

Jan. 22, 1963

C. F. ROBINSON

3,074,332

DRYING PLATEN FOR A RECORDING SYSTEM

Filed Oct. 20, 1958

Fig. 1.

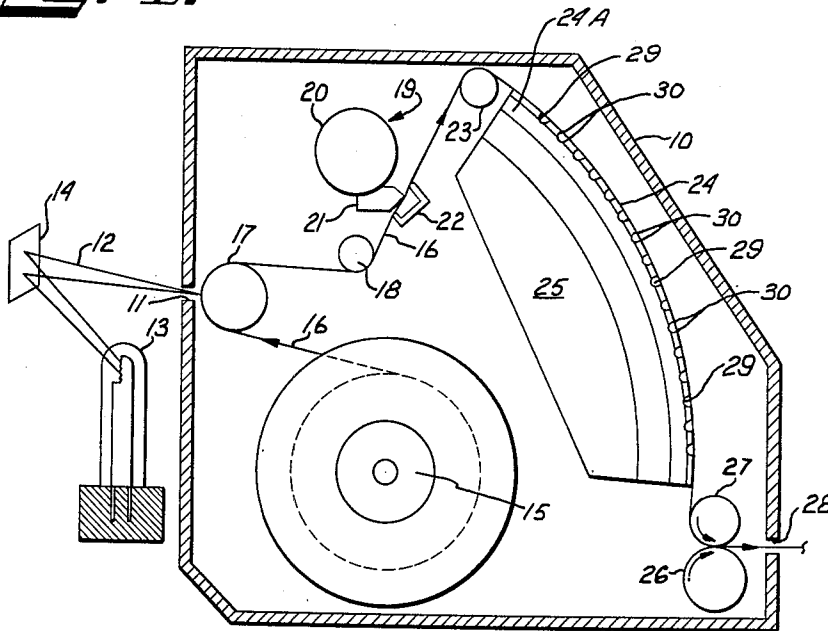
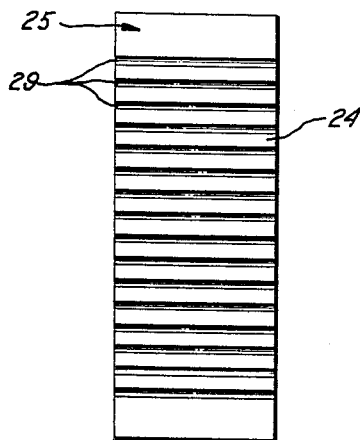


Fig. 2.



INVENTOR.
CHARLES F. ROBINSON
BY
Christie Parker & Hale
ATTORNEYS

1

3,074,332

DRYING PLATEN FOR A RECORDING SYSTEM
Charles F. Robinson, Pasadena, Calif., assignor, by mesne assignments, to Consolidated Electrodynamics Corporation, Pasadena, Calif., a corporation of California
Filed Oct. 20, 1953, Ser. No. 768,186
2 Claims. (Cl. 95-13)

This invention relates to a platen structure and particularly to a drying platen adaptable for use in dynamic recording systems.

The increase in application and importance of dynamic recording has evolved fields of use in which a very short access time is desirable. The term "access time" is used to indicate the time interval between the exposure of a photosensitive recording paper to a light stimulus to be recorded and the presentation of the recorded record for visual observation. Wind tunnel and flight testing represent examples of testing procedures wherein rapid access is of considerable value. Conditions of operation can be changed with greater facility and flexibility if the conditions undergoing tests can be recorded and visually observed in a brief rather than a prolonged interval of time.

While the drying platen of the present invention is in no sense so limited, it is particularly adapted to high speed processes for developing photosensitive emulsions. To illustrate its utility in such a process, it is described with reference to the rapid photographic developing process described in copending application, Serial No. 681,804, C. F. Robinson and J. H. Jacobs, filed September 3, 1957, and assigned to the same assignee as the present application.

The photographic developing process described in the above-identified application is a process for developing a photographic material having a photosensitive emulsion supported on a web or backing, preferably of paper. The method comprises an initial step of applying a thin film of processing solution to the emulsion surface. The applied film of processing solution is carefully controlled to be sufficiently thin so as to wet substantially only the emulsion leaving the emulsion support or web essentially dry. Immediately after application of the processing solution, heat is applied to the emulsion through the dry back surface of the web to accelerate development of the exposed emulsion and simultaneously to dry the processing solution from the emulsion. By this method, development of the latent image produced by exposure of the photo-sensitive medium occurs within a very brief interval subsequent to the exposure. Furthermore, this development occurs continuously and concurrently with exposure of succeeding increments of the emulsion-surfaced web.

