

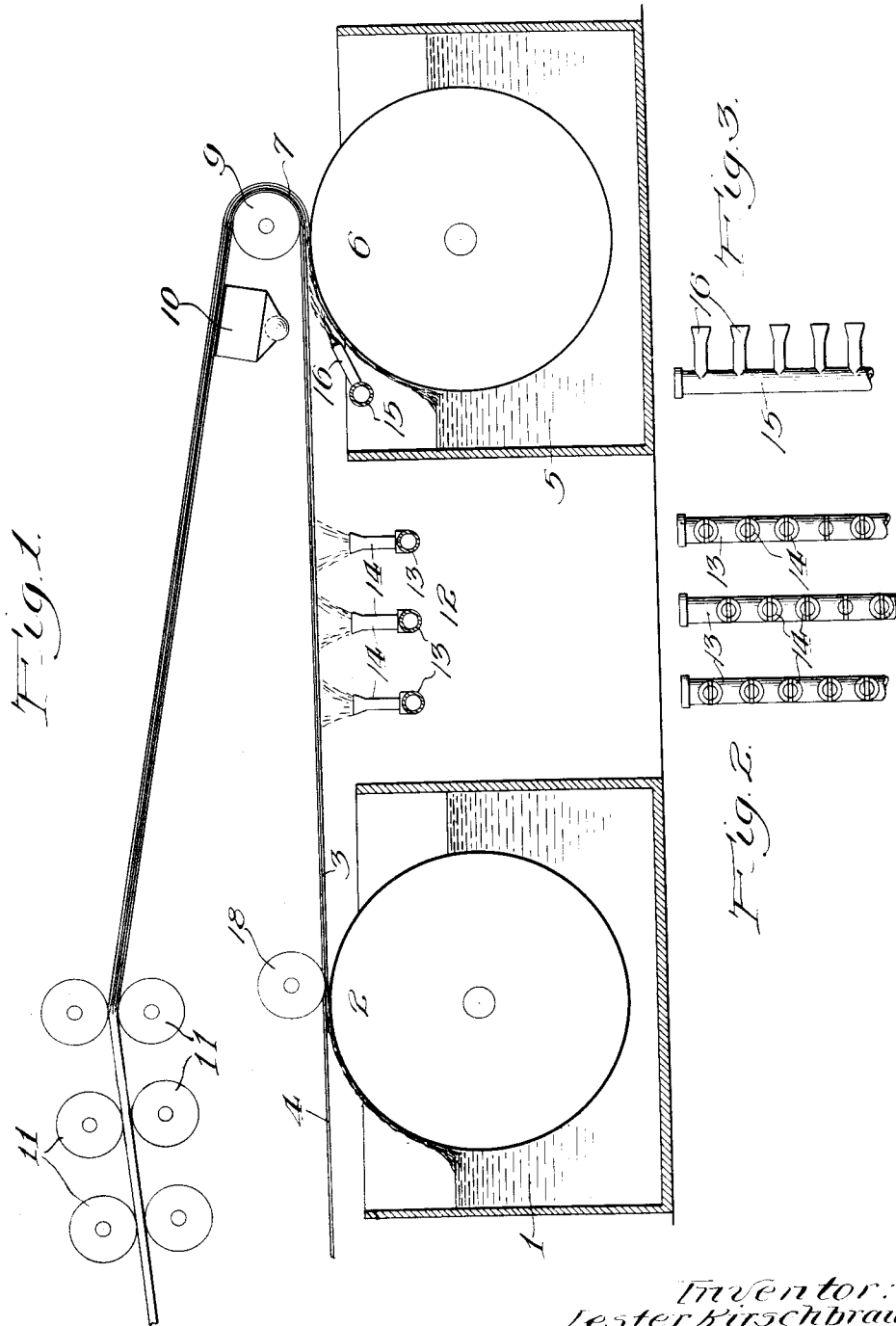
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APPARATUS FOR MAKING PAPER

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## UNITED STATES PATENT OFFICE.

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## APPARATUS FOR MAKING PAPER.

Original application filed November 4, 1921, Serial No. 512 808. Patent No. 1,526,522, dated February 17, 1925. Divided and this application filed January 12, 1925, Serial No. 2,039. Renewed March 26, 1928.

This invention relates to improvements in apparatus for making paper, and refers more particularly to an apparatus specifically designed for the rapid production of a water-proof or moisture-proof paper such for example, as is desired in the manufacture of air-tight or moisture-tight containers.

This application is a division of application Serial No. 512,808 filed on November 4th, 1921, issued February 17th, 1925, No. 1,526,522.

I have heretofore invented numerous improvements in the art of waterproofing paper, in which an asphaltic or bituminous medium is incorporated in the fibrous stock as the stock is being formed into a web on the usual types of paper-forming machinery. This is accomplished by forming the asphalt into a non-adhesive emulsion of asphalt and water, in which the water forms the external and the asphalt the internal phases respectively of the emulsion.

The present invention is not directed specifically to the manner of forming the emulsion in question.

While by means of my prior processes above referred to I have produce waterproof paper which is impervious against water in a liquid phase, there has been more or less tendency for moisture in the form of vapor-laden air to pass through the paper.

The object of the present invention is to provide a novel apparatus for preventing this. It is a further object of the invention to accomplish this result in such a way as to be able to use the usual multi-cylinder machine for making paper in carrying out the process, with such additions as form the novel feature of the present apparatus.

In the present invention, I produce a continuous asphaltic film which is devoid or substantially devoid of any pores through which air can pass.

