Oct. 5, 1943. L. HORNBOSTEL 2,330,891

PAPER MACHINE

Filed Nov. 13, 1940 2 Sheets-Sheet 1

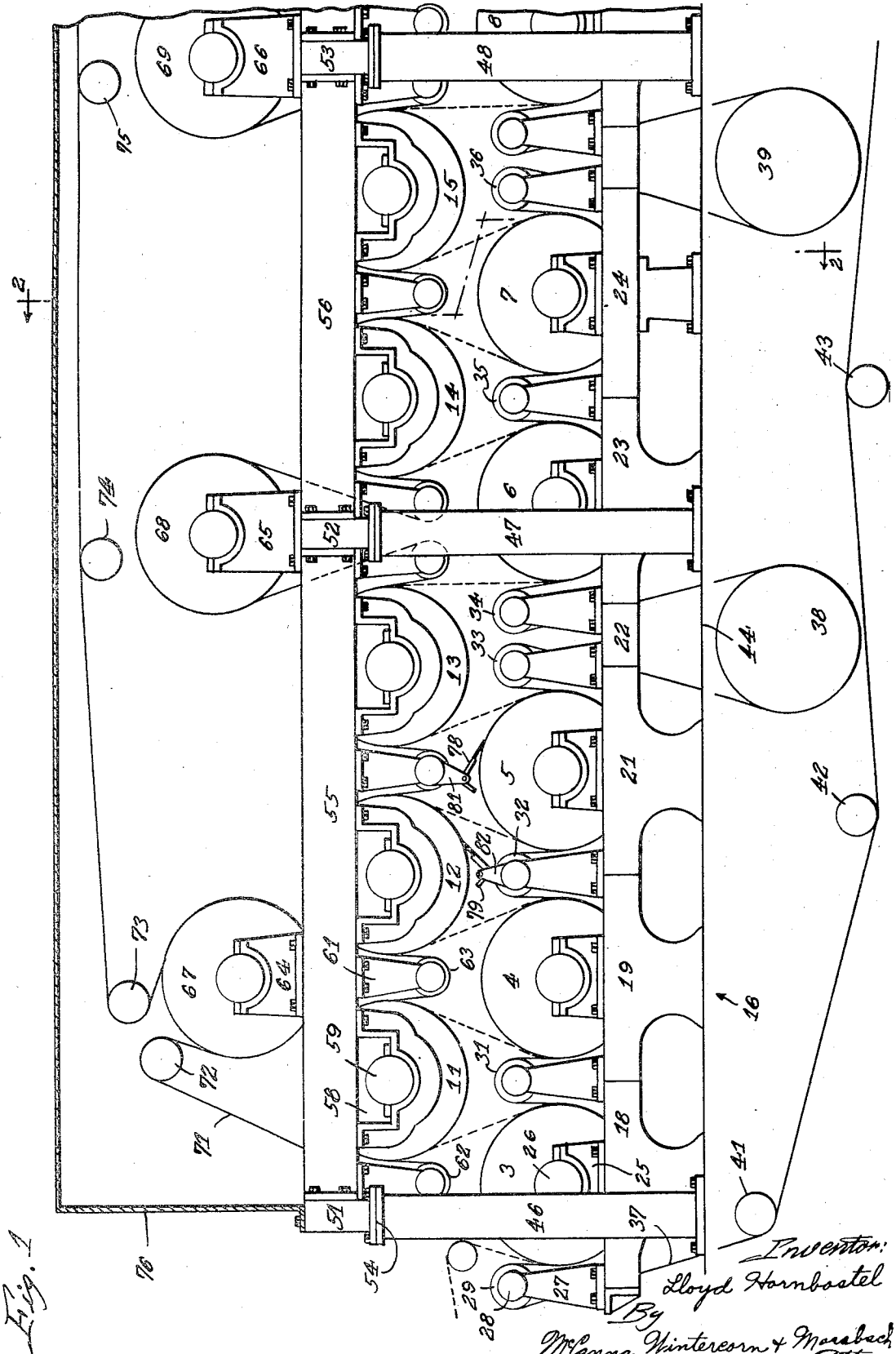

Fig. 1

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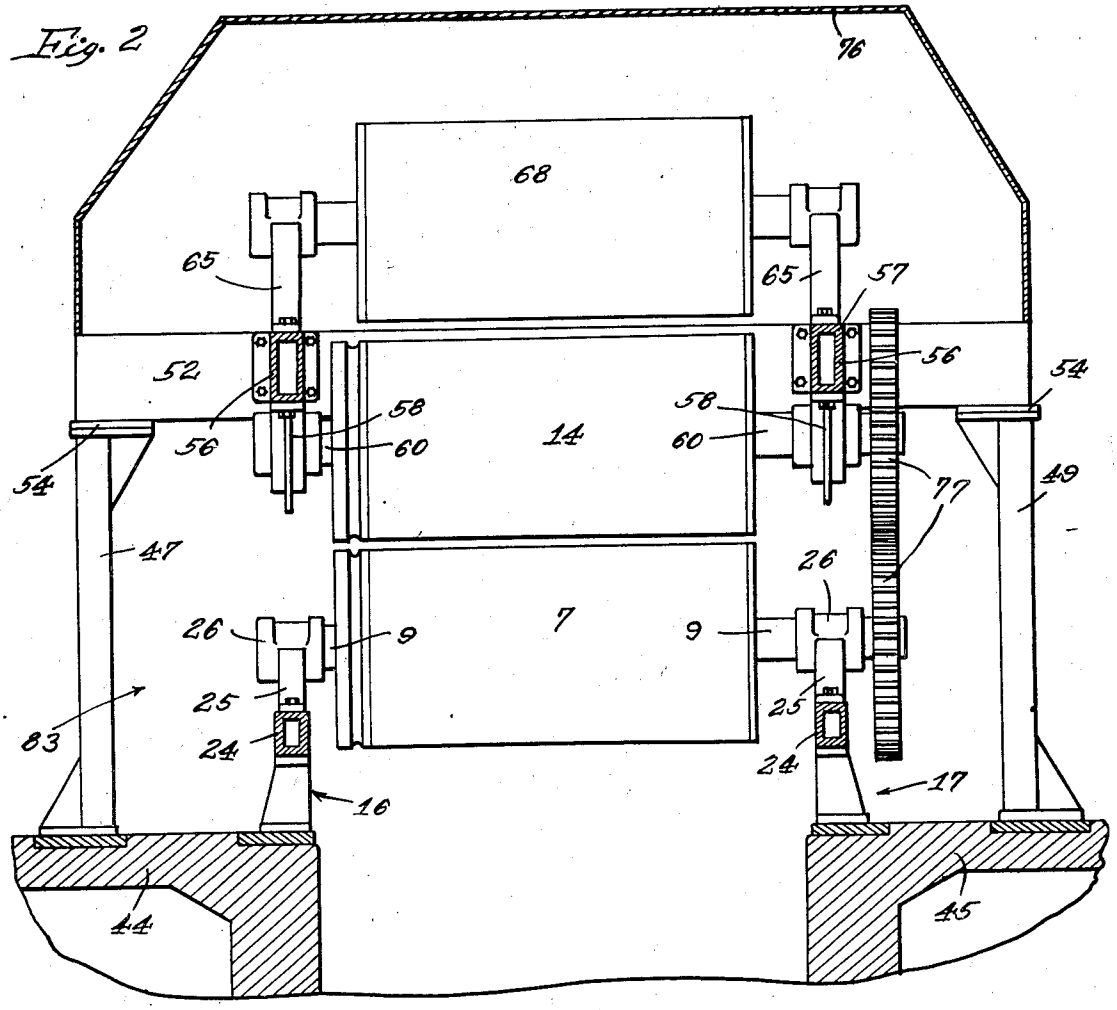
Fig. 2



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Patented Oct. 5, 1943

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UNITED STATES PATENT OFFICE

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PAPER MACHINE

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4 Claims. (Cl. 34—121)

This invention relates to paper machines and machines for performing analogous operations, and refers more particularly to the structure of paper machine drier sections and press sections.

