March 9, 1937. R. A. HAYWARD 2,073,208

PAPER WAXING APPARATUS

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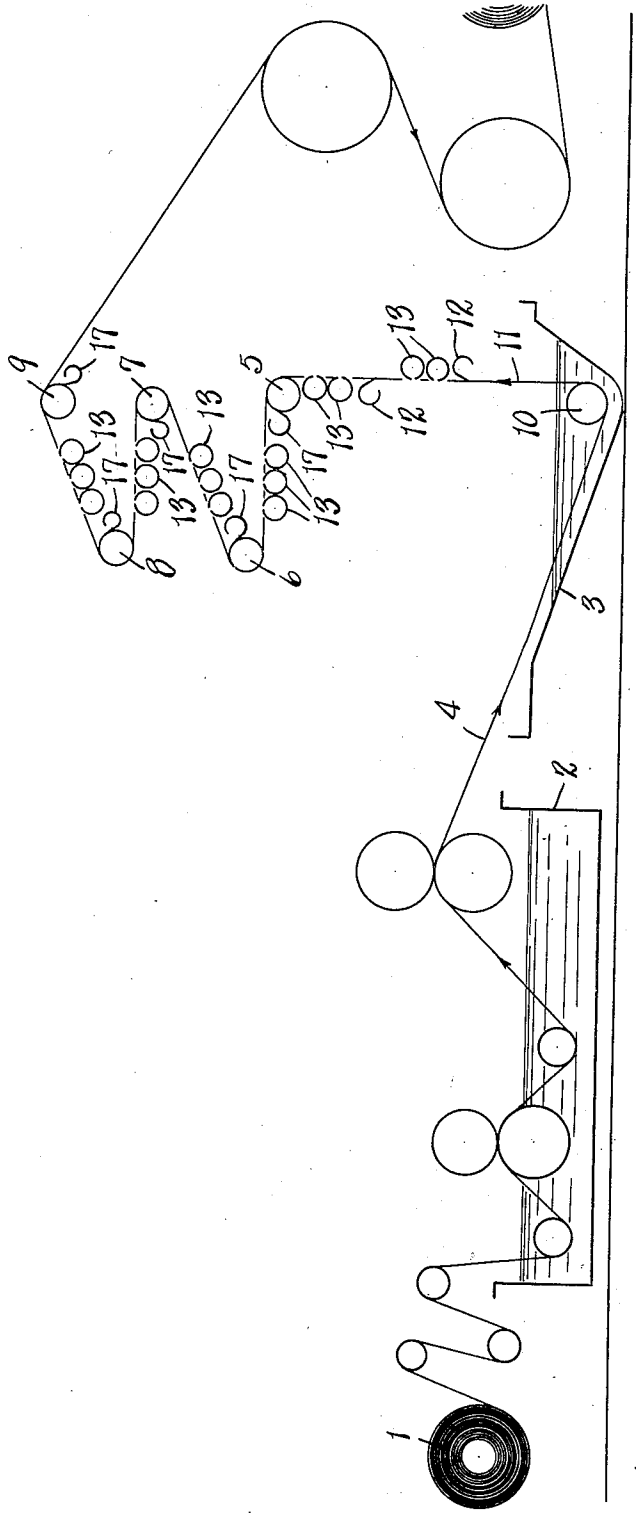


Fig. 1

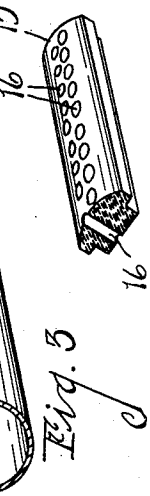


Fig. 3

Fig. 4

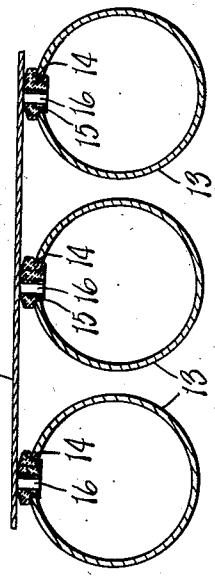


Fig. 2

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PAPER WAXING APPARATUS

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18 Claims. (Cl. 34—48)

The main objects of this invention are:

First, to provide in a waxing machine an improved means for removing water from the waxed web of paper which is highly efficient.

Second, to provide in a waxing machine an improved means for removing water from the web of waxed paper which permits the web being operated at very high speed, thereby greatly increasing the capacity of the waxing apparatus.

Third, to provide an apparatus having these advantages which is very simple and compact.

Fourth, to provide an improved method of removing water from waxed paper and the like.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary diagrammatic view of my improved waxing machine, the parts being shown conventionally for convenience in illustration.

Fig. 2 is an enlarged transverse section through a group of the suction pipes.

