

Dec. 19, 1939.

C. W. HOWARD

2,184,189

PAPER MAKING APPARATUS

Filed April 28, 1937

2 Sheets-Sheet 1

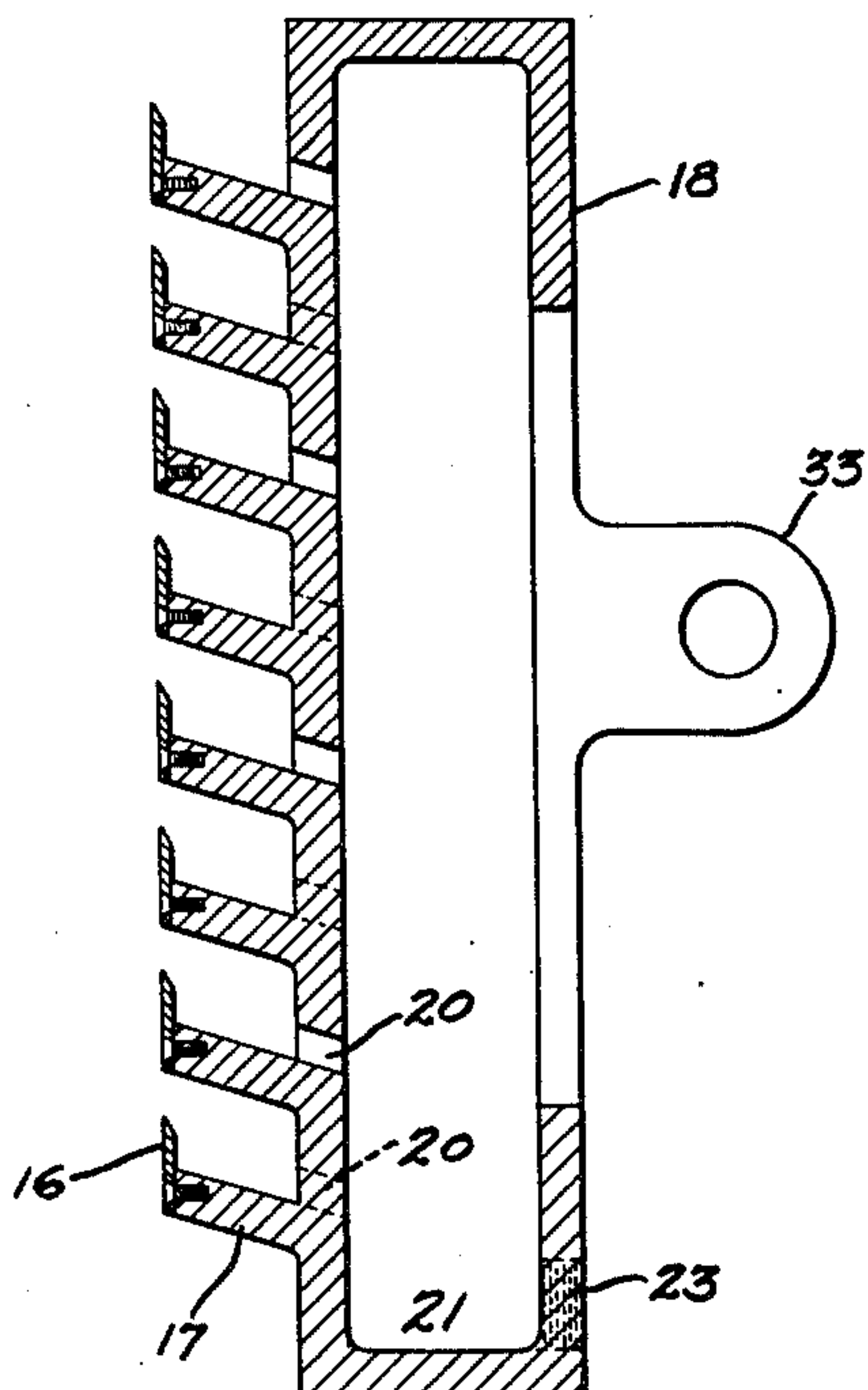
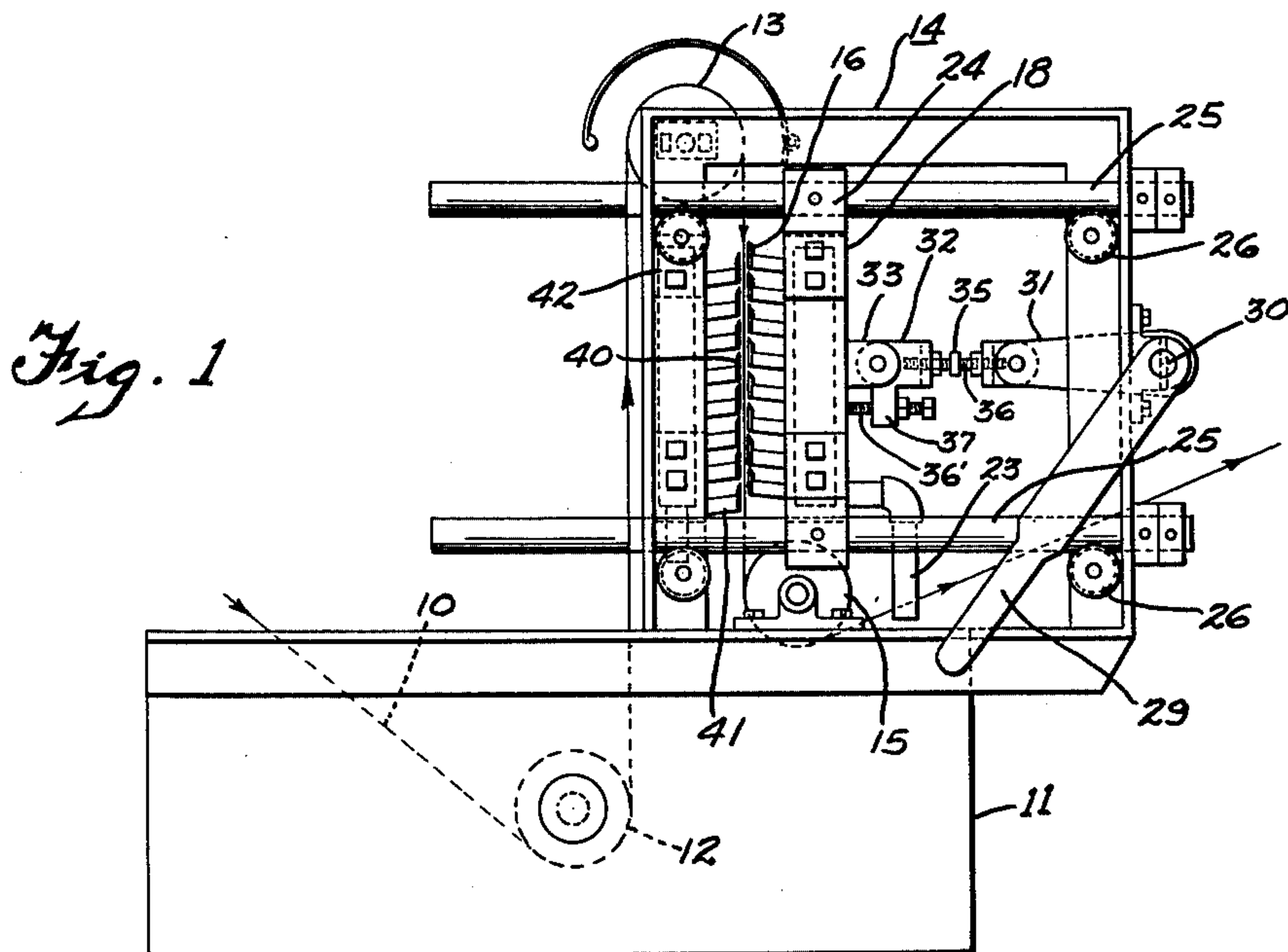


