

Aug. 22, 1933.

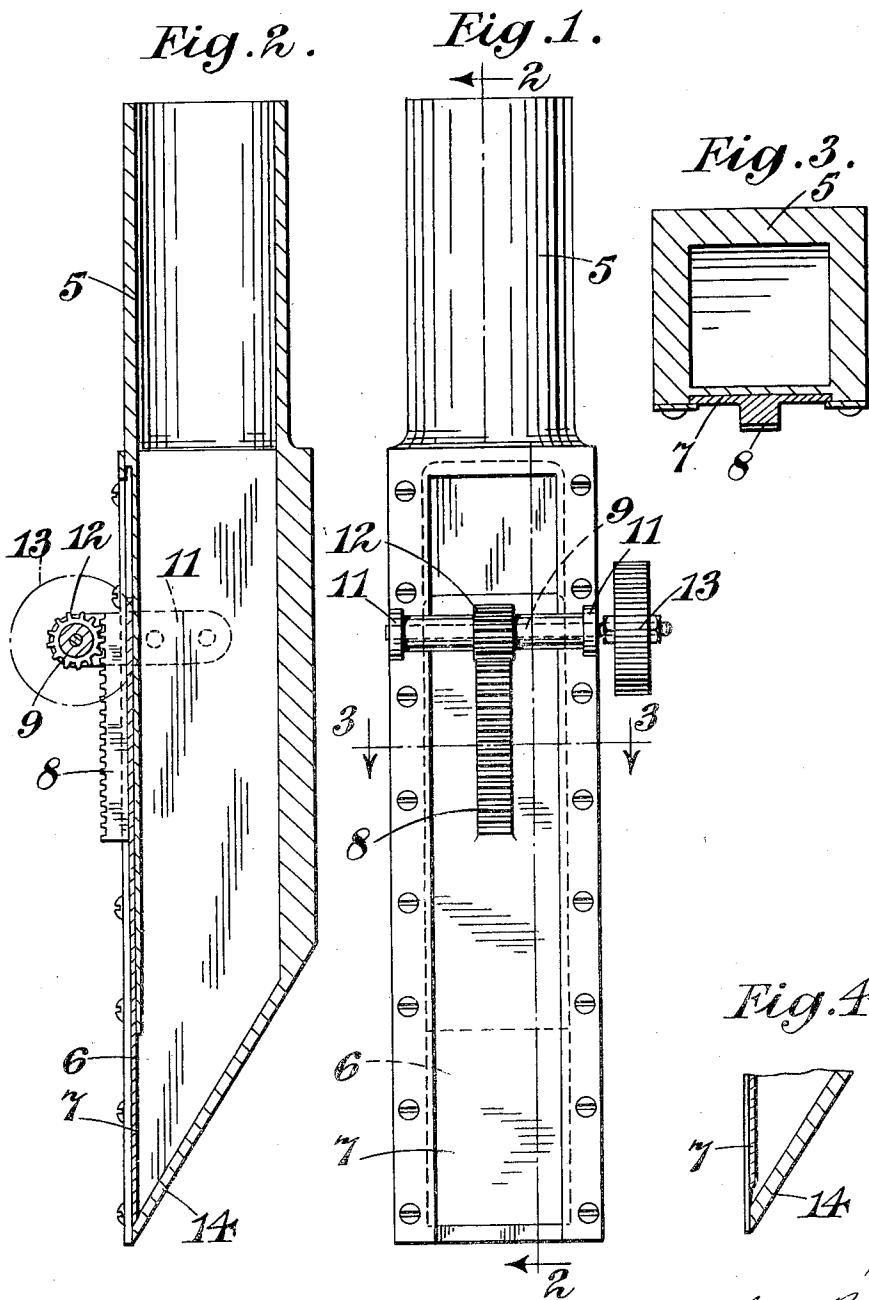
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1,924,010

MACHINE FOR CASTING FILMS OR THE LIKE

Filed Nov. 18, 1931

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 5.

