May 17, 1932. H. R. FARNSWORTH 1,858,546

YANKEE FOURDRINIER MACHINE

Filed Dec. 5, 1928

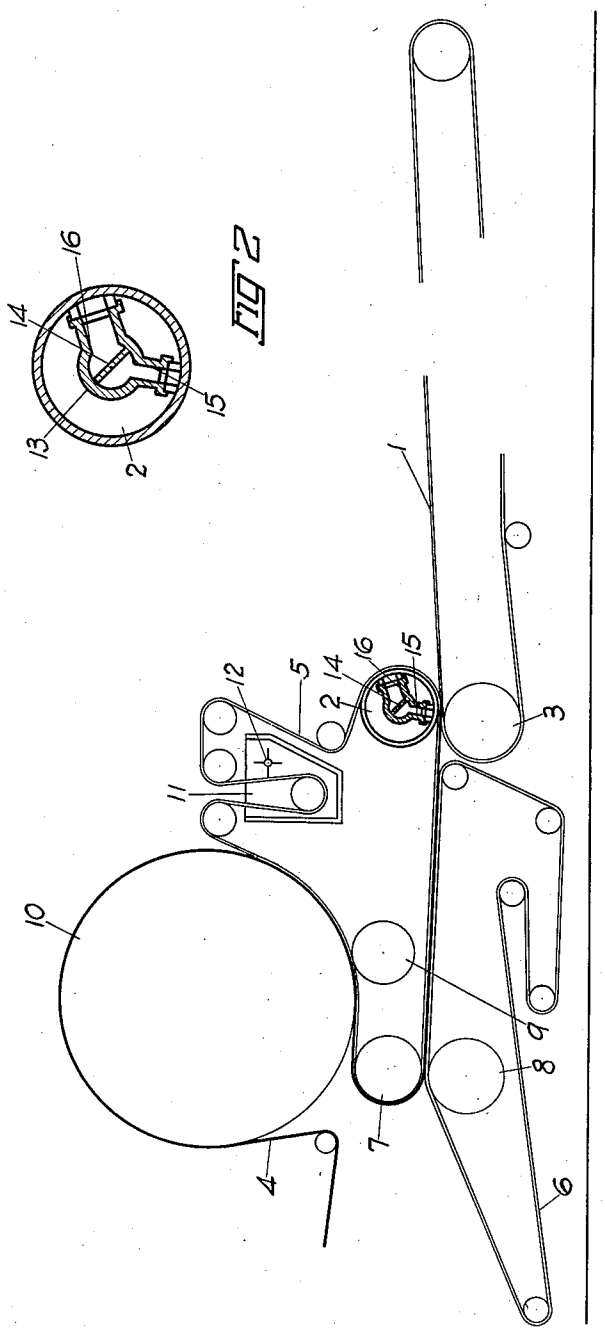


FIG 1

FIG 2

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Patented May 17, 1932 1,858,546

UNITED STATES PATENT OFFICE

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YANKEE FOURDRINIER MACHINE

Application filed December 5, 1928. Serial No. 324,032.

The invention to be hereinafter described relates to paper making machines of the Yankee Fourdrinier type.

Generally speaking the machines of this type comprise a Fourdrinier or other sheet forming section, a top felt adapted to pick the sheet from such section, a bottom felt cooperating with the top felt to convey the sheet through a pair of presses, a drier, a pressure roll to maintain contact between the sheet and drier and auxiliary directing and stretcher rolls. They are inherently slow machines. Attempts to speed them up to increase production are unsuccessful. When speeded up, the pick-up felt either fails to take the sheet from the wire or, if it does take it, fails to carry it far enough for it to be gripped between the two felts.

The main objects of the present invention are to avoid these and other objections and provide a Yankee Fourdrinier which may be successfully operated at much higher speeds and with correspondingly increased production. The invention is simple, efficient, compact, and inexpensive and may be readily and quickly applied to any existing machines of this type without any alteration of existing structures.

In order to more clearly disclose the construction, operation and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

In the drawings:

Fig. 1 is a diagrammatic view of one well known kind of Yankee Fourdrinier, with the inventions applied, the suction roll being shown in lateral vertical section; and

Fig. 2 is an enlarged lateral cross section through the suction roll.

Referring to the drawings in detail, 1 indicates the making wire on which the sheet first takes form, 2 and 3 upper and lower couch rolls between which said wire and sheet travel, 4 the sheet, 5 the top or "pick up" felt, 6 the lower or supporting felt, 7 and 8 press rolls between which the two felts and interposed sheet pass, 9 the pressure roll between which and the drier the upper felt and sheet pass, 10 the drier, 11 the felt washer tank, and 12 the felt whipper. With the exception of the top suction couch roll, the parts above enumerated are well known, both in the exact arrangement illustrated and in a considerable number of variations of such arrangement, more or less according to the particular kind of work to be done by the machine. The particular machine illustrated is designed for production of very light weight paper such as fine tissues.

