REFERENCES

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[3] BRAMAN, V. T.: "Glow-Lamp Sound-on-Film Recording," *Electronics*, **2** (June, 1931), No. 6, p. 679.

A NEW REEL-END ALARM*

D. CANADY AND V. A. WELMAN**

As the duties of the projectionist in a modern motion picture theater become more numerous and exacting, and as the quantity and intricacy of the equipment intrusted to his care is continually increased, some positive, unfailing means of announcing to him the impending finish of the reel he is showing upon the screen becomes absolutely necessary.

Without some such signal, tests, adjustments, repairs to equipment, or other work of immediate necessity must often be neglected in order to devote the last few minutes of a nine- or ten-minute reel to watching for the end, or, as an alternative, doing his other tasks and taking a chance on catching the change-over when the time comes.

Even in the silent days, when the operation was simpler, there was a general demand for some such signal, the earliest, perhaps, being a coin wound into the reel of film fifty or a hundred feet from the end. When the film unrolled to the proper point the coin would drop and the resulting clatter would provide the signal.

The most common device, both of the silent days and at the present time, is an arm pivoted near the edge of the magazine, bearing upon its free end a roller which rests on the film as it unwinds. When the core of film is no longer large enough to support it the roller drops with a bang, sounding a warning.

Thousands of this type of reel-end alarm are in use, and these thousands in constant daily use have caused and are causing an immense amount of film damage. It is no use to argue that with proper care it need not damage the film, or that if properly designed no damage will result. The proof of the matter may be had by dropping into any second-run theater in the country and watching the wavy scratch down the center of almost every reel.

Since the roller rides upon the emulsion side of the film, which, in first-run houses is usually fairly "green," this type of alarm is particularly dangerous in those houses.

This type of reel-end alarm has the further disadvantage that it must be manu-

* Received September 21, 1936; presented at the Fall, 1936, Meeting at Rochester, N. Y.

** Canady Sound Appliance Co., Cleveland, Ohio.

ally reset each time a reel is threaded in the projector. The human factor is thereby introduced, which is especially likely to fail during periods of difficulty with other parts of the projection room equipment, just at the times when the reel-end alarm is of most importance.

The requirements for a successful reel-end alarm are:

(*1*) It should accurately and positively announce the approach of the end of the reel, a predetermined distance from the end.

(*2*) It should not damage the film in any way.

(*3*) It should be automatic in action, requiring no act on the part of the projectionist to place it in operation.

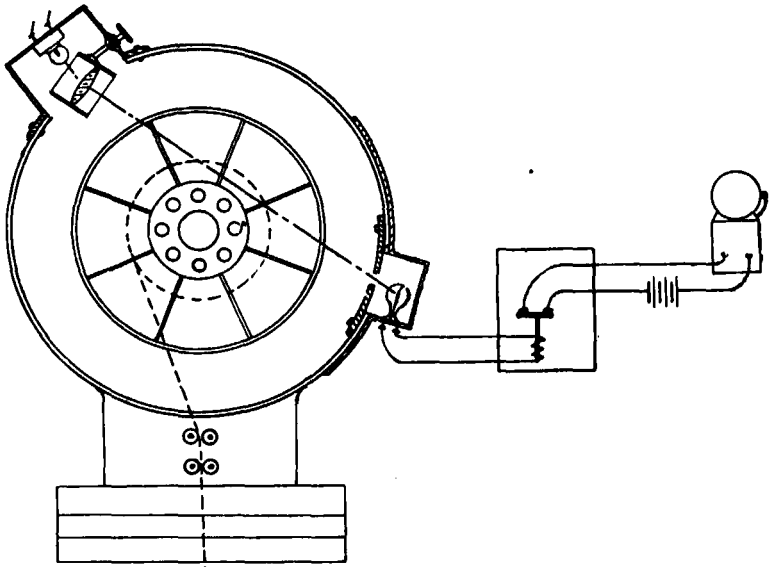

FIG. 1. Schematic arrangement of reel-end alarm.

(*4*) It should be rugged, and easy to install and maintain. These requirements are fulfilled in the alarm described here. Experimental samples were constructed and used about five years ago. The patent was applied for in 1932 and was recently issued as No. 1,982,133. The principle employed is that of uncovering a beam of light so that the light will fall upon a light-sensitive cell when the film unwinds to a predetermined point, a principle well known now and applied to many uses during the past year, but something of a mystery at the time the first models of this reel-end alarm were constructed.

The patent drawing (Figs. 1 and 2) is self explanatory, although in actual application many variations are possible as to light-source, lens, adjustment, type of light-sensitive cell, and relay and signalling device. The apparatus consists essentially of a light-source and a focusing and adjusting device, in a case attached to the upper magazine; and a light-sensitive cell to receive the beam of

light after it has passed the core of the reel of film. The light-sensitive cell is connected to a suitable relay, either vacuum-tube or magnetic, which operates a signal consisting of lights, buzzer, or electric bell. A one-stroke bell is perhaps the best signal. The power for the circuit is derived from the commercial power lines, no batteries being required.