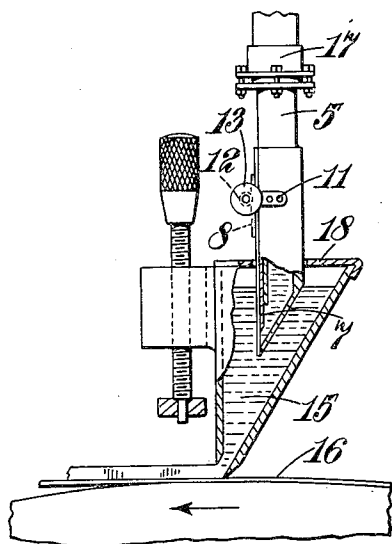
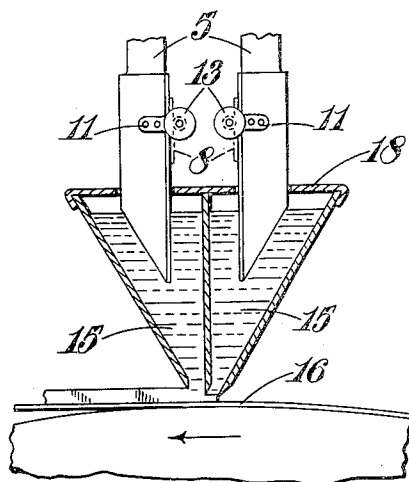


Fig. 6.



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UNITED STATES PATENT OFFICE

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MACHINE FOR CASTING FILMS OR THE
LIKE

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and in Great Britain December 22, 1930

6 Claims. (Cl. 18—15)

This invention comprises improvements in or relating to machines for casting films or the like, especially machines for casting films of compositions containing esters or ethers of cellulose, such as for example as cellulose acetate films.

Such film casting machines generally operate as follows. The dope, i. e. a solution, preferably in a volatile solvent, of the film-forming composition, is spread from a casting box on to a surface; the solvent is then dried off leaving a sheet or film of the composition on the surface, from which it is subsequently removed. The surface is usually constituted by a travelling band or rotating drum, and the evaporation of the solvent may be facilitated by the application of heat to the surface.

The dope is customarily fed to the casting box from storage tanks through pipes provided with control valves to regulate the flow of the dope. These valves are normally located well above the level of the casting box, with the result that it has been found difficult to avoid the formation of air bubbles in the film, which is a very grave disadvantage especially when the film is to be used for photographic purposes. It is the main object of the present invention to provide means whereby this difficulty may be overcome.

This invention provides a machine for casting sheets or films of compositions containing esters or ethers of cellulose, which is characterized by the fact that, during the casting operation the adjustable aperture of the valve controlling the admission of the dope to the casting box is located below the level of the liquid in the casting box.

According to a feature of the invention the control for the valve may be located outside the casting box. Thus, for example, the valve may be a gate valve and may be operable by means of a rack and pinion adjustment located outside the casting box.

In the preferred form of the invention the lower end of the pipe supplying dope from the storage tank to the casting box is adapted to constitute the valve, the valve opening being in the form of a horizontal slot, one edge of which is movable towards and away from the other edge.

By adopting this construction there is no danger of the dope in the pipe line containing air bubbles, as was the case in the prior constructions in which the control valve was located at some point in the pipe line intermediate between the storage tank and the casting box. In that case air pockets were very liable to form below the valve when the latter was opened, with the result that the length of pipe between the valve and the

casting box contained a mixture of dope and air. In the construction according to this invention on the other hand, when the run of film is finished, the valve may be closed and the end of the pipe which forms the valve may be lifted bodily from the casting box.

When it is desired to recommence the run, all that is necessary is to lower the pipe again, so that the valve is submerged in the liquid remaining in the casting box, and then to reopen the valve. No air will then be introduced into the dope, and the run may at once be continued without any film being wasted owing to the presence of air bubbles therein.

Of course, from time to time it may be desirable to empty the pipe line altogether. When this has been done, and it is desired to set the machine in action again, it is only necessary to allow dope to flow through the pipe until all the air is swept out—an operation which is facilitated by employing a pipe line of substantially streamline configuration—to close the valve, to lower the pipe until the valve is submerged in the liquid in the casting box, and then to reopen the valve and proceed with the casting process. It is, of course, to be understood that the small quantity of dope flowing through the pipe during the above-mentioned operation of removing the air from the pipe is not introduced into the casting box.