In the past driers have been made with unitary frame sections disposed on each side of the machine supporting the upper and lower rolls, these frame sections comprising a network of structural members designed to provide bearings for the roll and to permit the escape of vapors from the space between the rolls. While this construction has been almost universally employed as being the best commercially known construction, yet it offers substantial difficulty in operation because of the obstruction to free access to the space between the rolls where the maximum access is a thing eminently to be desired. For example, it is necessary to frequently feed the end of the paper through the drier at the start of the operation or when the sheet breaks. Because of the obstruction to the space between the rolls, it has been universal practice in the past to employ ropes which pass around the drier rolls, the edge of the paper being seated between the ropes and thus carried through between the rolls for the purpose of feeding the forward edge of the paper through. This is at best a makeshift operation and never has been completely satisfactory, for the reason that the paper sometimes comes out of the ropes or the ropes break, under which circumstances it is necessary to start the feeding operation over again because the end of the paper is not sufficiently accessible to the operator intermediate the ends of the drier. Another difficulty lies in the fact that when the paper breaks in the drier, the sheet, because of its speed in the machine, wedges into the machine making it a difficult job to remove this material from the rolls. Sometimes this operation takes several hours.

Another difficulty with prior art constructions has been the difficulty of maintenance due to the fact that the parts were relatively inaccessible, and to the fact that the various elements of the machine were so tied together that it was difficult to remove any one part. For example, the labor involved in putting on new felts on a drier section was relatively large because in such an operation it is necessary to remove all of the felt rolls, and in prior art constructions this involved a large amount of labor.

Another difficulty with prior art constructions was the fact that the frame work of the machine repeatedly crossed the operating space at the ends of the rolls, and presented a serious obstruction to the ventilation of the machine and thus affected the efficiency.

Numerous other difficulties occur because of this type of drier construction, and yet no means have heretofore been found for adequately solving the problem and producing a machine with adequate accessibility along the front side.

An important object of the invention is the provision of a drier section, press section or the like, wherein the operator has free access to the space between the rolls throughout the length of the drier.

Another object of the invention is the provision of a paper machine having a novel frame structure.

A further object of the invention is the provision of a machine of the character described having improved ventilation characteristics and a resultant greater efficiency.

A still further object of the invention is the provision of a drier section, press section or the like, wherein the lower drier rolls are supported from below the rolls and the upper drier rolls are supported from a point above the rolls to permit unobstructed access to the space between the rolls.

I have also aimed to provide a drier or press section wherein the front ends of the rolls are supported on upper and lower frame structures, the frame structures being vertically spaced to allow free access of the operator to the space between the rolls along the entire front side of the machine.

Other objects and advantages will appear from the following description and the accompanying drawings, in which—

Figure 1 is a side elevation showing a part of a drier embodying my invention, and

Fig. 2 is a section on the line 2—2 of Figure 1.

The invention is herein shown embodied in a drier having spaced lower drier rolls 3—8, inclusive, and upper drier rolls 11—15, inclusive. The lower rolls are supported on frame structures designated generally by the numerals 16 and 17, each of said structures being made up of a plurality of sections as shown at 18, 19, 21, 22, 23, 24, etc., the lower frame structures being formed in sections in this manner in order to simplify the operation of fabrication. The particular manner in which these frame structures are made up is not a matter of cardinal importance in the invention so long as they have adequate strength. Spaced along the frame structures 16 and 17 are bearing supports as indicated at 25

adapted to carry bearings as indicated at 26 for support of trunnions 9 at the opposite ends of the lower drier rolls for rotation. Intermediate the lower drier rolls at suitably spaced intervals are bearing supports 27 which carry bearings 28 upon which are supported suitable felt rolls as indicated at 29, 31, 32, 33, 34, 35 and 36, etc., over which the lower felt indicated generally by the numeral 37, is caused to pass. Advantageously in accordance with conventional practice, additional rolls 41, 42, 43, etc., are employed, over which the felts are caused to return. At intervals the felt is carried around the usual felt driers as indicated at 38 and 39. The bearing supports 25 and 27 are positioned on the upper side of the lower frame structures 16 and 17 so that the supports for the rolls do not extend above the trunnions carried in the bearings 26 and 28.

