July 21, 1959 H. P. FRY, JR 2,895,165

RADIUS BAR LINKAGE

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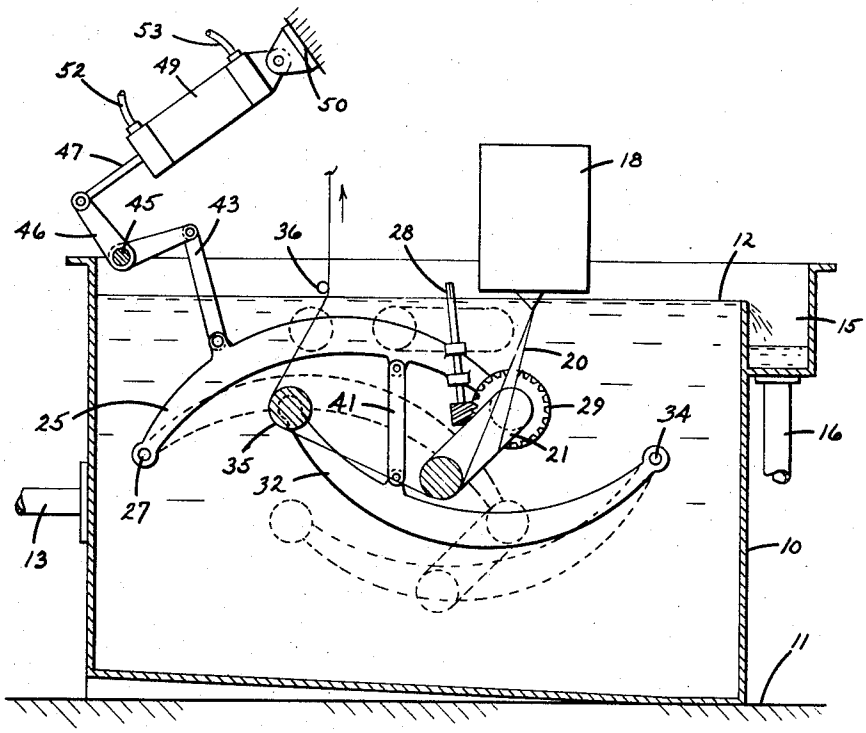


Fig. 1

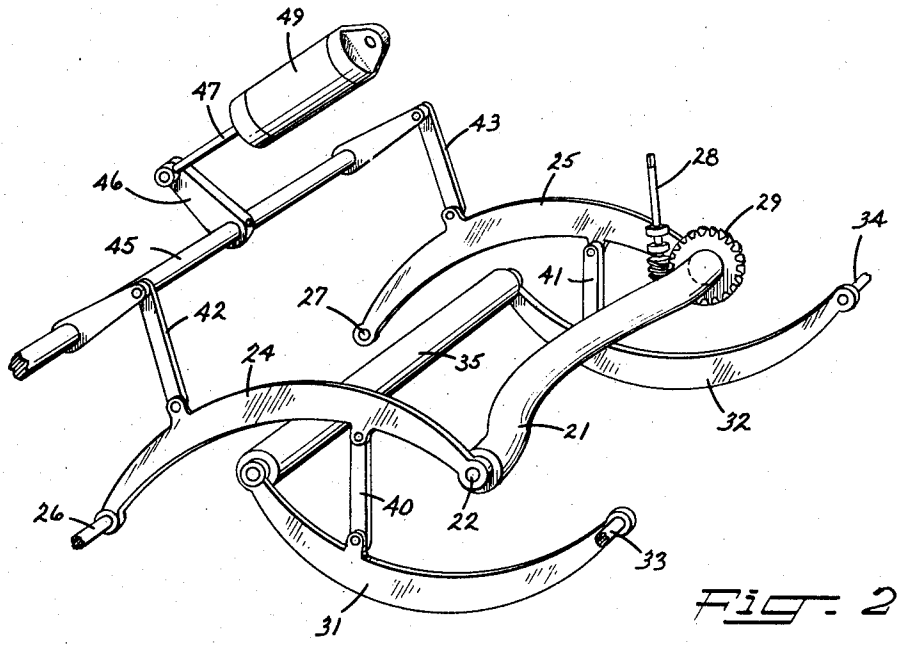


Fig. 2

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RADIUS BAR LINKAGE

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This invention is directed to an improved means for threading a freshly extruded film through spreader bars of a coagulation bath. More specifically it is directed to an improved means for raising to the surface of an acid casting tank the spreader bars employed in the extrusion of a cellophane film.