These delicate or filmy sheets are difficult to handle at any speeds and the difficulty increases as the speed of the machine rises. But, since production rises in proportion to increase in speed it is highly desirable to increase speed, yet absolutely essential to maintain breakage at lowest possible minimum. The chief cause of breakage has been inability of the "pick up" or top felt to hold the sheet which it picks from the wire, long enough for it to reach the bottom felt where it will be supported. Another cause, has been the persistency of the sheet in adhering or sticking to the wire and following around the bottom couch. If the sheet is too wet it can not be picked up, even at the average speed. It will then follow the wire. Or, if the machine is running faster than a certain predetermined speed, "the pick-up" felt can not function. Instead, it will simply pull away from the sheet, and the sheet will either drop between the couches and the end of the bottom felt, or else follow this wire back. It is understood, of course, that some felts are of different textures than others and that some will successfully pick up sheets that are wetter or at greater speeds than others. But the general rule applying to them all is, that the wetter the sheet or the faster the machine the greater is the difficulty in picking the sheet from the wire.

It is this difficulty in particular that the present invention aims to overcome. To this end, the bottom couch 3 remains a plain couch but the upper couch is entirely different. By this invention the upper couch becomes a combined drying and transfer couch. It is provided with a stationary suction box 13 divided into two separate compartments by a partition 14 running from end to end

and making two separate and distinct chambers 15 and 16 each having a radially elongated narrow conduit extending outwardly as a branch from the centre to the inner wall of the shell of the roll. Each branch comprises two spaced walls forming a suction conduit and having packing strips in their outer edges to provide a running sealing contact with the shell, as will be readily understood. The box, as a whole, is mounted in the usual and well known manner and its adjustment about its longitudinal axis, which is parallel to or coincident with that of the roll is in the usual manner and by the usual means. It is not thought that further details are necessary on this point as such mounting and adjustment are well known to those skilled in the art. To one end of the box is connected, in any suitable manner a suction pump or other evacuator with suitable valve connections for regulating the suction, so that a greater degree of vacuum may be effective in branch 15 than in 16. Any one of a number of such valve connections may be used and, therefore, need not be shown. On reference to the cross section of the suction box it will be seen that the branch 15 is much narrower than the branch 16 and that it is so positioned within the roll as to fall just over the line where the top or "pick up" felt is about to leave the wire with its sheet. Only a narrow area at this point is required. Suction acting upwardly through this branch at this point, draws the sheet from the wire and attaches it to the felt. As a matter of efficiency a comparatively high vacuum is used to more firmly interengage the sheet and felt and positively transfer the sheet from the wire to the felt. It will also be seen that the wider branch 16 is provided with a considerably enlarged operative suction area and that such area is so positioned as to fall within the upper part of the arc of contact of the top felt about the suction roll. As this point the wet felt fresh from the washer is greatly saturated with water. As it crosses the operative area of suction branch 16 a large part of the water will be drawn out by the vacuum and will flow by gravity to the partition and be drawn off in the usual manner. Because of the greater operative area and, corresponding longer operative time, a considerably lower vacuum may be used here than in the other branch. Also, here gravity assists whereas in the other branch gravity opposes. Likewise the purposes are different in the two branches, not necessitating as high a vacuum in the one branch as in the other.

It is well understood, of course, that the shell of the suction roll, together with the felts, and wire are all travelling continuously and at high speed, while the suction box is stationary so that the action of the vacuum is progressive and in exact accord with the travel of the same.

While a lower felt has been shown, as in the regular standard Yankee Fourdrinier, it will be understood, by those skilled in the art, that, for many kinds of paper, particularly the light weight, fine tissues, etc., the lower felt may be omitted. This is due to the fact that such lighter papers will become so firmly interengaged with and attached to the upper felt, by the action of the suction roll that the supporting action of the lower felt is not necessary.

A detailed statement of the operation of the machine is hardly thought necessary. In general it operates just as other well known Yankee machines operate, except that, due to this invention it is capable of more continuous operation (because of fewer breaks) and considerably increased speed with corresponding greater production.

Many changes may be made in the construction, arrangement and disposition of the various parts of the invention within the scope of the appended claims without departing from the field thereof, and it is meant to include all such within this application wherein only a preferred form has been disclosed purely by way of illustration.

Having described my invention, what I claim and desire to protect by Letters Patent is:—

1. In a machine of the class described, web forming means, an endless conveyor felt, upper and lower opposed couch rolls between which said felt and said forming means pass, a suction box only in said upper couch roll having two branches extending radially from separate chambers, one of the branches being operative at the line of contact of said rolls to cause the paper web to leave said forming means and adhere to said felt and the other branch being operative at a point where the felt is not in contact with the web for the purpose of substantially drying the felt before it contacts with the web.

2. A Yankee Fourdrinier machine comprising an endless web forming wire, a drier roll, an endless felt between said forming wire and said drier roll, upper and lower opposed couch rolls between which said felt and said wire pass, a suction box only in said upper couch roll having two branches extending radially from separate chambers, one of the branches being operative at the line of contact of said couch rolls to cause the web to leave said forming means and to adhere to said felt and the other branch being operative at a point where the felt is not in contact with the web for the purpose of substantially drying the felt before it contacts with the web.

3. In a machine of the class described, a Fourdrinier wire, a plain bottom couch roll around which the wire carrying the paper

web is trained, a pick-up felt and a top suction couch roll between which and said plain bottom couch roll said pick-up felt and wire with the web therebetween are adapted to pass and be pressed, said suction couch roll having a suction area including the line of pressure contact between the two rolls to cause said web to be transferred from the wire to said pick-up felt.

In testimony whereof I affix my signature.

HILAND R. FARNSWORTH.