Fig. 4

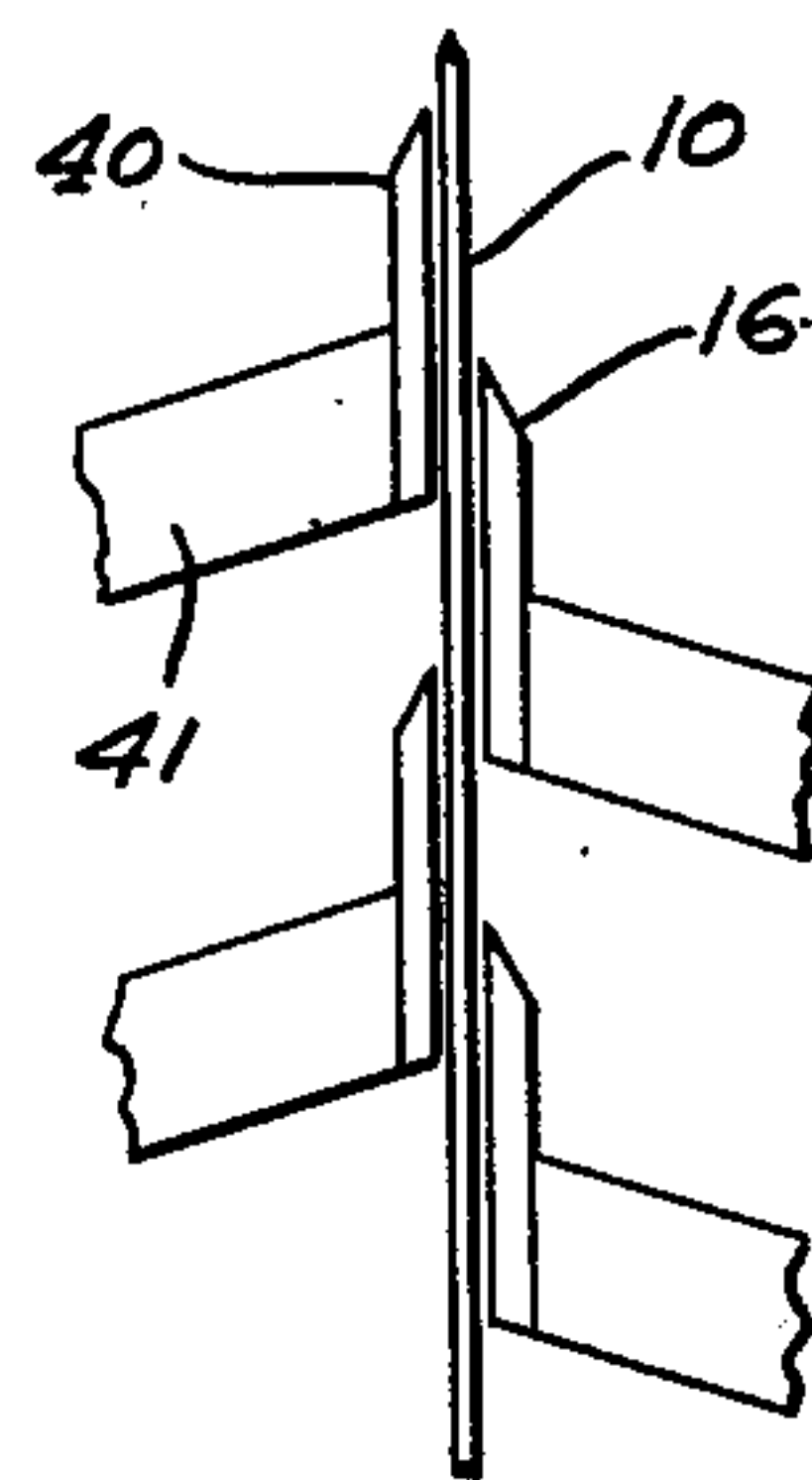


Fig. 3

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2 Sheets-Sheet 2

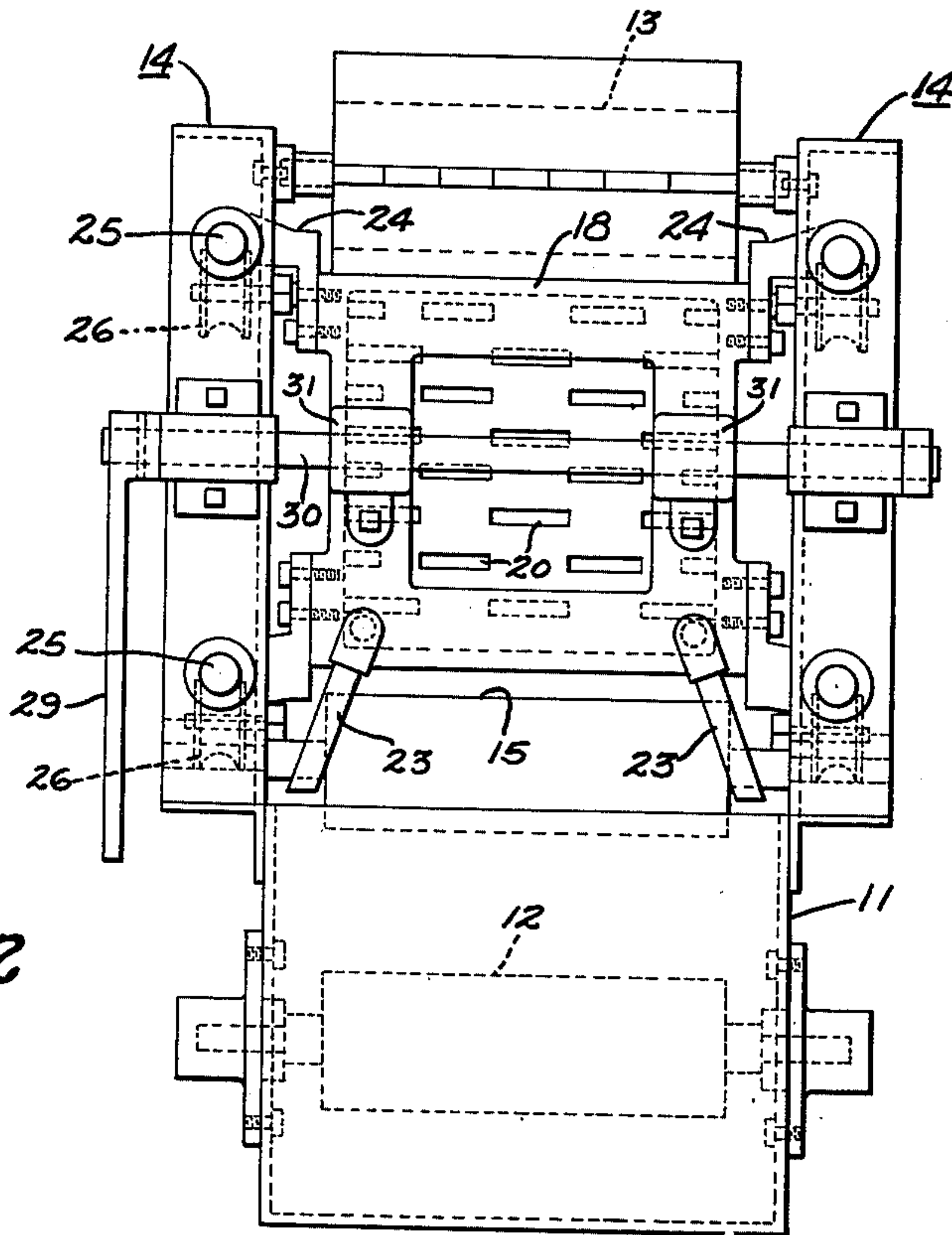


Fig. 2

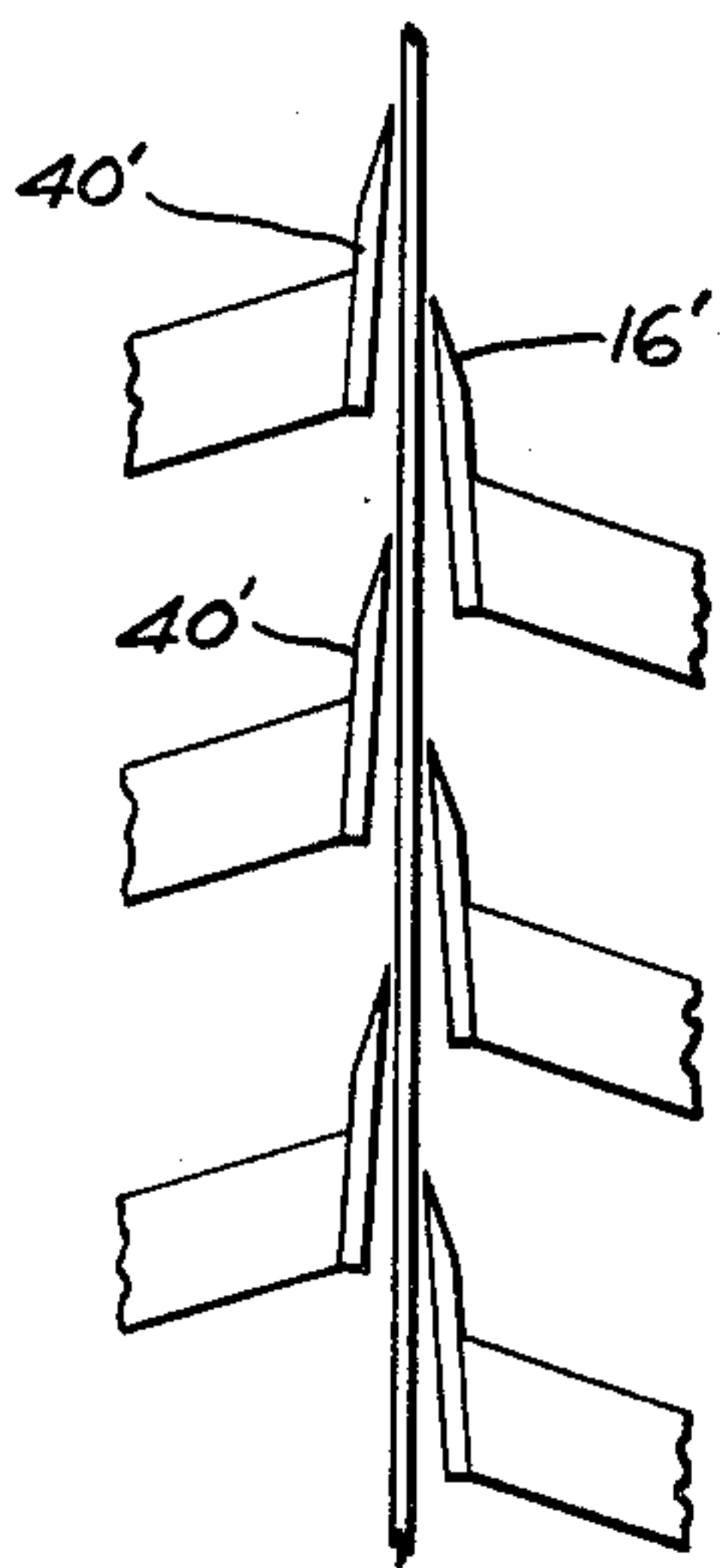


Fig. 5

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2,184,189

PAPER MAKING APPARATUS

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Application April 28, 1937, Serial No. 139,376

8 Claims. (Cl. 15—93)

This invention relates to the manufacture of paper, such as waxed paper and the like.

One object of the invention is the provision of apparatus for removing cooling water and the like from a traveling web such as a web of waxed paper and embodying a series of water removal members of metallic construction which remove the water in a downward direction from the paper web without engaging the web.

Another object is the provision, in a water removal device of the character mentioned, of a series of blades adapted to remove the surface water and the like from a side of a downwardly moving web which travels in a straight path past the blades and without frictional engagement therewith.

Other objects and advantages of the invention will be apparent from the following description, the appended claims and the accompanying drawings, in which,—

Fig. 1 is a side elevation of a machine embodying the present invention;

Fig. 2 is an end elevation of the same;

Fig. 3 is a fragmentary detail view showing the passage of the paper web between the blades of the two opposed blade series;

Fig. 4 is a longitudinal sectional view through the movable blade supporting member;

Fig. 5 is a fragmentary view corresponding to Fig. 3 showing a modified arrangement of blades the sides of which are inclined at a very small angle to the paper.

