Nov. 4, 1924. 1,514,011

C. E. POPE

PAPER MAKING MACHINE

Filed Feb. 13, 1920 2 Sheets-Sheet 1

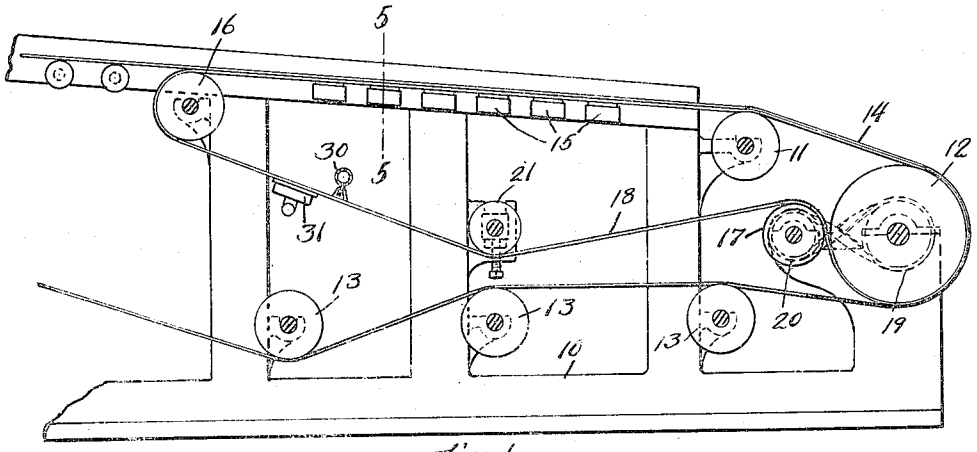


Fig. 1.

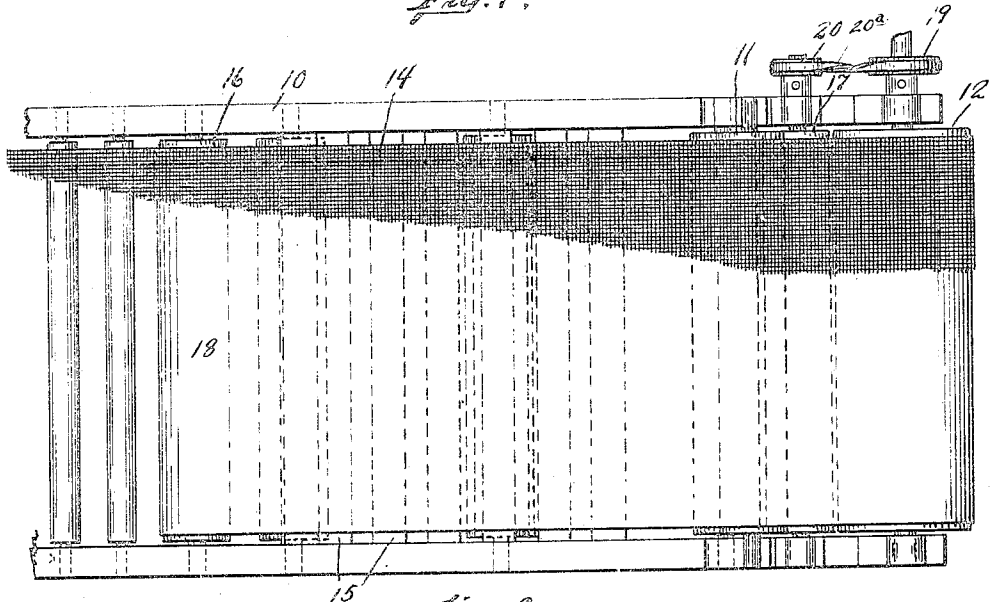


Fig. 2.

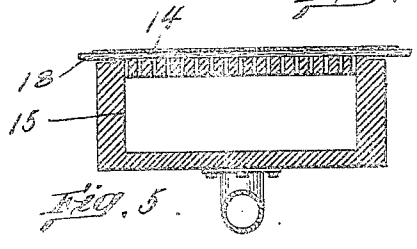


Fig. 5.

Inventor.

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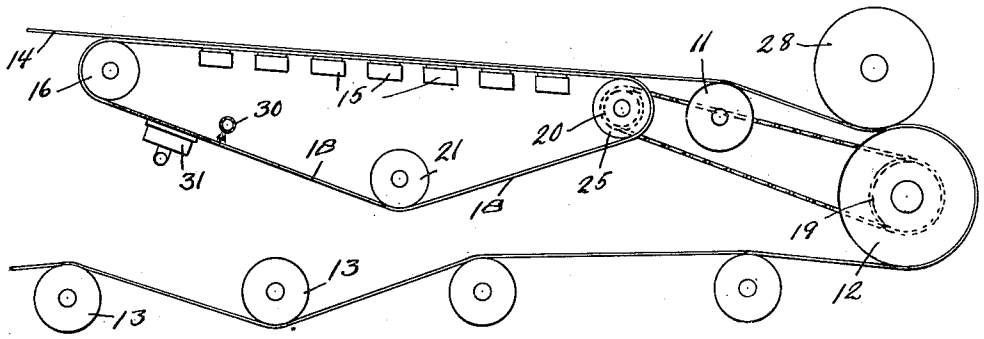


Fig. 3.

