July 10, 1928. 1,676,363

LE ROY SEIDELL ET AL

IMPREGNATING MACHINE AND PROCESS

Filed April 25, 1924 2 Sheets-Sheet 1

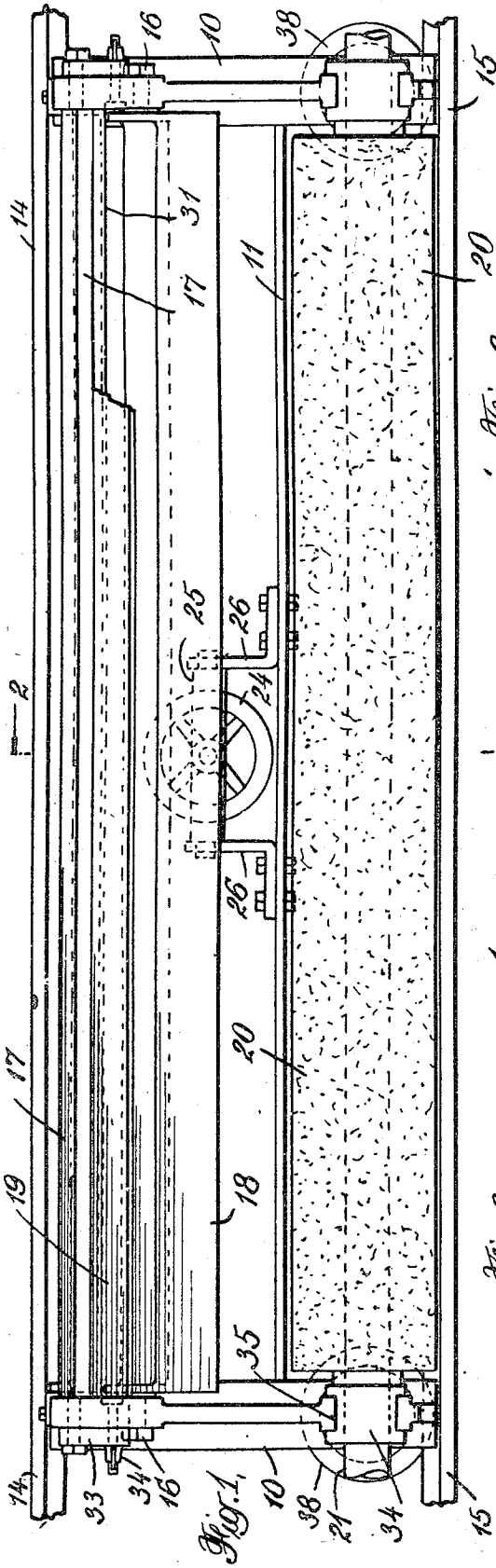


Fig. 1.

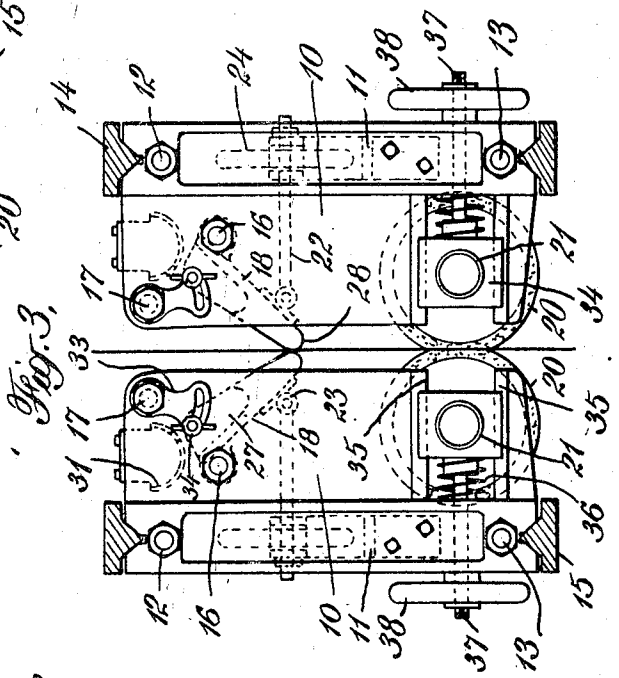


Fig. 3.