The invention is herein described with particular reference to a machine for removing the cooling water from the surface of a waxed sheet of paper. However, the machine is adapted for the removal of liquids generally from the surface of a traveling web of material. As shown in the drawing, 10 designates a web of paper or the like which has been coated with paraffin or wax. In order to chill the wax before the paper is wound up in a roll, the paper web, immediately after applying the wax to it, is passed to a cold water bath in the tank 11, which hardens the wax. After the paper passes beneath the submerging roll 12, it is guided upwardly over a guide roll 13 which is carried near the top of a supporting frame designated generally by the reference numeral 14. After the paper passes around the guide roll 13, it travels downwardly, and any water or other liquid remaining on the surface of the waxed sheet is then removed as the sheet travels past a series of water removing blades which operate successively to remove any remaining particles of water so that by the time

the paper reaches the lower guide roll 15 it is dry and the paper can then be supplied along the path indicated in Fig. 1 and wound up in a roll. Suction devices that are now commonly used to effect the removal of the water are therefore unnecessary.

In accordance with the present invention the water removing blades are arranged in two series, one of which is adapted to remove the surface water or other liquid from one side of the paper web while the other series is adapted to remove the water from the other side. As the paper moves downwardly from the guide roll 13, its right-hand side as viewed in Fig. 1 is thus engaged by the series of blades 16, each of which is preferably made in the form of an edged metal strip extending throughout the width of the sheet of paper. As shown in Figs. 1 and 4, the blades 16 are attached by suitable countersunk screws to the outwardly extending ledges 17 of a blade supporting member 18, in vertically spaced relation. The ledges 17 are inclined downwardly away from the waxed sheet so that water removed by the blades can flow down through the slots 20 into the hollow interior 21 of the blade supporting member. This water is then returned back to the tank 11 through a return pipe 23. The rear side of the blade supporting member is provided with an opening of considerable size so that air that flows down through the slots 20 can flow out freely through the rear open side of the member 18.

The blade supporting member 18 is held by means of clamp members 24 to four supporting tubes 25 which are carried for endwise movement on rolls 26 rotatably supported on the frame 14. The blade carrying member 18 is thus mounted for movement towards and away from the traveling web. It can be positioned by means of a hand lever 29 which is fixed to a shaft 30 on which are two lever arms 31. The ends of these lever arms are pivotally connected to a pair of adjustable links 32, connected in turn to the brackets 33 on the movable member 18. When the blade carrying member 18 is so positioned that the blades 16 are in their effective positions with respect to the paper, as shown in Fig. 1, the links 32 are in alignment with the arms 31, providing a toggle control which gives a definite predetermined position to the blades 16. This position, however, can be adjusted by turning the adjustment members 35 which are fixed on the adjusting screws 36, the opposite ends of which have right-hand and left-hand threads so that the effective length of the links 32 can be

readily changed. The normal position of the blade carrying member 18 can also be adjusted by means of a stop screw 36 adjustably carried in a bracket 37 which projects from one of the arms 32. When the toggle control is straightened the end of the screw 36 bears against the side of the blade supporting member 18.

At the opposite side of the paper there is a second series of blades 40 carried by the downwardly inclined ledges 41 of the fixed blade carrying member 42 which is supported in a suitably fixed position on the frame 14. The construction of the blade carrying member 42 is similar to that of the blade carrying member 18 except that it is provided in a fixed location beneath the roll 13.

The blades 40 and 16, as shown in Fig. 3, are substantially parallel to the paper web 10 and arranged so that the blades 16 alternate with the spaces between the blades 40. The blades are also spaced a few thousandths of an inch from the traveling paper web so as to be entirely free from frictional contact with the web itself. There is an effective removal of the water or other liquid, however, because the blade edges are wet, and there is an effective attraction by capillary action between the water on the wax paper and the water on the blades, the metallic surface of the blades tending to draw the water from the paper. This action is aided, of course, by the action of gravity, since the paper is moving downwardly and the path of travel of the water is only very slightly changed as it travels from the paper to the blades. This water removal action is also aided by the air currents which also tend to produce movement of the water from the paper to the blades. Those particles of air that are in contact with the paper deflect from the paper just before the edge of a blade is reached, the inclined edge of the blade producing this air flow.

Fig. 5 shows a modified form of blade arrangement, similar to the arrangement shown in Fig. 3, but with the blades having a very slight angle of inclination away from the paper. The edges of the various blades 40' which engage the left side of the paper as viewed in Fig. 5 are arranged in the same straight vertical line just as in the case of the blades 40 previously described, and the edges of the blades 16' shown in Fig. 5 are also arranged in a common vertical line, with all of the blade edges spaced very slightly from the paper. The supporting means for the blades of Fig. 5 is also like that of the construction previously described.

