Jan. 31, 1967 I. B. CURRENT 3,301,159

PROCESSING DEVICE FOR MOTION PICTURE FILMS

Filed May 18, 1964

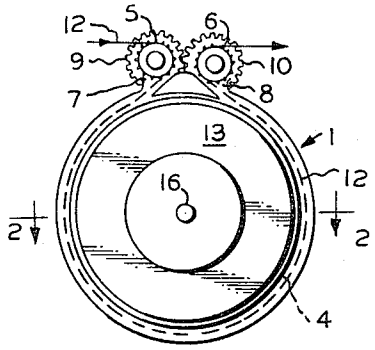


FIG.1

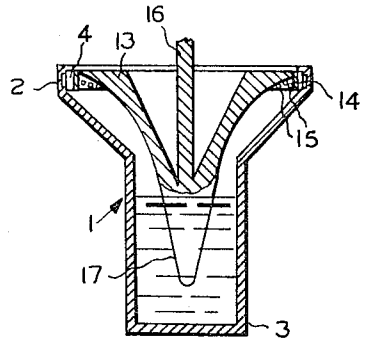


FIG.2

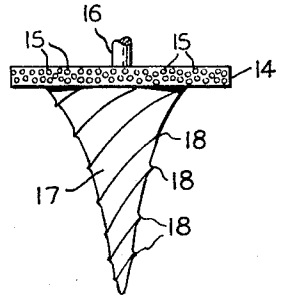


FIG.3

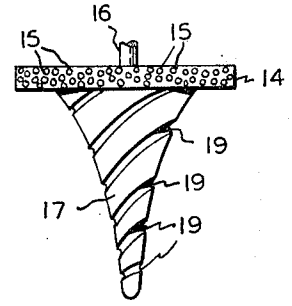


FIG.4

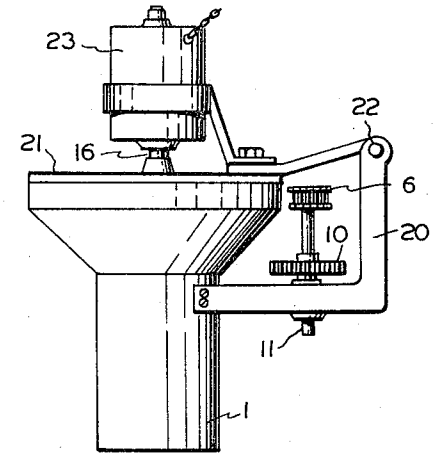


FIG.5

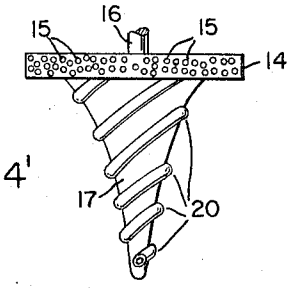


FIG. 4'

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PROCESSING DEVICE FOR MOTION PICTURE FILMS

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This invention relates to motion picture processing machines, and more particularly relates to machines for treating motion picture film or other long strips with liquids by impinging such liquids in the form of sprays or jets onto the film or strip.

It is well known in processing motion picture films to employ jet impingement or spray applications of developing soltuions on the film. Such jet or spray applications result in a faster rate of film development with greater uniformity than processes wherein the film is passed through the developing or processing solutions. However, heretofore known motion picture processing machines employing such jet or spray applications have several shortcomings in that they require a considerable amount of piping and/or a considerable number of pumps and, consequently are expensive, difficult to fabricate and manufacture, have a tendency to leak and generally require considerable maintenance.

It is, therefore, an object of this invention to provide a device for applying liquids in the form of jets or sprays to long strips, such as motion picture films, without the necessity of plumbing, piping or pumps.

Another object is the provision of such a device which possesses very few moving parts and, thus, is easy to manufacture, install and maintain.

Another object is the provision of a device for applying liquids in jets or sprays to motion picture film in a continuous manner without wasting substantial amounts of such liquids.

Further objects and advantages of this invention will be apparent from the following detailed description taken in conjunction with the appended drawings, in which:

FIG. 1 is a plan view of the device of this invention;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is an elevational view of one type of impeller which is employed in the device of this invention;

FIG. 4 and FIG. 4′ are elevational views of two other types of impeller for use in the device of this invention; and

FIG. 5 is an elevational view of the device of this invention further illustrating such elements as driving means for the impeller and the film moving sprockets.

Referring to FIGS. 1 and 2, there is shown a cylindrical tank **1** having an open enlarged upper end **2** and a solution sump **3** at its lower end. The upper end **2** is formed with a circular film channel **4** in its interior surface. Sprockets **5** and **6** are rotatably mounted adjacent the upper end **2** which is also formed with entry and exit slots **7** and **8**, respectively. The srockets **5**, **6** are respectively driveably connected to intermeshing gears **9** and **10** which are diven by a shaft **11** connected to a suitable source of rotational power, as best shown in FIG. 5. A motion picture film **12** is threaded around sprocket **5** through entry slot **7**, through film channel **4**, around the interior wall of upper end **2**, out of exit slot **8**, around sprocket **6** and thence to other processing equipment.

An impeller **13** is rotatably mounted within the tank **1** and tapers downwardly into the sump **3**. The impeller **13** is formed with guide means spirally extending from the lower end of said impeller upwardly and outwardly towards the film channel **4**. The impeller **13** is further formed at its upper end with a perforated peripheral rim **14** extending downwardly between film channel **4** and the above-mentioned guide means extending from the lower end of said impeller. The rim **14** is perforated with jet holes or guides **15**. The impeller **13** furthermore is provided with a drive shaft **16** for rotating said impeller.

