, the rounded cam follower 59 rides up the inclined end wall of groove 56, pivots, and through link 61 slides the shutter plate 63, guided within rails 64, out of hole-blocking position. When the cam wheel has completed a rotation, assuming the solenoid 31 to be de-energized, cam follower 38 drops into cam groove 54 to stop operation of the camera in the manner previously explained, while at the same time cam follower 59 again drops into groove 56 to move the shutter plate into hole-closing position.

To insure cam follower 59 remaining in contact with the cam wheel, pivot 60 is positioned so that the weight of the pivot bar on the cam follower side will be sufficient to bias it into contact. Obviously, if desired, additional weights could be used on the pivot bar, or spring means or other biasing means could be used to insure the desired constant contact.

The cameras and controls, including the batteries used, are readily accessible to any authorized person who has the key to fit lock 61 in the door 62, hinged at 63.

Applicant has provided a unit capable of taking photographs of persons destroying marker signs or of vehicles carrying such persons; a unit that is rugged, capable of sustained operations, and that will not arouse the suspicions of the vandals. In the interest of economy, the housing may be made only long enough to include the necessary control components and then be bolted, or otherwise affixed, to a standard wooden sign post 64, as shown.

Whereas there is here illustrated and specifically described a certain preferred construction of apparatus which is presently regarded as the best mode of carrying out the invention, it should be understood that various changes may be made and other constructions adopted without departing from the inventive subject matter particularly pointed out and claimed herebelow.

I claim:

1. A device for photographing persons destroying marker signs comprising: a housing; a backing plate yieldably mounted on said housing, said housing and said backing plate being constructed of material capable of withstanding the impact of a bullet; a movie camera in said housing; a hole through a portion of the housing not

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covered by said backing plate, said movie camera being aligned to photograph through said hole; a shutter, including a cover plate constructed of material capable of withstanding the impact of a bullet and normally covering the hole through the housing; and control means including normally open switch means closed by movement of said backing plate to thereby move said cover plate away from said hole and to actuate said movie camera for a predetermined period of time.

2. The device of claim 1, wherein said control means includes a plurality of biased open switches fixed to and spaced on said housing between the housing and the backing plate and wherein yieldable means are provided to bias the backing plate a predetermined distance away from the housing.

3. The device of claim 2, wherein said control means further includes a battery and a solenoid, said switches being connected in parallel between said battery and said solenoid and closed by movement of said backing plate toward the housing.

4. A device for photographing persons destroying marker signs comprising: an elongate housing; a backing plate; means yieldably holding said backing plate a spaced distance from the housing, said means yielding to allow the plate to move toward the housing in response to impact on the plate; a plurality of biased open switches fixed to and spaced on said housing between the housing and the backing plate, said switches being closed by movement of said backing plate toward the housing; a movie picture camera including a cam wheel rotatable during actuation of the camera and a camera actuating switch, said camera being positioned in said housing to photograph through a hole in said housing; a battery in said housing; a solenoid in said housing; said normally open switches being connected in parallel between said battery and said solenoid whereby closing of one or more of said switches will complete a circuit to energize said solenoid; means responsive to energization of said solenoid to contact said camera actuating switch and initiate operation of said camera; and means cooperating with said cam wheel to stop camera operation after a predetermined period of time and after said solenoid has been de-energized.

5. The device of claim 4 including shutter means normally closing the hole in said housing and means for positioning said shutter means to open the hole during camera operation.

6. The device of claim 4 wherein the means for initiating operation of the camera includes a bar pivoted intermediate its length on pivot means fixed to the housing; and an actuating rod having one end positioned within said solenoid and the other end pivotally connected to one end of said bar, the other end of said bar being positioned adjacent the camera actuating switch, whereby energization of the solenoid will cause withdrawal of the control rod and pivoting of the said other end of the bar into contact with the camera actuating switch.

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7. The device of claim 6 wherein the means cooperating with the cam wheel to stop camera actuation includes a cam groove formed in the periphery of the cam wheel; and a cam follower on the bar, said cam follower being positioned to ride on the periphery of said cam wheel when said solenoid is de-energized and to drop into the cam groove, thereby moving the said other end of the bar out of contact with the camera actuating switch.

8. The device of claim 7 further including shutter means normally closing the hole in said housing; and means in said housing for positioning said shutter means to open the hole during camera operation.

9. The device of claim 8 wherein said means for positioning said shutter means includes a battery; a second solenoid; a control rod having one end extending within the second solenoid and the other end connected to said shutter means; and a normally open switch positioned adjacent the bar so that movement of the bar into contact with the camera actuating switch will close said last named switch, said last named switch being connected in circuit with said battery and said solenoid, whereby closing of said switch will energize said solenoid to move said shutter means to open the hole.

10. The device of claim 8 wherein said shutter means comprises a shutter plate pivotally mounted on the housing and normally covering said hole; and wherein said means for positioning said shutter means comprises a reverse pivot bar mounted intermediate its length on pivot means fixed to the housing, one end of said reverse pivot bar being positioned to be contacted and pivoted by the camera actuating switch contacting end of the pivot bar; and linkage means pivotally interconnecting the other end of the reverse pivot bar and the shutter plate.

11. The device of claim 8 wherein said shutter means comprises a shutter plate pivotally mounted on the housing and normally covering said hole; and wherein said means for positioning said shutter means comprises a second cam groove in the periphery of the cam wheel, adjacent the first cam groove; a second pivot bar pivoted intermediate its length on pivot means fixed to the housing; a shutter plate; guide means on said housing to guide said shutter plate in sliding movement between hole-covering and hole-opening positions; a cam follower on one end of said second pivot bar, said cam follower being positioned to ride on the periphery of said cam wheel and to drop into said second cam groove; and linkage means pivotally interconnecting the other end of said second cam bar and the shutter plate.

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JOHN M. HORAN, *Primary Examiner.*