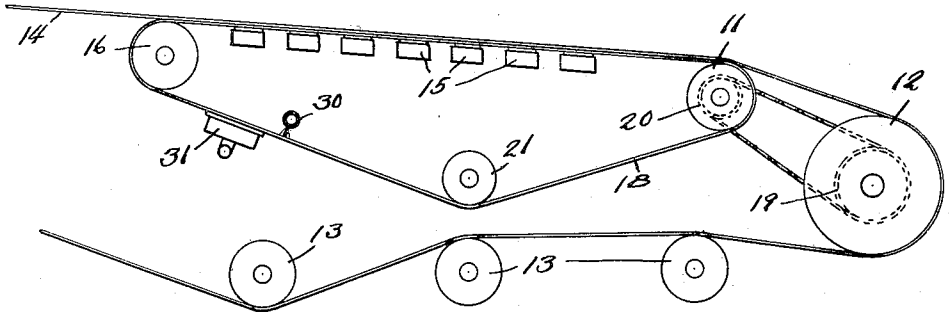


Fig. 4.

Inventor.
Charles E. Pope
by
Atty

Patented Nov. 4, 1924. 1,514,011

UNITED STATES PATENT OFFICE.

CHARLES E. POPE, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS TO GARRET SCHENCK, OF MILLINOCKET, MAINE, AND WILLIAM A. WHITCOMB, OF DEDHAM, MASSACHUSETTS: MARY A. POPE EXECUTRIX OF SAID CHARLES E. POPE, DECEASED.

PAPER-MAKING MACHINE.

Application filed February 13, 1920. Serial No. 358,350.

To all whom it may concern:

Be it known that I, CHARLES E. POPE, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented an Improvement in Paper-Making Machines, of which the following is a specification.

My present invention relates to Fourdrinier machines and has for its object to reduce wear on the papermaking wire.

It has long been known that a great part of the wear on the papermaking wire occurs on the bottom side thereof, or on that part in contact with the suction boxes and the couch roll, due to considerable pressure forcing the moving wire into frictional contact with the boxes, and due to the slipping of the wire on the lower couch roll because of the drag caused by the suction boxes.

Many patents have been granted for means to reduce the wear of the wire yet in practice the wire is run in direct frictional contact with the stationary suction boxes.

In carrying out my invention I interpose a travelling felt between the wire and those components of the Fourdrinier machine with which the wire is in frictional engagement, or with those components with which there is the greatest frictional engagement. In certain embodiments of my invention the felt may be co-extensive with that portion of the wire passing over the suction boxes and around the couch roll, and in other embodiments, it may be co-extensive with but that portion of the wire passing over the suction boxes. The felt may be driven by the couch roll, preferably assisted by a squeeze roll, or it may be otherwise driven, so that it travels with proper speed relation to the wire, whereby there is little or no slip between the felt and wire; and the felt takes the frictional drag of the suction boxes, and of the couch roll. The travelling felt materially assists the couch roll in driving the wire, even in that embodiment of my invention in which the felt is not passed about the couch roll, so that I may dispense with the upper couch roll.

Friction between the suction boxes and the felt, and consequently wear of the felt, occurs but is relatively unimportant when compared with wear of the papermaking wire.

Water is sucked from the paper web on the wire through the felt into the suction boxes and thereby removed, and the abstraction of water is about as effective as though no felt were interposed between the wire and boxes.

My invention may be applied as an attachment to existing Fourdrinier machines built according to present practice at little expense, and is of particular value when associated with fast running machines.

Fig. 1 is a side view of the suction box end of a Fourdrinier machine having associated therewith a preferred embodiment of my invention.

Fig. 2 is a plan view of Fig. 1 with the paper-making wire broken away to illustrate the travelling felt.

Fig. 3 is a diagrammatic representation of a modified embodiment of my invention wherein the felt is driven by an independent roll.

Fig. 4 is a diagrammatic representation of of a further modified embodiment of my invention wherein the felt is driven by the end roll.

Fig. 5 is a sectional detail along lines 5—5 of Fig. 1 illustrating the relation of the felt to the wire and a suction box.