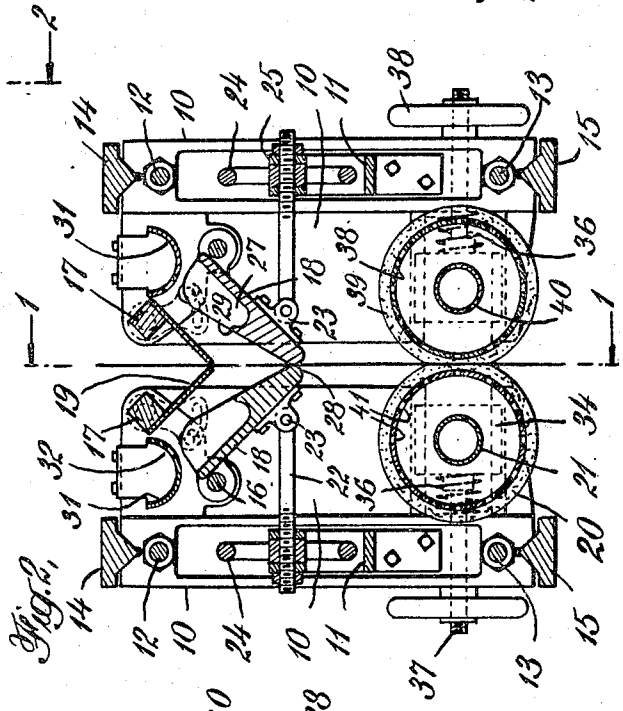


Fig. 2.

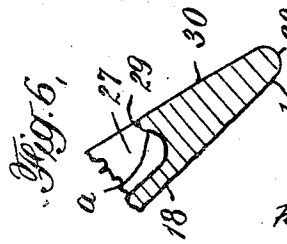


Fig. 6.

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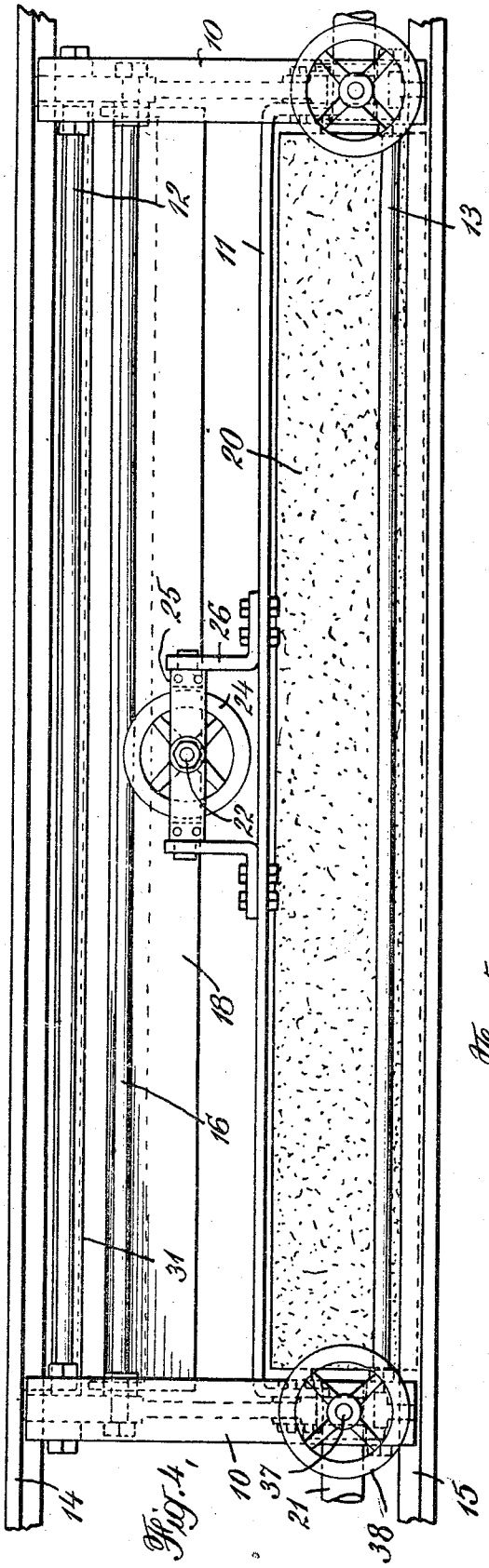


Fig. 4.