It is particularly important in a process such as that previously described that the record, a term applied to the exposed emulsion-surfaced web, be substantially dry before exposure to ambient light conditions for visual observation. A very rapid drying speed is therefore essential. The application of heat to dry the record consistent with the requirements of a rapid access time can be achieved by drawing the web over a heated drying platen. In view of the rapid rate with which the record is drawn over the platen, it is essential that the heat transfer from the platen surface to the record be highly efficient.

One of the problems encountered in drying the record in the manner previously described is that a boundary layer of air and/or steam adhering to the platen-side of the web is disposed between the paper and the hot platen, thereby acting to prevent intimate contact between the two. The heat transfer from the hot platen to the record is therefore impaired. The removal of this boundary layer becomes important in order to avoid the necessity for an increased access time because of poor heat transfer.

2

The present invention is a platen structure in which the boundary layer found on the side of the web adjacent the platen is effectively removed and the heat transfer between the hot platen and the record is markedly improved.

The platen structure of the present invention comprises a first surface which is in heat transfer relationship with a web adapted to be drawn across the first surface. A plurality of second surfaces intersect the first surface to define a plurality of edges at the first surface. These edges act against the underside of the web as it is drawn across the platen to remove any gaseous layers adhering to the web. Means are provided for heating the first surface so that heat is transferred from it to the web.

In a preferred embodiment of the invention, a plurality of slots are disposed in the surface of the platen structure to be transverse to the direction of travel of the web. These slots extend transversely across the entire width of the platen. The edges of the slots remove boundary gaseous layers adhering to the web and can be vented, if necessary, to the bottom or side of the case enclosing the record system. It has been found that, even though the area available for heat transfer is somewhat reduced by reason of the slots disposed in the surface of the platen, the overall heat transfer is materially enhanced by reason of the removal of the boundary layer. Furthermore, it has been found that wrinkling of the web at low recording speeds, an effect attributable to inadequate contact between the platen and the web because of the boundary layer of gas, is eliminated by the slots disposed in the surface of the platen.

The advantages of the platen structure according to the present invention together with the features of its operation will be appreciated from a description of the platen structure according to the present invention as utilized in a record handling unit. The description is made in conjunction with the accompanying drawings in which:

FIG. 1 is a schematic elevation of a record handling unit showing in side view an embodiment of the platen structure according to the present invention; and

FIG. 2 is a plan view of the embodiment of the platen structure shown in FIG. 1.

With reference to FIG. 1, the record handling unit is enclosed in a magazine 10 having on one side a window 11 through which a light beam 12, produced in a conventional recording camera, enters the magazine incident on the record therein. The camera is illustrated schematically as a light source 13 and a modulator 14 represented as a galvanometer mirror. The magazine houses a supply roll 15 on which an unexposed emulsion-surfaced web 16 is mounted. The web is carried over a metering roller 17 driven by a conventional roller drive means (not shown) to determine the speed of travel of the recording medium through the magazine. From the metering roller the record is carried around an idling or tension roller 18 and thereupon past a processing solution applicator 19. The applicator, described in greater detail in the previously identified copending application, is shown schematically and for the present purposes may be described as comprising a solution reservoir 20 and a slit applicator 21 which communicates at one end with the reservoir and at another end against the recording medium 16 as it is stretched across a mandrel 22. A thin film of processing solution is thereby applied to the emulsion surface. The web is carried from the applicator on a guide roll 23 and across a curved heat-transfer surface of a plate 24A in a platen structure 25. From the platen structure, the record is passed through compression rolls 26, 27 which are driven through a slip clutch to maintain a constant tension on the record strip between the metering roll 17 and the point of the compression roll-

ers. Thereupon the record is discharged from the magazine through an exit slit 28.