Fig. 3 is a fragmentary perspective view of a suction pipe with its suction nozzle or face removed.

Fig. 4 is an enlarged fragmentary perspective view of one of the suction nozzles or faces.

In the process of coating waxed paper for high-gloss wrappers and the like, the web of paper is passed through a bath of heated wax and then is promptly passed into a water or chilling bath which sets the wax, leaving it mainly on the surface of the web of paper in the form of a glossy coating.

My improvements relate particularly to the removal of the water from the surface of the web and to provide means whereby the web may be operated at high speed, and at the same time the water effectively removed.

In the accompanying drawing, 1 represents the roll of unwaxed paper and 2 the waxing or coating bath, this being shown conventionally, and 3 the water or chilling bath. The web of paper 4 is passed through the coating bath so that it is coated on both sides and is then passed directly to the chilling bath.

I provide a stack or series of rollers 5, 6, 7, 8 and 9 preferably located above the chilling bath, the roller 5 being preferably vertically disposed above the submersing roller 10 of the chilling bath so that as the web passes from the chilling bath, it travels in a vertical path or has a vertical reach designated by the numeral 11. On each side of this vertical reach, I mount doctors 12 which are disposed so that the paper travels across the edge thereof and a very large portion of the water carried up by the web is removed by these doctors. It will be understood that, traveling at high speed, a considerable amount of water is likely to be carried up.

At the rear of each of these doctors is a set of suction heads 13, two being illustrated in the embodiment illustrated. These suction heads are tubular or pipe-like in form, the heads having longitudinal slots 14 therein adapted to receive the suction bars or nozzles 15. These suction bars or nozzles have rounded faces and a plurality of suction orifices 16 preferably arranged in a double row and in alternating or zig-zag relation as shown in Fig. 4, one row being at each side of the center or crown of the suction nozzle so that when the web of paper 4 passes across the suction heads, the suction orifices are not completely closed; that is, the suction heads are so arranged relative to the paper that the point of contact with the web of paper is with the crown or high point of the suction heads, so that while the web is close to the suction orifices, it does not completely seal them but allows a rush or blast of air to pass across the surface of the web and into the suction heads, carrying the water with it. This passage of a web of paper across the suction head is old, an example of such a device being shown in my Patent No. 1,658,485, dated February 7, 1928.

I have found, however, that there is a tendency for the water to form in a film on the web of paper, particularly as a result of passing across the suction heads so that the water is not removed, and the water while in this form is very difficult to remove. I, therefore, provide means for transforming this water from the film condition to a globular condition or form in which form it may be quite effectively removed by the suction heads, and this I accomplish in the apparatus illustrated by passing the web of paper over or around the rollers 5, 6, 7, 8 and 9 which are, as stated, preferably arranged in the form of a zig-zag stack or series, these rollers not only constituting guides but they act to transform the water that may be in the form of a film or films to the form of globules or drops. It will be noted that by arranging the rollers in this way, first one side and then another of the paper is subjected to the action of a roller. Each roller is provided with a doctor 17 which acts to remove

the water which may be picked up by the roller.

At the rear of each roller and disposed to act upon the side of the paper acted upon by the roller, I provide a group of the suction heads 13 so that the roller acts to transform the film or films of water into a globular form in which condition it can be more readily picked up by the suction heads or the air currents produced thereby.

This apparatus is not only highly efficient in removing the water but it permits the operating of the machine at very high speed; that is, a much higher speed than has been possible with the apparatuses used and with which the applicant believes he is fully familiar from a practical or operating standpoint.

I have illustrated and described my apparatus mainly in conventional form but it should be understood that the apparatus illustrated is a commercial and highly satisfactory apparatus. Other forms of suction heads or means for producing blasts of air for removing the globules of water may be employed—for example, those shown in my patent referred to. However, the suction heads illustrated are simple and economical and very efficient. I have not attempted to illustrate or describe other embodiments or adaptations of my invention as it is believed that this disclosure will enable those skilled in the art to which my invention relates to embody or adapt the same as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. An apparatus for removing water from a waxed paper or the like comprising guides acting to lead the web vertically upward from a water bath, doctor bars disposed to act on both sides of the vertical reach of the web, suction heads arranged above each of said doctor bars, a series of rollers disposed in zig-zag relation to alternately coact with opposite sides of the web and acting to transform films or water on the web into globules of water, a doctor bar coacting with each of said rollers to remove water therefrom, and a plurality of suction heads arranged between each adjacent pair of rollers and having suction openings across which the web travels in passing from one roll to another, the suction heads being disposed on the undersides of the successive reaches of the web.