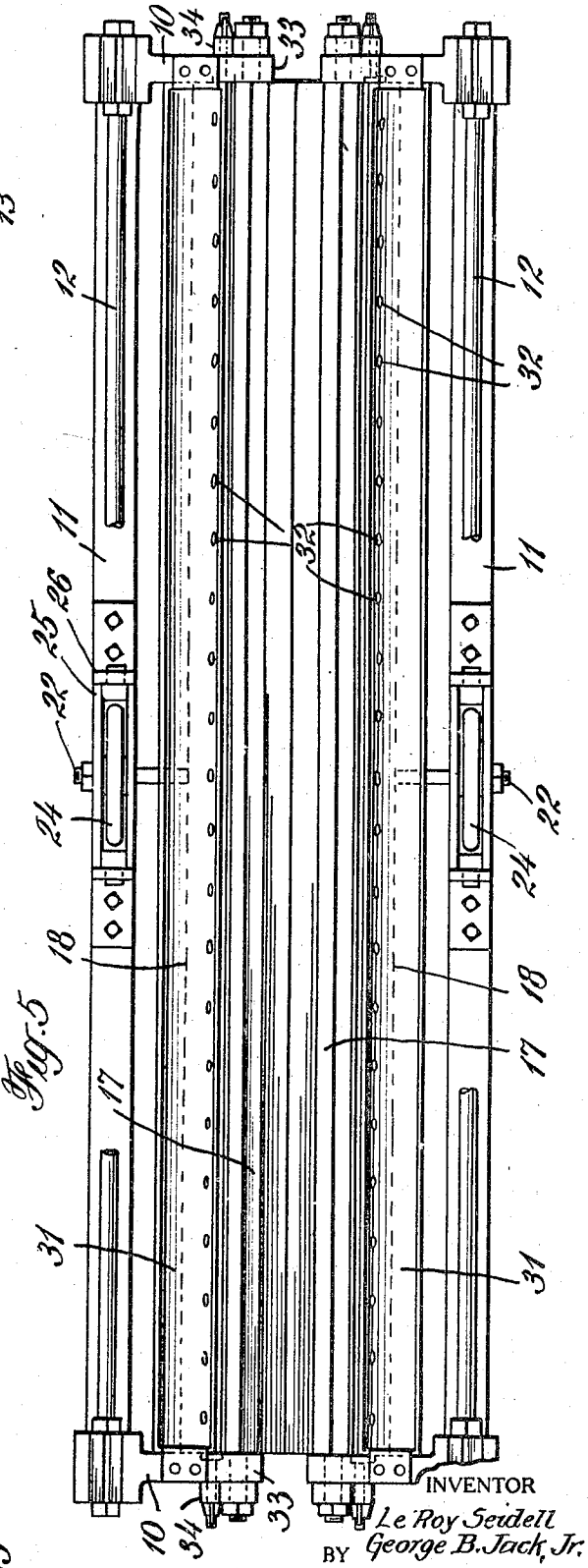


Fig. 5.

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UNITED STATES PATENT OFFICE.

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IMPREGNATING MACHINE AND PROCESS.

Application filed April 25, 1924. Serial No. 708,875.

This invention relates to an improved machine and process for impregnating fabrics with liquids such as dispersions of pyroxylin and celluloid in volatile solvents.

Among the objects of the invention is the provision of an improved machine and process for uniformly impregnating throughout fabrics and the like with the production of uniform and unmarred surfaces of the same structure and appearance on both sides of the treated material in a simple and direct operation. The invention also includes an improved knife member adapted for general use in the impregnation and treatment of fabrics with liquids. Other and further objects will appear as the description proceeds.

In the improved machine of the invention and in carrying out the process of the invention, the fabric undergoing treatment is moved upwardly through a trough formed of inclined knives contacting at their lower edges with opposite surfaces of the fabric, and the impregnating solution is distributed over and through the fabric within the trough and across the upper faces of the inclined knives. The knives forming the trough are provided with a longitudinal recess in the upper face arranged away from the lower edge which contacts with the fabric and generally parallel thereto. The impregnating solution is discharged into this recess, from which it overflows over the upper face of the knives between the recess and the lower edge, onto and through the fabric passing across the lower edge. Arrangements are also provided for impregnating the fabric with a pretreating liquid before it passes through the impregnating trough and for removing any excess impregnating liquid after it passes through the impregnating trough.