As here shown that part of the usual type of Fourdrinier machines with which my invention is associated includes the supporting frame 10 bearing the end guide roll 11, the couch roll 12 and various wire stretching rolls 13 over and about which the paper making wire 14 is passed. A plurality of suction boxes 15 are carried by the frame beneath the wire. A guide roll 16 is suitably supported by said frame immediately in front of the suction boxes and close to the wire.

In practising my invention, I extend an endless traveling felt 18 of suitable texture and thickness about said guide roll 16 and over said end guide roll 11 immediately beneath and supporting the paper-making wire, and above and in engagement with the suction boxes. Said felt is further extended about the couch roll 12 and between it and

the wire, and about the squeeze roll 17. Said squeeze roll is suitably supported by the frame 10 close to and in front of said lower couch roll and arranged to be driven from said couch roll. For this purpose the shafts of the squeeze and couch rolls are provided respectively with pulleys 19 and 20 fixed thereto about which the belt 20^a is passed, whereby the squeeze roll is positively driven by the couch roll, although obviously other forms of driving means may be employed. Said driving means is so arranged that the squeeze roll is, preferably, driven at slightly greater peripheral speed than the couch roll whereby the felt in contact with the paper making wire is kept taut. A tension adjusting roll 21 suitably carried by the frame of the machine serves to stretch the felt to any desired tautness.

In the arrangement above set forth the felt is driven by the couch roll and maintained taut by the squeeze roll and will drive the wire and both will travel at identical speeds, and, as the wire is in contact with the felt only, at the suction boxes and driving points, there is substantially no frictional wear of the wire.

In the preferred embodiment as above set forth and illustrated in Fig. 1, the upper couch roll is not essential because the wire is driven by the felt with which it is in contact for a long distance, that is, from the suction boxes to the bottom of the couch roll. The felt is driven by the lower couch roll without the interposition of an upper couch roll. Owing to the fact that the felt can be flexed to any desired extent without injury, it is possible to use the squeeze roll 17 and thus give to the felt a frictional contact with the lower couch roll much longer than the contact ordinarily given to the wire, so that the squeeze of an upper couch roll is unnecessary. However, it is obvious that the use of an upper couch roll does not destroy the value of my invention, and undoubtedly, my invention, especially when applied to existing Fourdrinier machines, will be used in connection with the usual upper couch roll frequently.

In the embodiment of my invention illustrated in Fig 3, an intermediate felt driving roll 25 is suitably carried by the frame just beneath the papermaking wire and immediately to the rear of the suction boxes, and is driven from the couch roll, like the squeeze roll 17 of Fig. 1.

As illustrated in Fig. 3, the felt is coextensive only with that portion of the papermaking wire passing over the suction boxes and serves adequately to support and protect the wire from frictional engagement therewith. An upper couch roll 28 may be employed to assist in drivng the wire, but in general will not be found necessary, as the felt takes the friction of the suction boxes, so that the frictional contact of the wire and lower couch will ordinarily be sufficient to drive the wire.

In the modification illustrated in Fig 4, the felt is driven by the end roll 11 which is preferably positively connected with the couch roll for driving; and the intermediate roll 25 and also the upper couch roll 28 is omitted. This modification is more conveniently applied than that of Fig. 3 to some existing machines and gives a greater contact between felt and wire than the modification shown in Fig. 3, but I prefer the arrangement of Fig. 3 to that of Fig 4 for most machines.

In all of the embodiments of my invention the felt is interposed between the wire and the suction boxes as the friction between the wire and boxes is the most destructive to the wire, and in that embodiment in which the felt is additionally interposed between the couch roll and the wire, my invention is particularly efficacious in that it additionally protects the wire from frictional engagement with the couch roll. The fact that my invention renders an upper couch unnecessary is of the utmost value.

Because of the characteristics of felt, water will be uniformly drawn from the entire width of the paper web through the felt without appreciable interference.

As a precautionary measure, to continually maintain the felt at its state of maximum effectiveness, I may associate clearing means with it.

The clearing means is arranged to act on the felt during its return traverse, and includes the perforated pipe 30 arranged to direct a stream of water downwardly through the felt as it passes under the suction boxes on its return traverse, thereby to force out and remove any paper fibres which may adhere to the felt. A suction box 31 may be arranged beyond said perforated pipe 30 to remove the surplus water from the felt and also to assist in freeing it from fibres.

I claim:

1. In a paper-making machine, the combination with the paper-making wire and the suction boxes, of an endless wire-protecting and supporting travelling apron comprising a felt of textile fibres which is uniformly porous and relatively yielding and flexible disposed co-extensive with that portion of the wire extended over said suction boxes and interposed between the wire and suction boxes.

2. In a paper-making machine, the combination with the paper-making wire, the suction boxes and the couch roll, of an endless wire-protecting and supporting travelling felt co-extensive with that portion of the wire extending over the suction boxes and couch roll and interposed between the

wire and the suction boxes and couch roll.

