I. J. WITHAM.

SUCTION BOX FOR PAPER MAKING MACHINES.

APPLICATION FILED JULY 15, 1915.

1,171,999.

Patented Feb. 15, 1916.

3 SHEETS—SHEET 1.

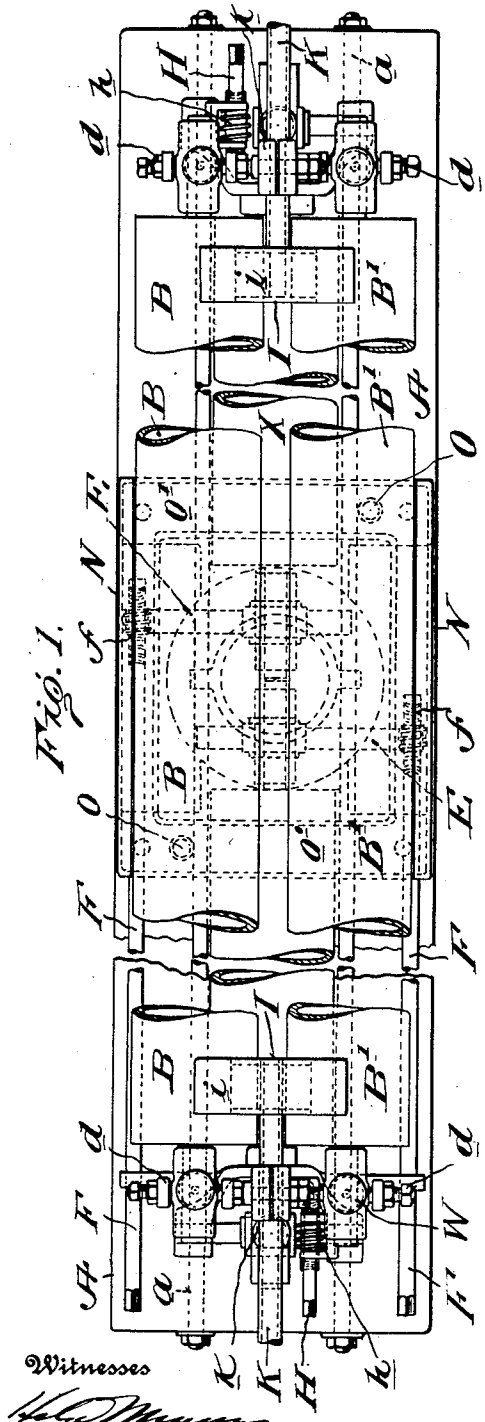


Fig. 1.

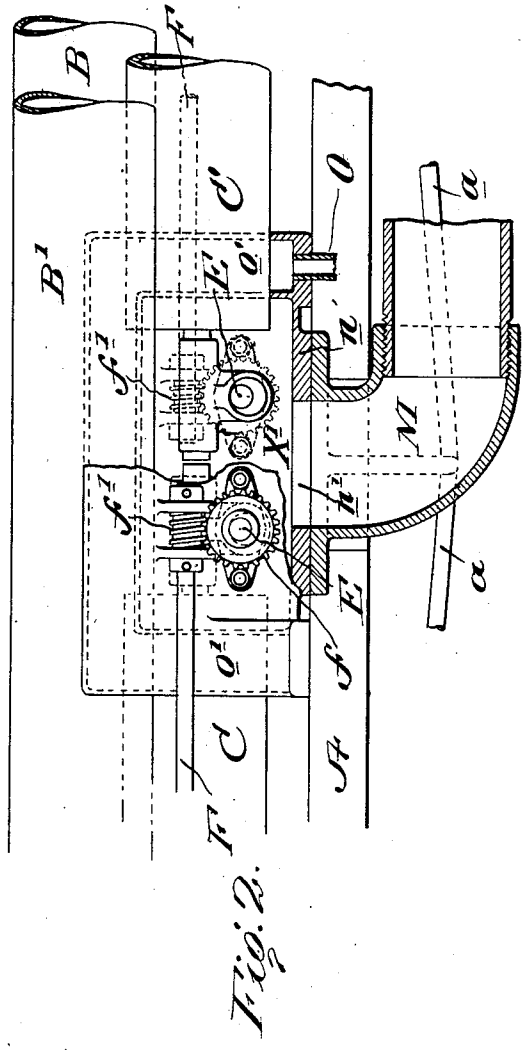


Fig. 2.

