R. MARX.

ROTARY SUCTION ROLL OR VACUUM COUCH ROLL FOR USE IN PAPER MAKING MACHINES.

APPLICATION FILED OCT. 19, 1911.

1,091,941. Patented Mar. 31, 1914.

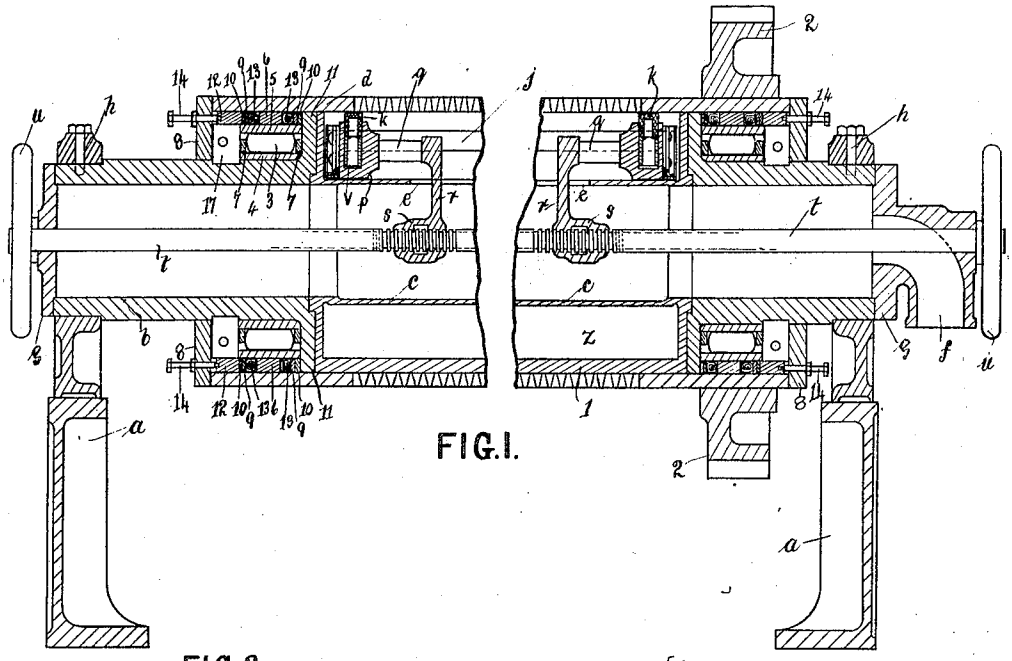


FIG. 1.

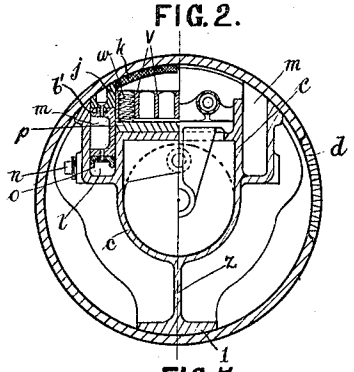


FIG. 2.

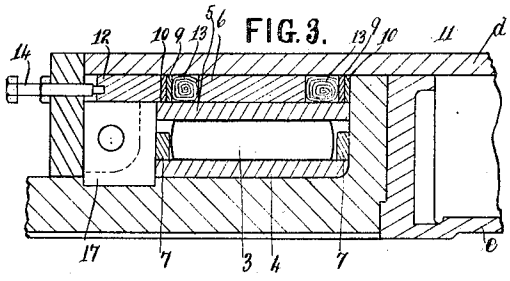


FIG. 3.

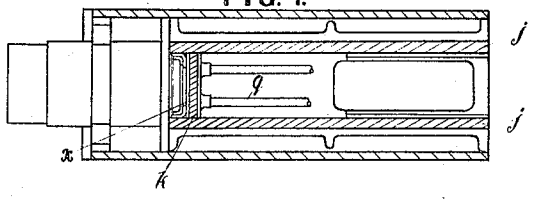


FIG. 4.

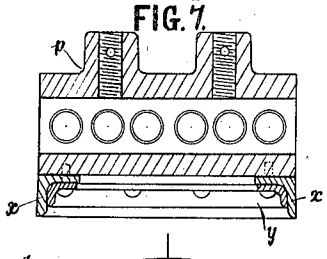


FIG. 7.

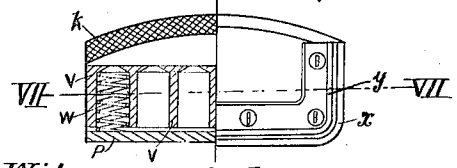


FIG. 5.

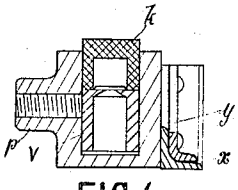


FIG. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

ROBERT MARX, OF LONDON, ENGLAND.