The tapering surface **17** of the impeller is so shaped that rotary motion of the impeller causes solution in which the lower end of the impeller is immersed to rise by centrifugal action to the upper end of the impeller where it is forced by centrifugal force through the holes or guides **15** in rim **14**. FIG. 3 illustrates one design of guide means for the tapering surface **17** as comprising spiral ridges or vanes **18** extending from the lower end of said surface to the upper end thereof. FIG. 4 illustrates another design of guide means for the tapering surface **17** as comprising spiral grooves **19** extending from the lower end of said surface to the upper end of impeller **13**, while FIG. 4′ shows another design comprising spiral tubes **20** disposed in or on the tapering surface **17** in the same place as spiral grooves **19** of FIG. 4 or spiral ridges **18** of FIG. 3.

Referring now to FIG. 5, there is shown a bracket **20** fixed to tank **1**. The sprocket gear drive shaft **11** is journaled in said bracket with gears **9** and **10** disposed above said bracket and sprockets **5** and **6** disposed above their respective gears. Cover **21** is hinged at **22** to said bracket. An impeller drive motor **23** is mounted on said cover and is connected to impeller drive shaft **16** which passes through said cover and is connected at its lower end to the impeller **13**, as best shown in FIG. 2.

The impeller can be driven by an individual motor, as shown in FIG. 5, or by a gear train, chains and sprockets, or belts and pulleys so that several impellers can be connected to and driven by the same power source as that employed to drive the film **12**, i.e., power source employed to drive shaft **11** and gears **9** and **10**.

In operation, the film **12** being processed is transported by means of sprocket **5** to form a loop within film channel **4** and is then carried to the next processing step by means of sprocket **6**. Interconnection of sprockets **5** and **6** by means of intermeshing gears **9** and **10** maintains the loop of film **12** in the proper size to fit the film channel **4**. The impeller **13** is rotated, for example, by motor **23** and imparts rotary motion to portions of the solution within sump **3** adjacent the surface of the impeller immersed therein. The spiral guide means on the tapering surface **17**, e.g., ridges or vanes **18** or grooves **19** or tubes, guide such portions of the solution upwardly to the rim **14**. The surface **17** guides the solution traveling therealong outwardly against the inner surface of rim **14** whereby centrifugal force causes said solution to pass through jet holes **15** and strike the surface of the film **12** in film channel **4** at a great velocity. After the solution has struck the film **12**, it drains off of said film back into the sump **3** for recirculation upwardly and outwardly along the surface **17** of impeller **13** to be again impinged against film **12**.

The solution in sump **3** can be a single charge or it can be replenished by a suitable metering device to maintain the solution therein at a proper level. Various means of temperature control of the solution, if necessary or desirable, can be employed in accordance with well-known procedures. The impeller device as described above can be employed at a single step of the overall processing of the film and remaining steps can employ conventional or previously known procedures. Alternatively, any number of impeller devices as described above can be used for more than one or all of the steps of the entire processing operation. Similarly, any suitable mechanical means for coupling various sprockets at the various processing steps or of synchronizing other driving mechanisms can be employed in accordance with conventional practices.

As other embodiments of the invention will be apparent to those skilled in the art without departing from the

spirit and scope of the invention, no limitations are intended in the annexed claims, except as are specifically expressed.

What is claimed is:

1. Device for impinging solutions on a long strip comprising a channel for guiding said strip in a circular path, a solution sump positioned below said channel, and an impeller rotatably mounted wihin the circular path of said channel and tapering downwardly into said sump, said impeller being formed with guide means spirally extending from its lower end upwardly and outwardly towards said channel and with a perforated peripheral rim extending downwardly between said channel and said guide means.

2. Device for impinging treating solutions on motion picture film comprising a channel for guiding said strip of film in a circular path, a solution sump positioned below said channel, an impeller rotatably mounted within the circular path of said channel and tapering downwardly into said sump, said impeller being formed with guide means spirally extending from its lower end upwardly and outwardly towards said channel and with a perforated peripheral rim extending downwardly between said channel and said guide means, and means for rotating said impeller.

3. Device for impinging treating solutions on motion picture film comprising a channel for guiding said strip of film in a circular path, a solution sump positioned below said channel, an impeller rotatably mounted within the circular path of said channel and tapering downwardly into said sump, said impeller being formed with guide means spirally extending from its lower end upwardly and

outwardly towards said channel and with a perforated peripheral rim extending downwardly between said channel and said guide means, means for rotating said impeller and means for moving said film along said circular path defined by said channel.

4. Device as claimed in claim 3 wherein said means for moving said film comprises a pair of interconnected sprockets.

5. Device as claimed in claim 3 wherein said guide means comprises a spiral vane formed on the external surface of said impeller.

6. Device as claimed in claim 3 wherein said guide means comprises a spiral groove formed in the external surface of said impeller.

7. Device as claimed in claim 3 wherein said guide means comprises a spiral tube along the external surface of said impeller.

8. Device as claimed in claim 3 wherein said channel, said impeller and said sump are enclosed within a tank.

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Disclaimer

3,301,159.—*Ira B. Current,* Binghamton, N.Y. PROCESSING DEVICE FOR MOTION PICTURE FILMS. Patent dated Jan 31, 1967. Disclaimer filed Sept. 30, 1982, by the assignee, *Eastman Kodak Co.*

Hereby enters this disclaimer to all claims of said patent.

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