Witnesses

E. B. Francois.

Inventor

I. J. Witham

by his Attorneys

Baldwin & Wight

I. J. WITHAM.

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3 SHEETS—SHEET 2.

Fig. 3.

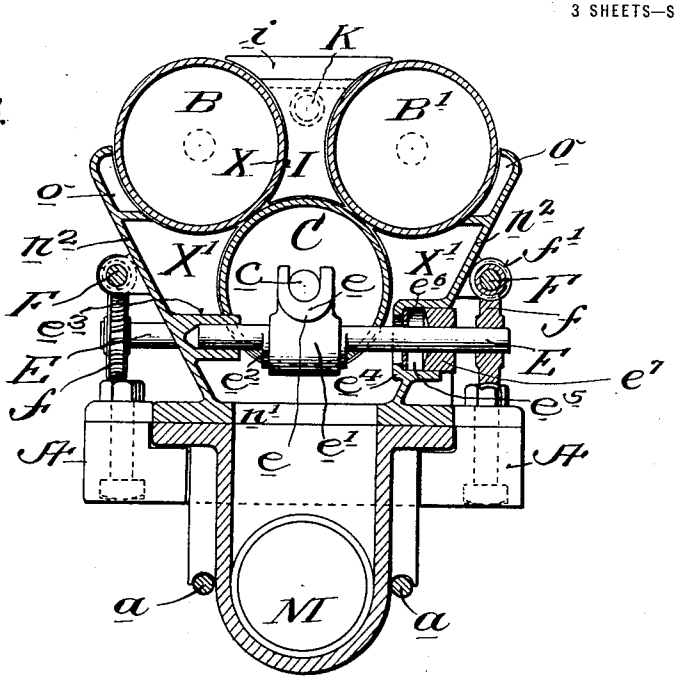
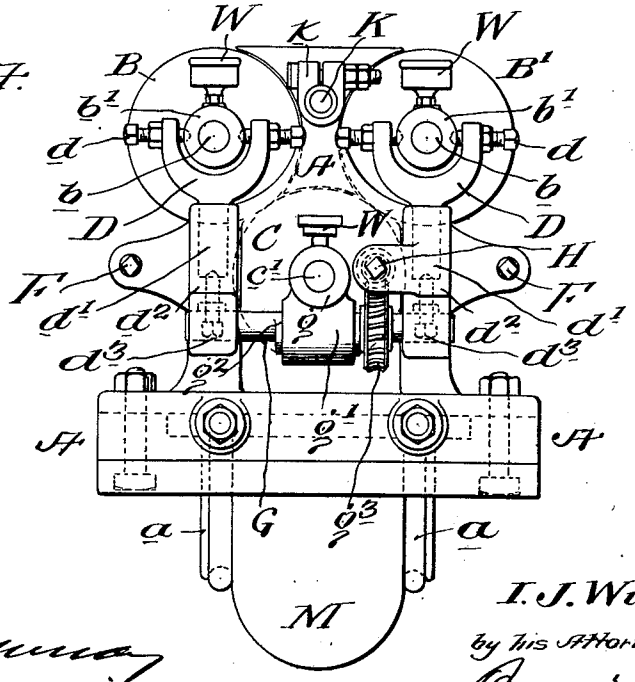


Fig. 4.



Inventor

I. J. Witham

by his Attorneys

Baldwin & Wight

Witnesses

E. C. Tanzini

I. J. WITHAM.

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3 SHEETS—SHEET 3.

Fig. 5.