ROTARY SUCTION-ROLL OR VACUUM COUCH-ROLL FOR USE IN PAPER-MAKING MACHINES.

1,091,941. Specification of Letters Patent. Patented Mar. 31, 1914.

Application filed October 19, 1911. Serial No. 655,521.

To all whom it may concern:

Be it known that I, ROBERT MARX, engineer, a subject of Great Britain, residing at 133–139 Finsbury Pavement, London, England, have invented certain new and useful Improvements in or Applicable to Rotary Suction-Rolls or Vacuum Couch-Rolls for Use in Paper-Making Machines, of which the following is a specification.

This invention relates to improvements in or applicable to rotary suction rolls or vacuum couch rolls for use in paper making machines.

An object of the invention is to mount a stationary suction box having an open top within a perforated drum or cylinder in such a way that said box is immovable radially of said cylinder and nevertheless an effective airtight joint is afforded between the interior of said cylinder and the edges bounding said open top.

Further objects are to provide antifriction bearings if desired of a more or less fluid tight nature between said drum and said box, to improve the construction and arrangement of members which produce said airtight joint between said drum and suction box, and generally to provide an apparatus in which the suction box is prevented from being drawn against the drum so that any wear comes upon the joint making members and is distributed over a considerable area, the result being that less driving power is required, the vacuum is more efficiently maintained, the wear parts are renewable in a simple manner and at low cost, and the power consumption by the pumps and the machine is considerably reduced.

The invention is illustrated in the annexed drawings forming part of this specification and in which—

Figure 1 is a central longitudinal section of an improved suction roll machine. Fig. 2 is a transverse section. Fig. 3 is a longitudinal sectional view of a bearing detail to a larger scale. Fig. 4 is a more or less diagrammatic plan view of the arrangement of packing members. Fig. 5 is partly an end elevation and partly a transverse section of one end packing member and its holder. Fig. 6 is a section taken at right angles to the section in Fig. 5 and Fig. 7 is a plan section taken on the line VII—VII of Fig. 5.

Referring to the drawings, *a*, *a* are suitable standards or supports, and fixedly connected thereto, are hollow trunnions *b*, which form extensions of the central suction box *c*.

d is a rotary drum mounted on the trunnions *b* in the manner hereinafter described.

The suction box *c* is provided with an aperture *e* which communicates with the suction chamber proper, and *f* is a suction connection at the end of one of the hollow trunnions *b* for exhausting the air from the suction chamber through the suction box. The ends of the hollow trunnions are hermetically sealed by disks *g*, and these trunnions may be fixed in the supports by means of the set screws *h*, so as to permit the adjustment of the suction box to meet the various requirements. The sides of the suction box are formed by a plurality of longitudinally extending bars which are seated in chambers *m*, as clearly shown in Fig. 2. These bars may be made in one piece, but I prefer to form them of a plurality of pieces, as illustrated in the drawings. Each of these members comprises the upper strip *j*, which is arranged to engage the inner periphery of the drum, and which is secured to a ram *b'*, so that the entire bar is movable in a vertical direction in the chamber *m* to hold the upper face thereof in contact with the inner periphery of the drum. The end members extend from bar to bar, and from the bottom of the suction chamber to a point adjacent to the inner periphery of the drum. Each of these end members comprises a holder *p* the full width of the suction chamber, and which is provided with a transverse groove, as clearly shown in Fig. 7. Movably mounted in this groove is a slider *v*, which is normally held in its upward position by means of a plurality of springs *w*, seated in openings in the bottom of the holder, which bear against the bottom of the groove in the holder. Seated within this groove above the slider *v*, is a packing member *k*, which extends from side bar to side bar, and is held in contact with the inner periphery of the drum *d* by means of the spring *w*, which holds the slider in its

elevated position. These packing strips *k* may be of inverted U-shape in cross section, the limbs of the U extending downwardly and rest on the slider *v* in the groove in the holder *p*.

Connected to the lower end of each of the end members, is a longitudinally extending leather packing which is arranged to form a tight joint between the sides of the chamber *m* and the members forming the sides of the box. Water under pressure is admitted to the spaces beneath these packing members *o* through a pipe *n* to hold the side members in their elevated position.

It will readily be understood from the foregoing description that the side members engage the end members throughout the entire height of the side members, which will avoid any leakage between the side and end members. The packing strips *k* prevent leakage between the end members and the inner periphery of the drum, and as the side members are held in contact with the inner periphery of the drum by means of hydraulic pressure, an air-tight joint will be formed between the drum and the side members.

Packing leathers *x* are fitted along the sides and bottom edges of the holders *p*, being fixed thereon by the angle bars *y*, and having for their purpose to prevent leakage of water or air past such holders into the vacuum or suction box *c*. At a point diametrically opposite its aperture *e*, the suction box *c* is formed with a web or support *z* carrying a foot piece 1, the lower surface of which is part-cylindrical to fit the interior surface of the drum *d*.