In the embodiment of the platen according to the present invention shown in FIGS. 1 and 2, a plurality of spaced-apart slots 29 are disposed in the heat-transfer surface of the platen structure. The slots extend across the width of the surface and are transverse to the direction of travel of the web. Where the surfaces defining the slots intersect the heat-transfer surface of the platen structure, a plurality of edges 30 are defined. It has been found that the effectiveness with which the boundary layer of gas is removed from the web tends to improve as the edges are more sharply defined. In a preferred embodiment of the platen structure according to the invention, an optimum condition is achieved when the slots are approximately $\frac{5}{32}$ " wide and $\frac{1}{20}$ " deep and are spaced about $\frac{3}{8}$ " apart. Under this condition, the loss in heat-transfer area of the platen surface is more than offset by the greatly-improved efficiency of heat transfer of the remaining area.

The heat-transfer surface of the platen structure is heated by insert heaters (not shown) mounted in the platen structure. The web drawn across the heat-transfer surface is dried at a temperature in excess of 90° C. and preferably at a temperature of 120° C. It is, of course, necessary that relatively large quantities of heat be transferred from the heat-transfer surface of the platen structure to the web. The improved drying platen structure of the present invention permits, however, more effective utilization of the heat input to the heat-transfer surface.

The effectiveness of the platen structure according to the present invention has been demonstrated by drawing a web to which no processing solution had been applied across the heat-transfer surface. The web, in this instance paper, contained only the moisture left in it as a result of the manufacturing process. However, a large amount of moisture was removed from the web by heating the platen structure and drawing the web across the slots as previously described.

It is apparent that modifications may be made in the geometrical configuration of the recesses in the heat-transfer surface without affecting the basic concept of removing the gaseous boundary layer from a web drawn across a platen surface having a plurality of edges. For example, shapes other than the transverse slots heretofore described, such as circular perforations or triangles, may be formed in the heat-transfer surface of the platen structure. This requires, however, that the distribution of the recesses be such as to insure contact of the entire width of the web as it is drawn across the platen. Other modifications in the geometrical configuration may similarly be introduced without departing from the basic concept of the invention. However, the transverse slots in the embodiment of the platen structure heretofore described are preferred since they lend themselves to ease of fabrication, either by machining or casting.

It is to be understood that while the platen structure of

the present invention has been described with respect to a rapid photographic development process, it is equally applicable to other applications where a web is drawn across a surface for drying purposes. An important improvement in the performance of heated platens is achieved by the platen structure of the present invention and the detailed description of its application to a rapid photographic development process should not be construed as limiting its usefulness to such applications.

I claim:

1. In a record handling unit, the combination comprising a roll of photographic paper having an emulsion surface and a back surface; a platen structure including a heat-transfer surface having a plurality of recesses formed by a plurality of surfaces intersecting the heat-transfer surface to define a plurality of sharply-formed edges at the heat-transfer surface; means for drawing the paper across the heat-transfer surface and the edges therein, said edges acting to remove gaseous layers adhering to the back surface of the paper; means for heating the heat-transfer surface; means for applying a thin film of processing solution to the emulsion surface prior to passage of the paper across the heat-transfer surface; and means adjacent the point of application of the processing solution to expose the paper to a light stimulus to be recorded.

2. In a record handling unit, the combination comprising a roll of photographic paper having an emulsion surface and a back surface; a platen structure including a curved heat-transfer surface having a plurality of slots formed by a plurality of surfaces intersecting the heat-transfer surface to define a plurality of sharply-formed edges extending across the heat-transfer surface; means for drawing the paper across the heat-transfer surface in a direction normal to the edges therein, said edges acting to remove gaseous layers adhering to the back surface of the paper; means for heating the heat-transfer surface; means for applying a thin film of processing solution to the emulsion surface prior to passage of the paper across the heat-transfer surface; and means adjacent the point of application of the processing solution to expose the paper to a light stimulus to be recorded.

References Cited in the file of this patent

UNITED STATES PATENTS

697,312	Atwood	Apr. 8, 1902
1,569,156	Thompson	Jan. 12, 1926
1,816,290	Klimis	July 28, 1931
1,888,947	Buck	Nov. 22, 1932
2,299,662	Thaler	Oct. 20, 1942
2,402,237	Carder	June 18, 1946
2,440,159	Stanley	Apr. 20, 1948
2,667,826	Martlin	Feb. 2, 1954
2,797,625	Fairbanks	July 2, 1957
2,848,931	Troidl	Aug. 26, 1958
2,933,825	Small	Apr. 26, 1960