It will be understood that the water removed from the paper will pass downwardly along the ledges on which the blades are supported and then into the blade supporting members, the water then returning through the openings in the bottoms of the blade supporting members back to the tank 11. It will also be clear in view of the preceding discussions that the paper travels upwardly from the water bath and any large particles of water can fall back into the bath before the paper reaches the upper roll 13. As there are a considerable number of blades effective on each side of the paper sheet, as the sheet moves downwardly from the guide roll 13 to the guide roll 15, there is an effective and substantially complete removal of surface moisture from the paper so that the waxed paper can be immediately wound into a roll. In case of breakage of the paper the end of the sheet can be readily threaded past the water removing blades by mere-

ly swinging the handle 36 upwardly from the position illustrated in Fig. 1 so as to pull the entire series of blades 16 on the right-hand side of the sheet away from the sheet, giving room between the different blade series for access to the paper and for threading the paper down from the upper guide roll 13 to the lower roll 15.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. Apparatus of the character described comprising a series of blades for removing surface liquid from a traveling web of material, supporting means for said blades, and means for guiding said web of material for movement in a downward direction and in a straight path past said blades and in slightly spaced relation thereto, the blades of said series having metal edges directed toward the oncoming portions of the web and arranged in a substantially straight line parallel to the path of travel of the web.
2. Apparatus of the character described comprising a series of blades for removing surface liquid from one side of a traveling web of material, supporting means for said blades, and means for guiding said web of material in a straight path past said blades and in slightly spaced relation thereto, the blades of said series having free edges projecting toward the oncoming portions of the web, and arranged in a substantially straight line parallel to the path of travel of the web.
3. Apparatus of the character described comprising a series of blades for removing surface liquid from one side of a traveling web of material, supporting means for said blades, and means for guiding said web of material in a straight path past said blades, the blades of said series having their sides arranged approximately parallel to the web of material and having sharp terminal free edges all directed toward the oncoming portions of the web and arranged in a substantially straight line parallel to the travel of the web.
4. Apparatus of the character described for removing surface liquid from a traveling web of material, comprising means for guiding the web for movement in a downward direction, and a series of water removing members on each side of the downwardly moving web, said members being slightly spaced from the web and having free terminal edges of a material offering a greater attraction to water particles than is offered by the traveling web and directed toward the oncoming portions of the web, said members having water guiding surfaces extending downwardly away from the web for the downward removal of the surface liquid.
5. Apparatus of the character described comprising a series of blades for removing surface liquid from a traveling web of material, supporting means for said blades, means for guiding said web of material for movement in a downward direction and in a straight path past said blades, the blades of said series being arranged one directly above the other and terminating in wedge-shaped edges which collectively define a plane generally parallel to the path of travel of the web, said edges projecting towards the oncoming portions of the web, and a second series of blades

arranged opposite the first series at the opposite side of the web.

5 6. Apparatus of the character described comprising a series of stationary blades for removing the surface liquid from one side of a traveling web of material, a second series of blades for removing the surface liquid from the other side of the web, said blades terminating in thin free edges which project toward the oncoming portions of the web, means for adjusting the position of said second series towards and away from the web and means for guiding the web past said blades in a straight path, the blades of the second series being alternately staggered with respect
10 to the blades of the first series.

7. Apparatus of the character described comprising a first series of edged metal blades for removing the surface liquid from one side of a traveling web of material, a second series of
20 edged metal blades for removing the surface liquid

from the other side of the web, said blades all terminating in thin wedge-shaped edges which project toward the oncoming portions of the web, and means for guiding the web past said blades in a substantially straight line close to the edges
5 of the blades.

8. Apparatus of the character described comprising a first series of edged metal blades for removing the surface liquid from one side of a traveling web of material, a second series of
10 edged metal blades for removing the surface liquid from the other side of the web, the edges of the blades pointing towards the oncoming portions of the web, and means for guiding the web for downward movement past said blades in
15 a substantially straight line close to but slightly spaced from the edges of the blades, and means for bodily moving said second series toward and from the web.

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