As can be seen from Fig. 1, when the reel of film has been reduced to a predetermined size, the beam of light is no longer interrupted but proceeds to the light-sensitive cell. Perhaps the most compact and most easily installed arrangement is to house the light-source, a copper-oxide cell, relay, and bell with their necessary associated parts in one metal box, mounted directly upon the magazine, returning the beam of light from the exciter lamp to the photoelectric cell stationed alongside it by means of a glass or metal mirror attached to the magazine upon the opposite side of the reel. Such an installation would require a minimum of changes in the magazine, the only outside electrical connection being a rubber- or metal-covered cord to the framing-light circuit or other convenient lighting circuit.

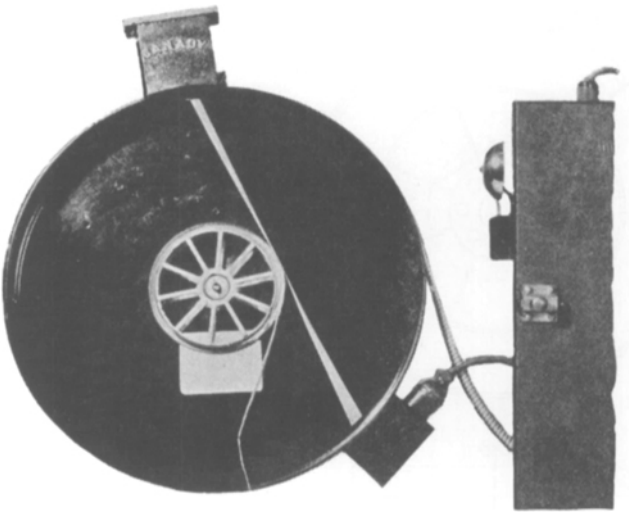

FIG. 2. Photograph of installation.

DISCUSSION

MR. CRABTREE: What is the sensitivity of the reel-end alarm, in terms of film convolutions?

MR. WELMAN: In this experimental set, two or three layers of film.

MR. CRABTREE: Can any projectionist say whether that sensitivity is adequate?

MR. HOVER: I believe that that is more sensitive than the average roller alarm. I checked the roller type some time ago, and found that it will drop, as a rule, anywhere within a length of film of approximately 12 feet one way or the

other. Even the most careful and accurate set-up has a certain amount of play in the bracket or arm that holds the rolls, and it is also influenced by whether the film is wound tightly or loosely.

MR. CRABTREE: When the usual black spot appears upon the screen, what tolerance does the projectionist have? In other words, how many seconds may elapse before he throws the change-over switch?

MR. WELMAN: This appliance has nothing to do with change-over. This provides a signal indicating that the change-over dot is soon coming. It is to warn the projectionist to look for the dot.

MR. CRABTREE: Why could it not be used to eliminate the black spot?

MR. WELMAN: It is not accurate enough for that. To eliminate the dot you must hit it within a couple of frames.

MR. TOWNSEND: I used to disapprove reel-end alarms for the reason that I felt it gave the projectionist a chance to nap, or do something other than pay attention to the show. Since I have gone back into the projection room I have used the alarm myself, not so that I can take a nap, but because the alarm has certain advantages, especially in smaller theaters that are now using the Suprex carbons which burn at quite a high rate.

The reel-end alarm provides a very definite time in which to light the arc. The projectionist can gauge the length of carbon, and can use short lengths to advantage. The human factor enters in this way: A projectionist who happens to be of a nervous temperament is likely to strike the arc two or three minutes earlier than is necessary if he merely looks at the amount of film left upon the reel. If he has an alarm that is thoroughly accurate, he will not light up too soon. Another projectionist may strike the arc too late, so as to utilize as much of the carbon as possible. He may change over and find that he has a poor light because of having struck the arc too late.

MR. HOVER: A signal of this type would be greatly appreciated by projectionists who have gone through a fire in the projection room. After such an experience the projectionist will have a strong aversion to opening the magazine door when the machine is running.

The condition actually exists, that because the little ports, or windows, in the magazines are not well lighted, the magazine door is sometimes left open so that the projectionist can watch the film. Every projector should have some kind of device that will indicate the time to light up the arc without having to open the magazine door.

MR. DANIELSON: Is the danger of fire increased by putting an exciter lamp in the upper magazine? What do the fire authorities think of the device?

MR. WELMAN: The lamp is in a separate box, and is blocked off by a glass plate. It is no worse than the light now in the magazines, which the underwriters have approved.