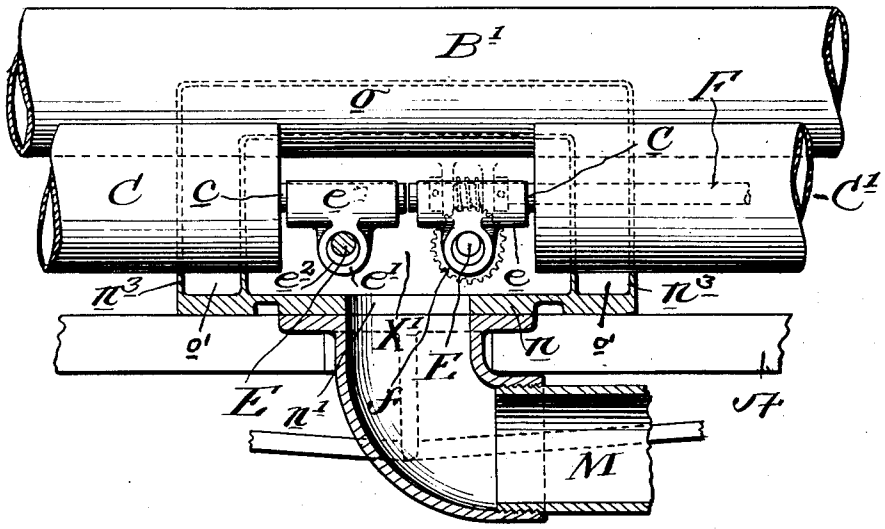
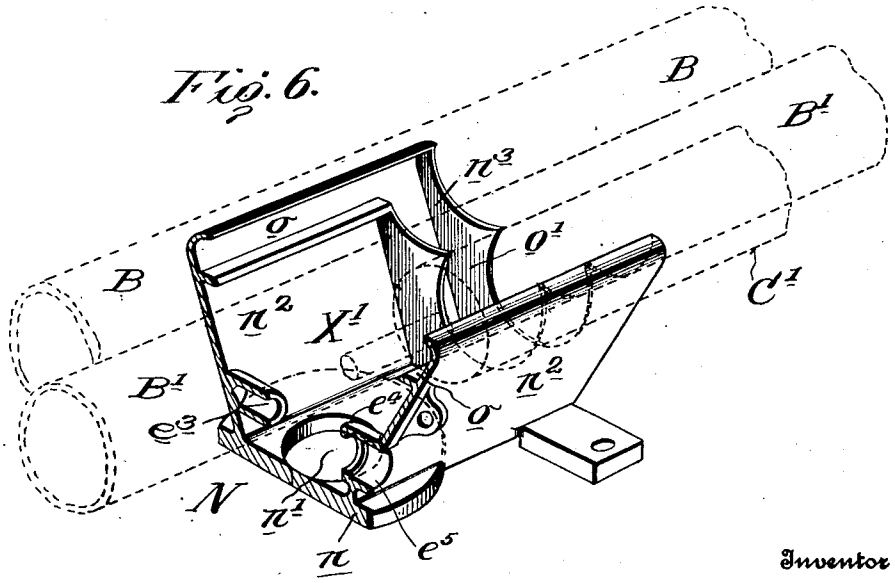


Fig. 6.



Witnesses

E. J. Frangoni.

Inventor

I. J. Witham

by his Attorneys

Baldwin & Wight

UNITED STATES PATENT OFFICE.

ISAAC J. WITHAM, OF HUDSON FALLS, NEW YORK, ASSIGNOR OF ONE-HALF TO GEORGE S. WITHAM, SR., OF HUDSON FALLS, NEW YORK.

SUCTION-BOX FOR PAPER-MAKING MACHINES.

1,171,999. Specification of Letters Patent. Patented Feb. 15, 1916.

Application filed July 15, 1915. Serial No. 40,034.

To all whom it may concern:

Be it known that I, ISAAC J. WITHAM, a citizen of the United States, residing in Hudson Falls, in the county of Washington and State of New York, have invented certain new and useful Improvements in Suction-Boxes for Paper-Making Machines, of which the following is a specification.

The object of this invention is to provide a suction box for paper making machines in which the friction between the Fourdrinier wire or felt and the box is reduced to a minimum. Usually the wire or the felt passes over the suction box in such close contact therewith as to produce a large amount of friction which necessitates the employment of considerable power to drive the wire or the felt and also causes such wear on them as to render them useless in a comparatively short time. Furthermore in the use of suction boxes of the usual construction the wire is not drawn smoothly through the machine and irregularities occur in the formation of the paper web owing to the fact that the friction produced where the wire traverses the suction box impedes the smooth and even movement of the wire while carrying the paper. I have found that by eliminating such friction or greatly reducing it, not only is the life of the wire or felt lengthened but materially less power is required to drive them and a more even web is produced.

