SIMPLIFYING AND CONTROLLING FILM TRAVEL THROUGH A DEVELOPING MACHINE*

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The developing machine described here is simple in design, thus reducing maintenance costs to a minimum and practically eliminating film breakage and damage hazards from mechanical causes. A very wide range of speed has been accomplished largely through the machine's ability to regulate and maintain an even flow of, and a constant tension on the film throughout its developing and drying process.

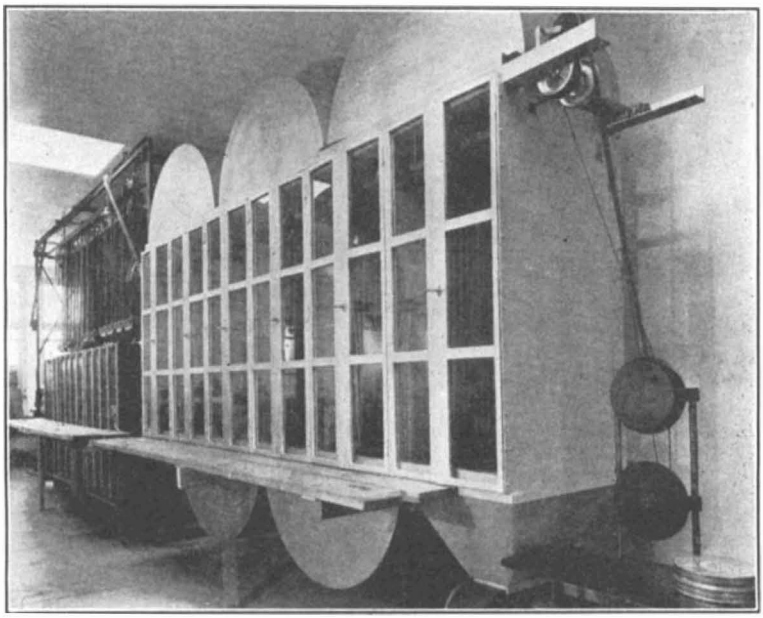

FIG. 1. 35-mm machine: capacity 600 ft per hr.

The entire drive of the film-carrying rollers is frictional, and the power is applied directly to the outer and upper edges of the rollers but only when there is normal tension on the film. This driving action is achieved by creating a light constant drag or tension on the film throughout the machine, and the tension thus set up is relieved in the following manner:

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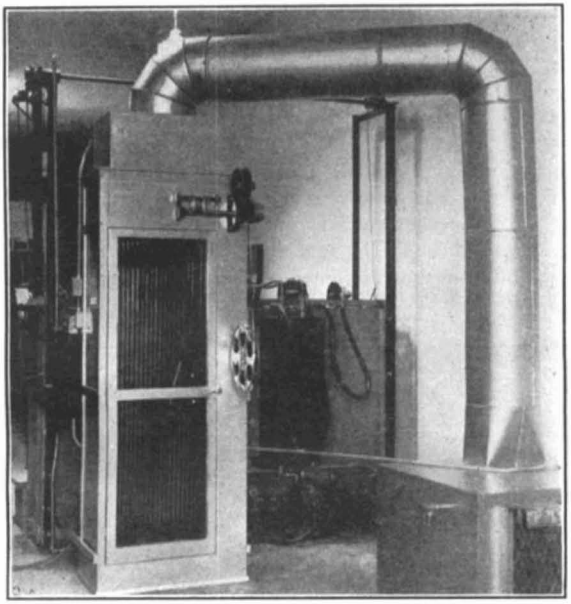

FIG. 2. 16-mm machine: capacity 1000 ft per hr.

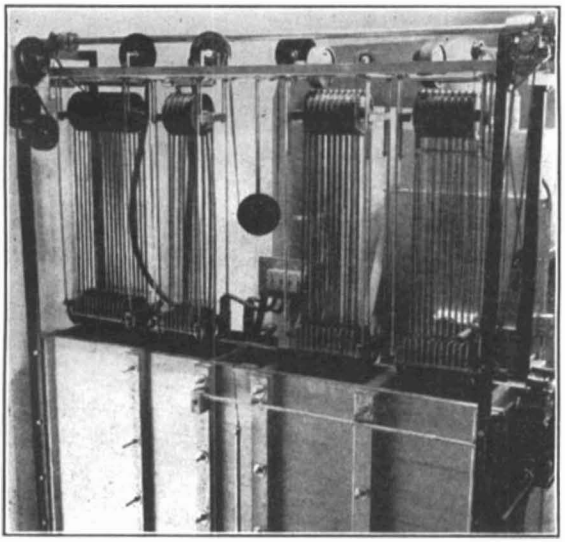

FIG. 3. Wet end of the 1000-ft 16-mm machine.

The film-carrying rollers are mounted on shafting which in turn is mounted yieldably downward on saddles which are carried on springs, and when the film drag or tension exceeds the amount determined by the spring adjustment, these upper film-carrying rollers are drawn downward and away from driving rollers until sufficient slack is fed up to relieve the tension, which then permits the springs to draw the film-carrying rollers again into contact with the driving rollers.

The drawing-downward action takes place almost constantly throughout, but is noticeable only in the dry box where film shrinkage is added to the drag set up in the machine. On the take-off end a driven friction roller keeps the tension constant to the rewind.

At the first entrance of the film into the machine a given speed is established and is maintained throughout the developing and drying process unless changed by the operator.

To meet the high initial and maintenance cost of ball bearings in film-carrying spools, $7\frac{1}{2}$-inch film-carrying rollers are used throughout the machine. This also reduces wear and depreciation by at least 50 per cent by slowing the rpm of the whole machine 50 per cent or in some cases even more, and yet maintaining film speed.

The driving rollers are directly over the upper film-carrying rollers. All driving mechanism is out of tanks and solutions. The upper film-carrying rollers are mounted so that they may engage or disengage the driving rollers automatically.

All film-carrying rollers in the wet end are mounted individually free, and in turn are all mounted on free-turning tubing or shafting. All film-carrying rollers in the dry box, in addition to being mounted individually free, are mounted on tubing which in turn is mounted with ball bearings on shafting, the entire unit being free to rotate or to slide laterally on the shaft, thus becoming self-aligning.

There are no ball bearings in the rollers, or bakelite gears to replace.

There are no sprockets to tear or pull film, or elevators to regulate tension.

Breakage from mechanical causes is practically eliminated, and speed and safety coöperate instead of limit each other.

Film enters the machine in a steady constant flow, and tension is regulated by the operator through the spring adjustment which holds the film-carrying roller shaft. When adjusted, the tension of the film remains virtually constant throughout the machine.

Finally, there are no precision parts or need for precision maintenance.