The frame sections 16 and 17 are seated on the usual floor or other foundation as indicated at 44 and 45, this being the conventional foundation as heretofore employed in the art. Carried on the same foundation and in spaced relationship to the lower frame section 16 are columns indicated generally by the numerals 46, 47, 48, etc., extending along the front side of the machine. In this particular embodiment of the invention a similar row of columns indicated generally at 49 (Fig. 2) is provided at the rear of the machine in spaced relation to the frame section 17. However, a substantial part of the benefits of the invention may be obtained by employing a standard frame construction at the rear of the drier in which case the functions of the columns 49 and the lower frame section 17 would be combined in a conventional frame structure along the rear end of the machine. Connecting the columns 46, 47, 48, etc., with each of the rear columns 49 are girders 51, 52, 53, etc., which are attached to the column by the conventional structural steel plates as shown at 54. Connecting each of the girders 51, 52 and 53 above the lower frame section 16 are steel beams indicated generally by the numerals 55, 56, etc. and connecting these girders above the lower frame section 17 are similar beams indicated generally by the numeral 57 (Fig. 2). In this instance the beams are of rectangular cross-section and are bolted, welded, or otherwise affixed to the girders. Attached to the lower side of the beams 55, 56 and 57 are upper bearing supports as indicated at 58 serving to support roll bearings 59 in which the trunnions 60 of the upper drier rolls are journaled. A plurality of brackets as indicated at 61 are likewise attached to the beams and serve to support a plurality of upper felt rolls as shown at 62, 63, etc., the felt rolls being suitably spaced in accordance with prior art practice. It will thus be seen that the girders and beams together with the brackets 58 and 61 form upper frame sections for supporting the upper drier rolls and felt rolls, these frame sections being in spaced relation to the frame sections 16 and 17 so that the entire space between the upper and lower felt rolls is accessible to the operator throughout the entire length of the machine, the space between the upper and lower frame sections preferably being greater than the diameter of the rolls, so that the rolls may be removed without disturbing the frames.

Brackets such as shown at 64, 65, 66, etc. on opposite sides of the machine and attached to the beams 55, 56 and 57 function to receive and support the trunnions of felt driers 67, 68, 69, etc., the upper felt or felts indicated at 71 being trained thereover by conventional felt rolls as indicated at 72, 73, 74, 75, etc. A hood as shown at 76 is attached to the upper frame section and serves to confine the moisture vapors emanating from the drier rolls from which the air and moisture vapors are withdrawn by means of exhaust fans (not shown) in accordance with conventional practice.

The upper and lower drier rolls are in this instance driven by a plurality of intermeshing gears as shown at 77 (Fig. 2) arranged along the back side of the machine on the trunnions of the drier rolls. Doctor blades, as indicated at 78 and 79 are mounted on brackets 81 and 82 attached to the brackets 61 and 27 supporting the upper and lower felt rolls, these doctors being positioned in the machine at suitable intervals as desired or required in accordance with the teachings of the art.

It will be seen that this construction provides a space as indicated at 83 (Fig. 2) sufficient for movement of an operator back and forth along the length of the machine, and from this area the operator has complete access to the space between the upper and lower rolls without any obstruction whatever to this space. This greatly facilitates the work of the operator in that it permits the sheet to be fed through the rolls by hand where desired. Where the usual rope carrier is employed, the operator can at once correct the situation where the rope breaks or the sheet drops out of the ropes. Likewise, when difficulty arises which causes the sheet to break and wedge into the spaces between the rolls, the operator has complete accessibility to this area for rapid removal of the material. A further advantage lies in the fact that it permits the fuzz and small articles which collect on the doctor blades and other parts of the machine to be blown out through the front of the machine. In the past the upright portions of the frame structure which constituted obstructions to the space between the rolls prevented this from being accomplished freely since the blast of air caused this fuzz and small particles of paper to stick to the inner surface of the frame, the gears, chains, etc. In the present construction this material can be blown out from the rear of the machine and be thus delivered completely free of the machine structure.

A further advantage of the construction is that the carrier ropes can be changed with ease, and that all repairs to the drier can be conducted with considerably greater facility and at lesser expense because of the accessibility of the parts and because the frame does not prevent the free removal of the rolls and parts. It will be noted that it is only necessary to remove one felt roll to permit any drier roll to be removed from the frame structure for the repair of the roll or its associated parts, whereas in previous constructions it was necessary to remove at least one frame section and three rolls to accomplish this purpose. It will also be observed that the endless felts can be replaced with substantially greater ease and speed than prior art constructions because of the facility with which the felt rolls can be removed.

One of the important advantages of the construction is the fact that the unobstructed space between the upper and lower frame sections permits of free movement of air transversely of the machine between the loops of the felt so that the ventilation characteristics of the drier are substantially enhanced. This gives more rapid

and uniform drying action and therefore greater drying efficiency which is of considerable importance since the ultimate purpose of the drier section is to produce drying of the sheet.