I am aware that attempts have been made to provide frictionless suction boxes but so far as I know they have not gone into extensive use owing largely to the fact that they have not been equipped with efficient means for maintaining a good vacuum to provide the desired suction.

According to this invention I construct the box of rolls so mounted in a suitable frame as to provide a space or a chamber below the wire or felt which is water sealed in such manner as to prevent the entrance of air to the box except through the wire or except from that part immediately under the felt. The wire or felt passes for the most part in contact with rolling surfaces only, there being only a small part of the box in contact with the wire which is stationary.

My improvements are shown in the accompanying drawings, in which,

Figure 1 is a plan view of a suction box embodying my improvements, parts being broken away and other parts shown in dotted lines. Fig. 2 is a view partly in side elevation and partly in section of a portion of the suction box shown in Fig. 1, some parts being also shown in dotted lines. Fig. 3 shows a transverse section of the apparatus. Fig. 4 is an end elevation thereof. Fig. 5 is a detail view in section showing particularly the connection between the suction pipe and the vacuum space or chamber between the rolls. Fig. 6 is a detail view in perspective and in section of the casing of the vacuum space showing by dotted lines how the rolls are associated with said casing.

Different parts of the frame are indicated in the drawings by the letters A and *a*. These may be of any suitable construction and need not be described in detail. In this frame are mounted four rolls B, B′ and C, C′. The former rolls are horizontally arranged parallel with each other and extend from one end of the frame to the other with a space X between them. The latter rolls are comparatively short and each extends from one end of the frame toward the other but terminates one side of the middle portion of the frame so as to leave a space X′, as best shown in Fig. 5. These rolls C, C′ are in the same vertical and horizontal planes their axes being in a vertical plane intermediate the rolls B, B′, which latter are in close contact with the rolls C, C′, as shown in Fig. 3. Each roll B, B′ has its trunnions *b* mounted in sleeve bearings *b′* supported by coned screws *d* carried by yokes D each having a stem *d′* entering a socket d^2 and resting on a vertically adjustable screw d^3 by means of which the roll may be adjusted vertically. By these last named devices each roll B, B′, can be vertically adjusted at each end and it can be also adjusted sidewise relatively to the rolls C, C′. The parts marked W in the drawings are grease cups which are preferably employed. Each roll C, C′ is also provided with means for adjusting it. The inner end of each said roll has a trunnion *c* resting in an open bearing *e* which has a strap *e′* sur-

rounding an eccentric e^2 on a transverse shaft E, the inner end of which enters a bearing e^3 in the frame and the outer end of which passes through a bearing e^4 and carries outside said bearing a worm wheel f gearing with worm wheel f' on a longitudinal horizontal shaft F extending to one end of the frame and adapted to receive a wrench or other device for turning it. In this way the inner end of each roll C, C' may be raised and lowered and properly adjusted with relation to the upper rolls B, B'. The bearing e^4 is sealed in such manner as to prevent the entrance of air through it.

It will be observed by reference to Fig. 3 that the eccentric e^2 is formed in one piece with the shaft E. The shaft with its eccentric are inserted through the opening e^5 and the inner end of the shaft is seated in the bearing e^3. The bearing e^4 is closed by means of the washer e^6 and the follower e^7 between which packing material is interposed. The outer end of each roll C, C' is also provided with similar means for raising and lowering it. These devices are shown in Fig. 4 where c' indicates the outer trunnion of one of the rolls which enters a sleeve bearing g carried by a strap g' surrounding an eccentric g^2 similar to the eccentric e^2 and which is carried by a shaft G to which is attached a worm wheel g^3 operated by a worm h on a shaft H. The outer trunnion of each lower roll C, C' is provided with such adjusting devices. In this way the lower rolls may be so adjusted as to insure close airtight contact with the upper rolls and exclude air from the suction box and such adjustment is permanent, not being disturbed by the jar of the mechanism. The lower rolls serve to support the upper ones and provide roller bearings therefor. Any tendency for the upper rolls to sag or bend in their middle portions is eliminated and they are at all times maintained in true and even horizontal positions. As the wire or felt traverses them they are made to revolve and thus friction is reduced to a minimum.