I have stated that the invention is carried out by making a non-adhesive emulsion of asphalt, clay and water, but an invention can be carried out utilizing my basic idea in which instead of clay and asphalt, other emulsifying agents, as for example soaps, casein, sulphonic acid, salts or other agents may be used, and instead of asphalt other forms of bitumens, hydrocarbons or pitchy material may be used all possessing waterproofing qualities. An invention may be carried out using this basic idea in which

the waterproofing constituent may perhaps not necessarily be in a non-adhesive form so long as it is not brought directly into contact with any of the elements of the paper machine which would tend to gum up or interfere with the paper forming operation.

To more clearly understand the invention, I have drawn the accompanying drawing, in which Fig. 1 is a somewhat diagrammatic view of a part of a multi-cylinder paper machine, equipped with my invention.

Figs. 2 and 3 are diagrammatic plans of the spraying apparatus, by which the asphalt is applied to the fibrous web.

Referring to the drawings, 1 designates a vat containing cylinder mould 2, on which is formed the fibrous web 3, carried by the underside of the blanket 4. 5 designates a second vat, containing the cylinder mould 6, on which is formed a second web 7. 8 and 9 designate couch rolls, 10 the suction box, and 11 a series of press rolls, with which the usual multi-cylinder machine is equipped.

Between the vats 1 and 5 is interposed a spraying device designated as a whole 12, consisting of a series of transversely disposed headers 13, each equipped with a plurality of upwardly extending atomizing nozzles 14. The spraying device is equipped with suitably controlled valves (not shown), whereby any one or more of the manifold nozzles may be used independently of the other.

Above the vat 5 is suitably mounted a transversely disposed manifold 15, containing a plurality of atomizing nozzles 16, the nozzles being inclined upwardly so as to project the waterproofing material into the nip between the incoming ply and the cylinder mould.

By means of the apparatus shown, the emulsion may be sprayed either through the nozzles 14 across the entire face of the sheet so as to produce a continuous film of any desired thickness, which film is substantially pure bitumen in emulsified form free from a fibre. Also, if desired, a bituminous film may be formed by forcing the non-adhesive emulsion through the nozzles 16; or, if desired, either the nozzles 16 or the nozzles 14 may be used alone.

In order to facilitate the retention of the asphalt and to avoid interference with the formation and couching of the sheet, it is desirable to carry the suction in the cylinder moulds as low as possible to produce the dry-

est web capable of retaining the emulsion without disturbance.

I have described the formation of two fibrous webs formed of paper stock only united by a continuous film of non-porous bitumen. However, in some cases it may be desirable to make the webs themselves of bituminous stock, which may be accomplished by mixing the non-adhesive emulsion with the pulp in each vat and between the webs formed of such stock interpose the film of bitumen by means of the spraying devices heretofore described. By using bituminous stock in this manner, the sprayed film of bitumen need not be so heavy, as the absorption of the bitumen into the paper plies is lessened on account of the presence of the bituminous stock.

I claim as my invention:

1. In an apparatus for producing a waterproof multi-ply fibrous sheet, the combination with spaced fibrous pulp vats, of cylinder molds adapted to be rotated therein, and adapted to have suction applied thereto to cause a layer of fibrous pulp solution to felt on the surfaces thereof, a continuous flexible web contacting and removing the felted layers from successive molds, and spraying means interposed between designated molds adapted to project waterproofing medium on the surface of predetermined fibrous plies.

2. In an apparatus for producing a waterproof multi-ply fibrous sheet, the combination with spaced fibrous pulp vats, of cylinder molds adapted to be rotated therein, and adapted to have suction applied thereto to cause a layer of fibrous pulp solution to felt on the surfaces thereof, a continuous flexible web contacting and removing the felted layers from successive molds, and liquid spraying means interposed between designated molds adapted to project liquid waterproofing medium on the surface of predetermined fibrous plies.

3. In an apparatus for producing a waterproof multi-ply fibrous sheet, the combination with spaced fibrous pulp vats, of cylinder molds adapted to be rotated therein, and

adapted to have suction applied thereto to cause a layer of fibrous pulp solution to felt on the surfaces thereof, a continuous flexible web contacting and removing the felted layers from successive molds, and a waterproofing-medium-projector positioned between designated cylinder molds.

4. In an apparatus for producing a waterproof multi-ply fibrous sheet, the combination with spaced fibrous pulp vats, of cylinder molds adapted to be rotated therein, and adapted to have suction applied thereto to cause a layer of fibrous pulp solution to felt on the surfaces thereof, a continuous flexible web contacting and removing the felted layers from successive molds, and a waterproofing-medium-projector positioned between designated cylinder molds, comprising upwardly projecting sprays.

5. In an apparatus for producing a waterproof multi-ply fibrous sheet, the combination with spaced fibrous pulp vats, of cylinder molds adapted to be rotated therein, and adapted to have suction applied thereto to cause a layer of fibrous pulp solution to felt on the surfaces thereof, a continuous flexible web contacting and removing the felted layers from successive molds, and a waterproofing-medium-projector positioned between designated cylinder molds, comprising upwardly projecting sprays arranged substantially transversely of the fibrous sheet.

6. In an apparatus for producing a waterproof multi-ply fibrous sheet, the combination with spaced fibrous pulp vats, of cylinder molds, adapted to be rotated therein, and adapted to have suction applied thereto to cause a layer of fibrous pulp solution to felt on the surfaces thereof, a continuous flexible web contacting and removing the felted layers from successive molds, and spraying means interposed between designated molds adapted to project waterproofing medium on the surface of predetermined fibrous plies, and means for pressing the plies together to form a sheet and means for drying the pressed sheet.

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