A very important advantage of the construction is the materially smaller cost of a drier made in accordance with this invention.

While I have described and illustrated a specific embodiment of the invention, it will be understood that this is by way of illustration, and I do not wish to be limited except as required by the scope of the appended claims, in which I claim:

1. The combination in a water removing section of a paper machine of spaced lower drier rolls, spaced upper drier rolls spaced vertically from said lower rolls, an upstanding frame for operatively supporting said lower rolls, a plurality of columns spaced forwardly from said upstanding frame in a plane parallel therewith a distance sufficient to permit the passage of an operator therebetween, an elevated frame structure fixedly disposed on said columns and depending means on said elevated frame structure for operatively supporting said upper rolls to provide unobstructed access to the space between the upper and lower rolls during normal operation of said rolls for free circulation of air between said rolls and for free access by the operator.

2. The combination in a paper machine of a water removing section arranged for free access to the front thereof comprising a plurality of lower rolls in parallelly spaced relationship, said rolls having axially disposed trunnions at their ends, a plurality of upper rolls in parallelly spaced relationship disposed above said lower rolls for the passage of a paper sheet alternately over adjacent upper and lower rolls through said section, said upper rolls having axial trunnions at their ends, a rear frame structure for supporting the trunnions at the rear ends of said rolls, a lower front frame structure disposed below the trunnions on the front end of said lower rolls, spaced cross beams attached at one end to said rear frame structure and extending longitudinally of said rolls to a plane forward of said lower front frame structure, roll carrying beams above the trunnions on the front ends of said upper rolls connecting said cross beams, means for supporting the trunnions at the front end of said upper rolls on said roll carrying beams and the trunnions at the front end of said lower rolls on said lower front frame structure, vertical columns disposed in a plane spaced forwardly of said rolls and of said lower front frame structure a distance sufficient for the passage of an operator therebetween, said columns being attached to said cross beams for supporting the cross beams, said roll carrying beams and said rolls from a plane spaced forwardly of the rolls for unobstructed access to the front end of said rolls for feeding the sheet between the rolls and for the escape of moisture from between the rolls.

3. The combination in a paper machine of a water removing section arranged for free access to the front thereof comprising a plurality of lower rolls in parallelly spaced relationship, said rolls having axially disposed trunnions at their ends, a plurality of upper rolls in parallelly spaced relationship disposed above said lower rolls for the passage of a paper sheet alternately over adjacent upper and lower rolls through said section, said upper rolls having axial trunnions at their ends, lower frame structures disposed below the trunnions of said lower rolls, spaced cross beams extending across said machine in parallelism with said rolls to planes beyond the ends of said rolls and beyond said lower frame structures, roll carrying beams above the trunnions on said upper rolls connecting said cross beams, means for supporting the trunnions of said upper rolls on said roll carrying beams and the trunnions of said lower rolls on said lower frame structures, vertical columns disposed in planes spaced from the ends of said rolls and from said lower frame structures a distance sufficient for the passage of an operator therebetween, said columns being attached to said cross beams for supporting said cross beams, said roll carrying beams and said upper rolls from planes spaced forwardly and rearwardly from the ends of the rolls for unobstructed access to the ends of said rolls for feeding the sheet between the rolls and for the escape of moisture from between the rolls.

4. The combination in a paper machine of a water removing section arranged for free access to the front thereof for feeding the paper, removing the rolls, and for free ventilation comprising spaced lower rolls, spaced upper rolls spaced vertically from said lower rolls, trunnions disposed on the ends of said rolls, means for supporting the rear ends of said rolls, and means for supporting the front ends of said rolls comprising an upstanding lower frame section extending along the front side of the machine, supporting members extending upwardly from said frame section and supporting the trunnions of said lower rolls in spaced relation to said frame section, a plurality of columns spaced from said frame section in a plane parallel therewith a distance sufficient to permit the passage of an operator between said frame section and the columns, an elevated frame structure fixedly disposed on said columns in a plane spaced above said lower frame section a distance greater than the diameter of said rolls for the removal of said rolls endwise between said frames, and depending supporting members on said elevated frame structure for operatively supporting the trunnions at the front end of said upper rolls to provide unobstructed space at the front ends of said rolls for the circulation of air and for access to the space between said rolls from the front of the machine.

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