In the preferred form of the machine of the invention, the elements of the machine contacting with the fabric undergoing treatment are arranged in pairs, each element being adapted for supporting the fabric against the opposite element, and the pairs of elements are arranged in superposed relation, whereby the fabric undergoing treatment is kept free from contact with other edges or surfaces on both sides. The elements on each side of the path of the fabric are supported in separate frames, and provision is made for supporting the opposite frames in correct relation against the opposite sides of the fabric passing through the machine. Adjustments are also provided for maintaining the proper relation between the elements of each pair and the fabric.

The improved knife member of the invention is of general application, and is adapted for use in the treatment of both sides of the fabric or of only one side of the fabric. Where the improved knife is employed in treating one side of the fabric, the fabric is supported against the lower edge of the knife by means of a table or other suitable support, and the impregnating liquid is distributed over the surface of the fabric contacting with the knife and flowing over the upper face of the knife to the edge as it overflows from the recess. The fabric may be passed horizontally under the lower edge of the knife, either in a direction toward the back face of the knife or toward the face over which the impregnating liquid is flowing. Where the fabric is passed in a direction toward the face of the knife over which the impregnating liquid is flowing, the knife also assists in removing excess liquid from the fabric.

The invention will be further described in connection with the accompanying drawings illustrating a machine embodying the invention and adapted for carrying out the process of the invention, but it will be understood that this specific illustration and the following description are for the purpose of exemplification and that the invention is not limited thereto.

In the accompanying drawings:

Fig. 1 represents a machine embodying the invention in vertical section on line 1—1 of Fig. 2,

Fig. 2 is a vertical section on line 2—2 of Fig. 1,

Fig. 3 is an end view of the machine shown in Fig. 1,

Fig. 4 is a side view of the machine shown in Fig. 1,

Fig. 5 is a top view of the machine shown in Fig. 1, and

Fig. 6 is an enlarged detail in section of a fragment of a knife embodying the invention.

Referring to the drawings, the end frames 10 are connected and spaced by the space bars 11 and the space rods 12 and 13, and

are supported by the rails 14 and 15 forming guideways at the upper and lower ends of the end frames 10. The opposite pairs of guideways are parallel and are adapted to support the frames formed by the end frames and the space rods and bars in alignment on opposite sides of the path of the fabric through the machine. Each pair of end frames are also connected by the rods or bars 16 and 17. Knives 18 are supported between the end frames on rods 16 and scrapers 19 are supported between the end frames on the bars 17. Hollow rollers 20 are supported on hollow shafts 21 journalled in slides carried by ways in the frame.

The knives 18, forming the impregnating trough, are rotatably mounted on the rods 16 and are adapted to be supported against fabric passing through the trough by knuckle shafts 22 pivoted in the knuckle bases 23 on the knives. The knuckle shafts are threaded in hand wheels 24 supported against end plates 25 carried by angle members 26 on the space bars 11. By rotation of the hand wheels 24, the knives 18 are adjusted with respect to fabric passing therebetween.

A recess 27 is provided in the upper faces of the knives 18 spaced away from the lower edges 28 and having the edge of the recess 29 in the upper face of the knife parallel to the lower edge 28 of the knife. The faces 30 of the knives 18 between the edge of the recess 29 and the lower edge of the knife 28 and for a short distance on each side thereof are ground and polished. As shown in Fig. 6, the surface of the knife is ground and polished between the points *a* and *b*. Feed troughs 31 are supported between end frames 10 and have a series of apertures 32 in the lower part thereof arranged above and adapted for discharge into the recesses 27 in the knives 18.

The scrapers 19, preferably of glass, are fastened to the scraper bars 17. The scraper bars 17 are rotatably mounted in the end frames 10 and adjustment of the scrapers is provided by adjusting arms 33 rigidly connected to the scraper bars. The scrapers are locked in position by wing nuts 34 on studs passing through slots in the adjusting arms. The lower edges of the scrapers 19 are ground and polished.

The hollow shafts 21, supporting the rollers 20, are journalled in roller slides 34 which are supported in ways 35 in the lower part of the end frames 10. Springs 36 are positioned about slide bars 37 between the roller slides and the end of the ways 35 thereby tending to force the rollers toward the path of the fabric. Hand wheels 38 are threaded on the outer ends of the slide bars 37 and are supported against the end frames at the point at which the slide bars pass therethrough. By rotation of the hand wheels 38, the limit to which the rollers 20 can be moved by the springs 36 is adjusted. The rollers 20 comprise a perforate cylinder 38 covered with resilient porous material such as felt as shown at 39. Pretreating liquid is supplied to the hollow shafts 21 (through connections not shown), passes through perforations 40 in the hollow shafts to the interior of the cylinders 38, and is distributed through the layer of porous material covering the roller through perforations 41.