In manufacturing regenerated cellulose films, viscose is forced through a nozzle having an elongated orifice, beneath the surface of an acidic coagulating bath. From this bath, it is led in the form of a thin, continuous film through several subsequent operations including additional coagulating and regeneration, purification, finishing and drying, after which it is finally obtained in the form of a glass-clear, smooth, thin, non-porous, flexible film of regenerated cellulose.

Under present practice freshly coagulated viscose cellophane is pulled around a curved bar as it passes from the lips of the casting nozzle through the bath to a rotating roll above the surface of the bath. The purpose of this curved bar, known as a radius bar, is to cause the sheet to spread outward, increasing its width or conversely retarding shrinkage and, secondly, for smoothing out wrinkles. There are sufficient gas bubbles on the surface of the sheet to act as a lubricant so that this means can be utilized. The usual practice is to have the radius bar about eight inches below the lips of the nozzle. This depth is dictated by the distance that a man with bare arms can reach into the casting bath in order to grip the newborn sheet and get it threaded or laced under the radius bar, a second straight bar, and on up to the rotating roll. The radius bar is mounted on pivots so that it can be rotated and thus change the relationship of the bar's curvature to the path of the sheet. This enables the operator to control the final width of the sheet.

The disadvantage of this arrangement is that the depth of immersion of the bars in the coagulating bath is limited by the depth to which a worker can reach into the bath to get the newly cast film started around the bars. More efficient use of the space in the tank would result if the bars could be set lower in the path, but then they would be beyond the operator's reach. Hence the efficiency of the system could be improved if a means could be devised which would permit the bars to be set deep in the tank during production and yet brought within the operator's reach when the film is first threaded through. Deeper immersion could advantageously be combined with higher bath temperatures and higher spinning speed.

Hence, an object of this invention is to provide means for bringing the radius bar up close to the surface of the casting liquid during threading or lacing so that it is more readily reached, thus permitting the use of higher casting bath temperatures.

A further object is to provide means to lower the radius bar to a depth greater than that permitted by the present practice, thus permitting more coagulating time between the lip of the nozzle and contact with the radius bar. This increased depth would make higher spinning speeds possible.

The present invention meets the objects of the invention by providing a linkage mechanism which permits the spreader bars to be pulled up to the surface of the casting tank during lacing up of the film, and also permits them to be lowered deep into the acid during use.

Referring to the drawings, Figure 1 is a longitudinal vertical section through the casting tank with the radius bar linkage mechanism of this invention in place and Figure 2 is a perspective view of the bars and linkage mechanism shown in Figure 1.

Referring to Figure 1 reference character **10** denotes a casting tank **10** set on a floor or base **11** and filled with an acidic coagulating or casting solution or both to the level **12**. A stream of fresh solution is continuously admitted to the tank through line **13** and used solution withdrawn at the same rate into an overflow trough **15** and into a drain pipe **16**. Viscose solution is extruded through an orifice at the base of casting nozzle **18** and is immediately coagulated as a film **20** which is advanced under a guide member or radius bar **21**, over to and under a straight bar **35**, and then up past a wiper bar **36** and onto a driven rotating roll (not shown). It is the latter roll which pulls the film **20** through the bath. The function of wiper bar **36** is to wipe surface liquid from the film as it leaves the bath. Radius bar **21** is mounted on pivots **22** at the outer end of two crescent-shaped beams **24, 25** which are pivotably mounted at their other ends on lugs **26, 27** on the inside surface of the casting tank. The radius bar **21** is rotated about its pivots by means of a worm and worm gear set **28, 29** which is mounted on beam **25**. The stem of the worm **28** is long enough that it at all times extends above the coagulating bath where it can be turned so that the radius bar **21** can be rotated at the maximum depth of immersion.