3. In a paper-making machine, the combination with the paper-making wire, and the suction boxes, of an endless, wire-protecting and supporting travelling apron comprising a felt of textile fibres which is uniformly porous and relatively yielding and flexible disposed co-extensive with that portion of the wire extended over said suction boxes and interposed between the wire and suction boxes, and means to drive said felt and wire at equal linear speeds.

4. In a paper-making machine, the combination with the paper-making wire, the suction boxes and the couch roll, of an endless, wire-protecting and supporting travelling felt co-extensive with that portion of the wire extended over the suction boxes and about the couch roll and interposed between the wire and the suction boxes and couch rolls, and means to drive said felt at equal speed with the wire.

5. In a paper-making machine having a papermaking wire and suction boxes, an endless, wire-protecting and supporting travelling apron comprising a felt of textile fibres which is uniformly porous and relatively yielding and flexible disposed interposed over the suction boxes beneath the papermaking wire, and supporting and driving means therefor arranged to drive it at the speed of the wire.

6. In a paper-making machine having a paper-making wire, suction boxes and a couch roll, an endless, wire-protecting and supporting travelling felt interposed over the suction boxes and couch roll beneath the paper-making wire, and supporting and driving means for said felt arranged to drive it at the speed of the wire.

7. In a paper-making machine, the combination with the paper-making wire, the suction boxes and the couch roll, of an endless, wire-protecting and supporting travelling felt interposed between the wire and the suction boxes and couch roll, whereby it and the wire are driven at equal speed by the couch roll, and additional means to drive the felt.

8. In a paper-making machine, the combination with the paper-making wire, the suction boxes and the couch roll of an endless, wire-protecting and supporting travelling felt interposed between the wire and the suction boxes and couch roll, whereby it and the wire are driven at equal speed by the couch roll, and additional means to drive the felt arranged to be driven at a speed slightly greater than the speed of the wire.

9. In a paper-making machine, the combination with the paper-making wire, and the suction boxes, of an endless, wire-protecting and supporting travelling felt interposed between the suction boxes and wire, means to support and drive the felt at the same speed as the wire, and means to clear the felt of paper fibres.

10. In a paper-making machine, the combination with the paper-making wire, and the suction boxes, of an endless, wire-protecting and supporting travelling felt interposed between the suction boxes and wire, means to support and drive the felt at the same speed as the wire, and means to clear the felt of paper fibres comprising means to direct a stream of water through the felt during its return traverse.

11. In a paper-making machine, the combination with the paper-making wire, and the suction boxes, of an endless, wire-protecting and supporting travelling felt interposed between the suction boxes and wire, means to support and drive the felt at the same speed as the wire, and means to clear the felt of paper fibres comprising means to direct a stream of water through the felt during its return traverse and a suction box cooperating with said directing means to remove the water from the felt previous to its outward traverse.

12. In a paper-making machine having a paper-making wire, suction boxes and a couch roll, an endless, wire-protecting and supporting felt interposed between the paper-making wire and the suction boxes and the couch roll and driven by the couch roll whereby the felt and wire travel at the same speed, and additional means to drive the felt.

13. An attachment for paper-making machines, comprising an endless, wire-protecting and supporting felt adapted to be interposed between the paper-making wire and the suction boxes and the couch roll and to be driven by the couch roll and additional means to drive the felt arranged to be driven at a speed slightly greater than the speed of the wire.

14. In a paper-making machine having a papermaking wire and suction boxes, an endless wire-protecting and supporting travelling felt adapted to be interposed between the paper-making wire and the suction boxes and clearing means for the felt arranged to operate thereon during its traverse.

15. In a paper-making machine having a papermaking wire and suction boxes, an endless wire-protecting and supporting travelling felt adapted to be interposed between the paper-making wire and the suction boxes and clearing means for the felt arranged to operate thereon during its return traverse comprising means to direct a stream of water through the felt.

16. In a paper-making machine having a papermaking wire and suction boxes, an endless wire-protecting and supporting travelling felt interposed between the paper-making wire and the suction boxes and

clearing means for the felt arranged to operate thereon during its return traverse comprising means to direct a stream of water through the felt and a suction box to remove the water from the felt.

17. In a paper-making machine, the combination with the paper-making wire of an endless felt, arranged between the wire and the suction boxes and lower couch roll.

18. In a paper-making machine, the combination with the paper-making wire of an endless felt, arranged between the wire and the suction boxes and lower couch roll, said felt being driven by the lower couch roll and constituting the sole driving means for the paper-making wire.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES E. POPE.

Witnesses:
FRANK C. BOWLER,
WARREN D. SHUMWAY.