A practical embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the lower end of the pipe for supplying dope to the casting box of the machine;

Figure 2 is a section along the line 2—2 in Figure 1;

Figure 3 is a section along the line 3—3 in Figure 1;

Figure 4 is a part sectional view showing the valve in the end of the pipe opened;

Figure 5 shows diagrammatically the valve and the lower end of the pipe for supplying dope in position in a casting box; and

Figure 6 shows a further diagrammatical arrangement in which two dope supply pipes are shown in position in a double casting box for casting a film consisting of two layers of different materials.

Like reference numerals indicate like parts throughout the drawings.

The lower portion of the pipe for supplying dope from the storage tank to the casting box is of approximately rectangular section, the end

of the pipe being tapered and having in its front wall a horizontal aperture 6, which constitutes the adjustable aperture of the valve. A vertical plate 7 is located in a recess in the front wall of the pipe, and carries a rack 8.

A spindle 9, supported in bearings 11 on the front wall of the pipe carries a pinion 12, engaging with the rack 8, and a knurled knob 13. By manipulating the knob 13 the plate 7 may be moved towards or away from the inclined end face 14 of the pipe which constitutes the lower edge of the aperture 6.

Figure 2 shows the plate 7 in the position in which it closes the aperture 6 completely. Figure 4 shows the aperture partly open, the plate 7 having been raised by the rack and pinion adjustment.

Figures 5 and 6 show diagrammatically the arrangement of the supply pipe in the casting box. The casting box 15 is arranged for casting film onto a travelling band 16, and the pipe 5 is shown in position ready for casting with the aperture 6 located below the level of the dope in the box. The control knob 13 is located outside the box so that it is easy and convenient to operate the valve during a run, without removing the cover 18. At the upper end of the pipe 5 is provided a telescopic joint 17 so that the valve may be raised and lowered or removed from the box as required.

When it is desired to commence casting film the pipe is filled with dope as described above, its end is introduced below the level of the liquid in the casting box and the valve is opened.

Conveniently, the casting box may be calibrated so that the end of the pipe may be set at the optimum level for casting different thicknesses of film.

I claim:

1. The combination with the casting box of a film-casting machine, of a supply tank to contain dope, a conduit communicating between the supply tank and the casting box and having an outlet extremity extending within the latter, and a valve for controlling the admission of dope from the conduit to the casting box located at the outlet extremity of the conduit so as to prevent the trapping by the dope supply of air in said conduit and control valve.

2. The combination with the casting box of a film-casting machine, of a supply tank to contain dope, a conduit communicating between the supply tank and the casting box, a valve for controlling the admission of the dope from the conduit to the casting box comprising relatively movable walls defining a horizontal slot at the

outlet extremity of the conduit so as to prevent the trapping by the dope supply of air in said conduit and control valve, and means to move one wall of the slot towards and away from the other wall thereof.

3. The combination with the casting box of a film-casting machine, of a supply tank to contain dope, a conduit communicating between the supply tank and the casting box and having an outlet extremity extending within the latter, a valve for controlling the admission of dope from the conduit to the casting box located at the outlet extremity of the conduit so as to prevent the trapping by the dope supply of air in said conduit and control valve, and a control for the valve located outside the casting box.

4. The combination with the casting box of a film-casting machine, of a supply tank to contain dope, a conduit communicating between the supply tank and the casting box, a valve for controlling the admission of the dope from the conduit to the casting box comprising relatively movable walls defining a horizontal slot at the outlet extremity of the conduit so as to prevent the trapping by the dope supply of air in said conduit and control valve, means to move one wall of the slot towards and away from the other wall thereof, and a control for said means located outside the casting box.

5. The combination with the casting box of a film-casting machine, of a supply tank to contain dope, a conduit communicating between the supply tank and the casting box, a valve for controlling the admission of the dope from the conduit to the casting box, said conduit being tapered to form a horizontal slot at the outlet extremity of the conduit so as to prevent the trapping by the dope supply of air in said conduit and control valve, and a rack and pinion adjustment for moving one wall of the slot towards and away from the other wall thereof.

6. The combination with the casting box of a film-casting machine, of a supply tank to contain dope, a conduit communicating between the supply tank and the casting box, a valve for controlling the admission of the dope from the conduit to the casting box, said conduit being tapered to form a horizontal slot at the outlet extremity of the conduit so as to prevent the trapping by the dope supply of air in said conduit and control valve, a rack and pinion adjustment means for moving one wall of the slot towards and away from the other wall thereof, and a control for the rack and pinion located outside the casting box.

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