A second set of crescent-shaped beams **31, 32** is pivotably mounted on the side walls of the tank by pins **33, 34** with a straight but fixed bar **35** extending between them at one end. Tie links **40, 41** are provided between the beams on each side so that when one beam is moved the other is pulled with it. Beams **24, 25** are connected by links **42, 43** to a shaft **45** which is journalled at its ends into the tank wall. Shaft **45** is rotated through a connecting rod **46** by a piston rod **47** which moves within a hydraulic cylinder **49** mounted on the outside of the machine frame to a fixed mounting **50**. The hydraulic cylinder is controlled by a valve that is turned by the machine operator to pump fluid in or out through lines **52, 53**. It is evident that cylinder **49** with piston rod **47** and connecting rod **46** could be positioned at any point along arm **45**. For example they could be placed at one end of arm **45** so as to be outside of tank **10**.

When the machine is ready to be threaded the operator causes fluid to be pumped into the cylinder **49** to raise the beams **24, 25** and **31, 32**. This will raise the radius bar **21** and its companion fixed bar **35** through a substantially vertical path to substantially the same degree so that they are both close to the surface **12** of the casting bath. The operator then starts the sheet under the radius bar **21** and the bar **35**, up over the wiper bar **36**, and around the upper roll (not shown). The radius bar in the upper dotted position of Figure 1 has been rotated so that its plane of curvature is horizontal, thus bringing all portions close to the surface. Once the machine is threaded, the beams are lowered to the desired depth.

Since it is possible to immerse the radius bar into the spin bath below the operator's reach by means of the present invention it is now possible to make greater use

of the coagulating bath, to operate at acid temperatures which would be beyond the human endurance of an operator who previously had to reach into the bath and to run at higher spinning speeds as a result of these factors.

It is evident that various changes could be made in the apparatus without departing from the principles of the invention.

I claim:

1. In an apparatus for the manufacture of film by the extrusion of film-forming solution into a coagulating bath, the combination comprising a container for the coagulating bath, a nozzle adjacent to said container for extruding film-forming solution into the bath, a curved guide member and a straight bar immersed in the bath in spaced-apart relationship, the freshly extruded film being drawn under said guide member and bar before it is removed from the bath, an elevating means for raising said guide member and straight bar as a unit to the surface of the bath to permit initial lacing of the film thereover, said elevating means including a first pair of arms holding the ends of the curved guide member, a second pair of arms holding the ends of the straight bar, each pair of arms being rotatably mounted on the walls of said container, a direct mechanical linkage connecting the two sets of arms, and a lever positioned above the bath and connected to one of said pair of arms, whereby movement of said lever determines the elevation of the guide member and bar in the bath.

2. In a combination comprising a casting tank containing an acidic coagulating solution and an extrusion

nozzle mounted above said tank so as to continuously extrude a sheet of viscose into said coagulating solution, a guide member and a bar positioned in said tank below said nozzle and extending transversely across the path of the sheet, said guide member being spaced from the bar and being bowed at its center so as to spread the film passing over it, a first set of arcuate arms connected at one end to the ends of said guide member and pivotably supported at the other end by the side walls of the casting tank below the surface of the bath, a second set of arcuate arms connected at one end to the ends of the said bar and at the other end pivotably mounted on the side walls of the tank below the bath surface, a direct mechanical linkage between said two sets of arms, a fixed shaft extending between one set of said arms and connected thereto, and means for rotating said shaft when the guide member and bar are to be raised to the surface of the bath, the rotation of said shaft serving to raise as a unit the two sets of arms and the bar and guide member held thereby.

References Cited in the file of this patent

UNITED STATES PATENTS

1,942,990	Voss	Jan. 9, 1934
2,311,755	Hutchinson	Feb. 23, 1943

FOREIGN PATENTS

520,430	Canada	Jan. 3, 1956
385,783	Great Britain	Jan. 5, 1933