In operation, the fabric to be treated is passed upwardly in succession between the pairs of rollers, knives and scrapers, and the impregnating liquid is supplied to the troughs 31 and the pretreating liquid to the hollow shafts 21. The impregnating liquid may be supplied to the feed troughs from any suitable tank or supply receptacle through a pipe discharging into the trough, or preferably, through a pipe having a series of outlets along the feed troughs. In passing between the rollers 20, the fabric is thoroughly impregnated with the pretreating liquid with which the porous covering of the rollers is saturated. The fabric then passes between the lower edges of the knives 18 forming the impregnating trough. The impregnating liquid is discharged and distributed into the recesses 27 in the knives 18 through the apertures in the feed troughs and forms a puddle in the recesses which overflows the edge 29 of the recess. The overflowing liquid flows in a film across the polished faces of the knives toward the lower edges where it contacts with and uniformly impregnates the fabric passing between the lower edges. Excess liquid is removed from the fabric as it passes between the scrapers 19 after leaving the impregnating trough.

In the impregnating trough, the impregnating liquid overflows from the puddles formed in the recesses in the knives in the form of a thin film. This film becomes substantially uniform in flowing across the polished face of the knife. The puddle in the recess also assists in maintaining the distribution of impregnating liquid uniform. The upwardly moving fabric is thus contacted, simultaneously, on both surfaces with a substantially uniform film moving in a downwardly direction toward the fabric.

Where the pretreating liquid or the impregnating liquid comprise valuable volatile components, the impregnating machine is enclosed in a housing connected to suitable recovery apparatus through which the vapors are withdrawn for the recovery of such components.

While the improved machine of the invention is of general application, it is of special value and application in connection with the process described in an application

filed February 25th, 1924, Serial No. 695,039, for the treatment of fabric with thin solutions of low viscosity containing cellulose esters. For example, the impregnating liquid, supplied to the feed troughs 31, may comprise a solution in a mixed solvent, such as a mixture of alcohol, benzol, and ethyl acetate, or a mixture of alcohol and benzol with acetone or ether, of cellulose nitrate or cellulose acetate together with camphor. The pretreating liquid, supplied to the hollow shafts 21, may comprise the solvent mixture employed in the impregnating liquid. The improved impregnating machine of the invention is also useful in the treatment of other material in sheet form such as paper and the like.

It will thus be seen that this invention provides an improved machine and process for impregnating fabrics in which the fabric undergoing treatment is thoroughly and uniformly impregnated throughout and with simultaneous treatment of both surfaces of the fabric. In the improved machine, both surfaces of the fabric are uniformly treated and neither surface is subjected to prolonged contact with any of the elements of the machine. After impregnation in the machine, the surfaces of the fabric are contacted only with the scrapers for removing excess liquid.

It will further be seen that the invention provides an improved knife which is particularly effective in accomplishing a uniform distribution of liquid over the fabric undergoing treatment.

We claim:

1. An improved knife adapted for use in impregnating machines, having a lower edge adapted to contact with the material treated and a recess adapted to contain a puddle of treating liquid in one face of the knife arranged away from the lower edge and substantially parallel thereto.

2. In an impregnating machine, an inclined knife having a lower edge adapted to contact with the material treated and a recess in the upper face thereof arranged away from the said edge and substantially parallel thereto, means for supplying liquid to the recess, and means for supporting the material treated against the said lower edge of the knife.

3. In an impregnating machine, a trough comprising a pair of oppositely arranged inclined knives in aligned relation, said knives having lower edges adapted for contact with opposite sides of the material treated and having recesses in their upper faces within the trough arranged away from the said edges and substantially parallel thereto, and means for supporting the said lower edges against the material treated.

4. A method of impregnating which comprises forming two films of impregnating liquid, bringing said films in contact with opposite sides of the material to be treated, and moving the material past said films in a direction contrary to the direction of motion of said films.

5. A method of impregnating which comprises forming a film of impregnating liquid, bringing said film in contact with the material to be treated, and moving the material past said film in a direction contrary to the direction of motion of said film.

6. A method of impregnating which comprises forming two substantially uniform downwardly flowing films of impregnating liquid, simultaneously bringing said films in contact with opposite sides of the material to be treated and moving the material upwardly past said films.

In testimony whereof we affix our signatures.

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GEORGE B. JACK, JR.