The space X extends from one end of the frame to the other between the upper rolls and it is adapted to receive water from the widest wire or felt, but in order to adapt this space to wires or felts of different widths, I employ the head blocks I which enter the space X between the top rolls and are made adjustable toward and from each other. Each of said head blocks may be made of metal topped with wood i to reduce friction, the wood preferably being arranged with its grain parallel with the direction of the movement of the wire or felt and these pieces of wood may be made detachable so that they may readily be renewed when worn. Each head block has its side and bottom edges disposed close to the rolls leaving only a narrow space between its edges and the rolls, as indicated in Fig. 3. Each head block is channeled as indicated to receive water and to provide a water seal which excludes air and the block is supported by a pipe K which extends through a clamp k on one end of the frame. By these devices each block may be adjusted to the desired extent and held firmly in place while water may be supplied to the channeled heads through the pipes in such manner as to keep the channels full of water and to also fill the spaces between the edges of the blocks and the rolls. In this way also an efficient lubricant is afforded between the rolls and the blocks. The excess water, of course, passes to the suction pipe. The suction pipe M opens into the vacuum chamber X' in the manner indicated particularly in Figs. 3 and 5 and said vacuum chamber is surrounded by a water seal of novel construction. As shown it comprises a casing N having a base n formed with an opening n' connected with the suction pipe, sides n^2 and ends n^3 shaped to accommodate the upper and lower rolls. The sides and ends of the casing are channeled to afford water seals surrounding the vacuum chamber. For this purpose each side piece has a horizontal channel o at its upper end and each end of the casing has a channel o'. Water is admitted to the channel casing at O and escapes into the vacuum chamber X' but the supply is greater than the leakage and an efficient water seal is provided which prevents the entrance of air around the lower portions of the two sets of rolls to the vacuum chamber, other means hereinbefore described being provided to prevent the entrance of air to the vacuum chamber except through the space between the head blocks and the upper rolls.

By the mechanism shown and hereinbefore described I am enabled to withdraw water from the paper web carried by a Fourdrinier wire or a felt most efficiently and with a minimum amount of friction. Comparatively small power is required to drive the wire or felt and to operate the suction apparatus owing largely to the fact that the apparatus produces a minimum amount of friction and the leakage of air to the suction or vacuum chamber is reduced to a minimum. The rolls are mounted in bearings which may be quickly and conveniently adjusted to maintain their proper relation with each other and with the water seals to insure the least amount of friction and the greatest security against the reduction of the efficiency of the operation by the entrance of air thereto.

I claim as my invention:

1. A suction box for paper making machines, comprising a pair of parallel horizontally arranged rolls with a space between

them and a pair of supporting rolls therefor arranged beneath said space and having a space between their inner ends to afford a suction chamber, and means for sealing said space against the entrance of air thereto.

2. A suction box for paper making machines, comprising a pair of parallel horizontally arranged rolls with a space between them, head blocks arranged in said space and adjustable toward and from each other, a pair of rolls on which said first mentioned rolls rest arranged below the space between said upper rolls and having a space between their inner ends to provide a vacuum chamber and means for sealing said vacuum chamber against the entrance of air.

3. A suction box for paper making machines, comprising a pair of parallel horizontally arranged rolls with a space between them, head blocks arranged in said space and provided with chambered water seals, other rolls arranged below said upper rolls having a space between their inner ends and serving to support the middle portions of said upper rolls, and a casing surrounding said space and provided with means for excluding air therefrom.

4. A suction box for paper making machines, comprising a pair of parallel horizontally arranged rolls having a space between them, means for adjusting said rolls vertically and sidewise, end blocks arranged in the space between said rolls, means for adjusting said end blocks toward and from each other, other rolls arranged below said upper rolls having a space between their inner ends and means for adjusting said lower rolls at both their inner and outer ends.

In testimony whereof, I have hereunto subscribed my name.

ISAAC J. WITHAM.

Witnesses:
GEORGE S. WITHAM, Sr.,
GEORGE G. DURANT, Jr.