2. An apparatus for removing water from a waxed paper or the like comprising a series of rollers disposed in zig-zag relation to alternately coact with opposite sides of the web and acting to transform films of water on the web into globules of water, and a plurality of suction heads arranged between each adjacent pair of rollers and having suction openings across which the web travels in passing from one roll to another, the suction heads being disposed on the undersides of the successive reaches of the web.

3. An apparatus for removing water from a waxed paper or the like comprising guides acting to lead the web vertically upward from a water bath, doctor bars disposed to act on both sides of the vertical reach of the web, a suction head arranged above each of said doctor bars, a series of rollers disposed in zig-zag relation to alternately coact with opposite sides of the web and acting to transform films of water on the web into globules of water, a doctor bar coacting with each of said rollers to remove water therefrom, and a suction head arranged at the rear of each roller to act on the surface of the web contacted by the roller.

4. An apparatus for removing water from a waxed paper or the like comprising a series of rollers disposed in zig-zag relation to alternately coact with opposite sides of the web and acting to transform films of water on the web into globules of water, and a suction head arranged at the rear of each roller to act on the surface of the web contacted by the roller.

5. In a machine for waxing a traveling web of paper and the like, apparatus for removing water from the web as it travels upwardly from the cooling water trough, comprising in combination doctors coacting with opposite sides of the web to remove most of the water therefrom, a series of longitudinally and vertically spaced rolls coacting with opposite sides of the web to collect the films of water thereon into local areas by capillarity, doctors coacting with said rolls to remove the water therefrom, and air suction means arranged above each of said first named doctors and under the web between said rolls for coaction with the sides thereof to remove the water therefrom.

6. In a machine for waxing a traveling web of paper and the like, apparatus for removing water from the web as it travels upwardly, rolls coacting with opposite sides of the web to collect the films of water thereon into local areas by capillarity, and air suction means arranged under the web between said rolls for coaction with the sides thereof to remove the water so collected therefrom.

7. In an apparatus for removing water from a traveling web, the combination with a plurality of suction heads arranged in alternate relation on opposite sides of the web and having suction openings past which the web moves and acting to remove the water therefrom, of means for collecting the water on the web into local areas in the form of globules before the web is acted upon by said suction heads, comprising a series of rolls arranged so that the web is caused to take a zig-zag path while traveling upwardly, and means for removing the water from said rolls as they rotate, the suction means being arranged between the rolls for coaction with the under surface of the web.

8. In an apparatus for removing water from webs of paper and the like, the combination of a plurality of rollers disposed in zig-zag relation and constituting guides for the web of paper treated, and a plurality of suction heads disposed at the rear of each roller to act on the surface contacted by the roller, each head having a longitudinal series of staggered suction orifices.

9. In an apparatus for removing water from waxed paper or the like, the combination of a series of rollers disposed to coact with the web, and acting to transform films of water thereon into globules of water, doctor bars coacting with said rollers to remove water therefrom, and suction heads arranged at the rear of the rollers to act on the surface of the web contacted by the preceding roller.

10. An apparatus for removing water from webs of paper or the like comprising a plurality of rollers disposed in zig-zag relation to alternately engage opposite sides of a web of paper, and water removing means comprising suction heads disposed to act upon the paper at the rear of the rollers and so that the paper is alternately subjected to the action of rollers and the suction heads.

11. An apparatus for removing water from webs of paper or the like comprising a plurality of rollers disposed to alternately engage opposite sides of a web of paper, and water removing means disposed to act upon the paper at the rear of the rollers and so that the paper is alternately subjected to the action of rollers and the suction heads.

12. An apparatus for removing water from webs of paper and the like comprising suction heads disposed to act on both sides of a traveling web, and means disposed in alternating relation to the suction heads having traveling contact with the webs and acting to transform films of water thereon into globules directly in advance of each suction head to facilitate removal of water by the suction heads.

13. An apparatus for removing water from waxed paper consisting of means acting to transform films of water on the web into globular form, and suction means for removing the globules of water.

14. An apparatus for removing water from waxed paper consisting of means acting to transform films of water on the web into globular form, and means at the rear of said film transforming means for removing the water by currents of air.

15. The method of removing water from webs of paper and the like consisting of the steps of alternately subjecting the web to suction heads and rollers, the rollers acting to transform films of water into globules and the suction heads acting to remove such globules.

16. The method of removing water from waxed paper comprising the successive steps of subjecting moving surface of the paper to means acting to transform films of water into globular form or drops, and removing the globules of water by suction.

17. The method of removing water from waxed paper comprising the successive steps of subjecting moving surface of the paper to means acting to transform films of water into globular form or drops, and removing the globules of water by air currents.

18. The method of removing water from webs of waxed paper consisting of translating webs of paper at high speed over rollers disposed to alternately engage opposite sides thereof, and subjecting the surface contacted by each roller at the rear thereof to the action of one or more suction devices across which the web is translated in contacting relation.

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