The drum *d*, which is driven for example by the toothed ring 2 shrunk or otherwise fixed thereon, runs upon the antifriction bearings around the trunnions *b*. Such bearings may comprise rollers 3 running upon steel sleeves 4 fixed on the trunnions *b* and within a steel casing or bushing 5 which is connected with the drum *d* by a ring 6, preferably of cast iron, which is slidable between the drum *d* and casing 5 but is non-rotatable in relation therewith. The rollers 3 run between the end spacing rings 7, and the assembled parts of the bearings are secured in place by a divided cast iron ring 17 which is interposed between the cover ring 8 and the bearing parts. Rings 9 are arranged to turn with the casing 5 and similar rings 10 are arranged between the inner rings 9 and the flanges 11 on the trunnions and also between the outer rings 9 and sliding rings 12. In the spaces between the ends of the rings 6 and the rings 9 are inserted rolls 13 of sheet asbestos impregnated or covered with rubber and well greased, or any other suitable packing material and it will be seen that by screwing up the bolts 14 the rings 12 will be forced inwardly in the axial direction, thereby compressing the rolls 13 and causing them to make a tight joint between the drum *d* and the casing 5. At the same time the axial pressure due to the screwing up of the bolts 14 does not set up undue friction owing to the presence of the rings 9 and 10, which rub against one another and take the wear, as well as preventing binding of the drum to the stationary parts as might happen in the absence of these rings 9 and 10.

It will be seen that in an apparatus fitted with these improvements, the fluid tight sliding joint between the drum *d* and the suction box *c* is quite independent of the atmospheric pressure which in previous machines of this type, was utilized to force these parts together when a vacuum was set up in the suction box *c*. Consequently, heretofore, if a high degree of vacuum were employed the suction box and drum were held together so tightly that the drum became practically inoperative. In other cases the high vacuum could not be maintained owing to faulty packing arrangements. Now in the improved arrangement the suction box *c* is absolutely prevented from moving out of concentricity with the drum *d* and the formation of the fluid tight sliding joint is entirely due to the operation of the packing strips and bars *j k*, consequently the degree of vacuum employed may be as high as it is possible to obtain and nevertheless the power required for driving is reduced. In addition, the drying action is increased by the higher degree of vacuum which can and may now be employed.

It must be pointed out that it is important to provide means for preventing leakage between the holders *p* and the drum *c* and between the longitudinal packing strips *j* and the ends of the transverse packing strips *k* and their holders *p*. Reference to Figs. 2 and 4 will show that the ends of the strips *k* fit nicely against the strips *j* and the upward pressure upon the strips *j* by the rams *l*, not only causes the upper edges of the strips *j* to press tightly against the interior of the drum, but, owing to the engagement of the curved surfaces of the strips *j* and drum *d*, there may be a tendency for the strips *j* to move laterally a little and to tightly press against the ends of the strips *k*. When the transverse packing strips *k* are moved toward one another from the position seen in Fig. 1, it will be noticed that the water and air has access to the spaces on the outer sides of the strips *k* and their holders *p* through the side perforations in the drum. In these circumstances the packing leathers *x*, which extend down the sides and along the bottom of the holder *p*, prevent such water and air from leaking past the holder into the suction box *c*.

The roller bearing which preserves the concentricity of the drum *d* with the trunnions *b* and also facilitates the movement of

the drum, is protected against the entry of water or liquor by the rolls of packing material 13 hereinbefore described and the tightness of the packing can be adjusted as desired through the agency of the adjusting screws 14 and the axially slidable rings 12 and 6.

The invention is not confined to the use of a suction box of the particular cross section described, as other known forms can be substituted without departing from the invention.

The arrangement comprising hydraulic devices for forcing the longitudinal packing bars *j* upward and springs for forcing the transverse strips or bars *k* upward, offers many practical advantages. The longitudinal bars being of great length require to be pressed upward with uniform pressure along their whole length and this uniform effect is attained by hydraulic means which are readily applied owing to the holders of the longitudinal strips or bars *j* being relatively immovable. As the transverse bars or strips *k* are comparatively short, springs are effectively applied for operating upon such bars and, as the holders *p* are slidable, the use of springs obviates any difficulty which might be encountered in supplying hydraulic pressure to such slidable holders *p*.

The direct contact between the transverse packing members and the longitudinal strips is important for various reasons. Heretofore it was proposed to guide the longitudinal strips between fixed walls both of which extended substantially to the inner face of the perforated drum, but which necessarily were slightly spaced from said drum, in order to afford necessary clearance. The transverse packing members operated against the inner faces of the inner walls. As a result there was a material amount of leakage over the edges of the inner guide walls and apparently eddy currents were formed which at the take-off point of the roll caused variations in suction and consequent change of the take-off point. This was apt to cause the breakage of the sheet and at times non-uniform drying. By having direct contact between the transverse packing members and the longitudinal strips, the available suction with the consequent breaking of the sheet is eliminated. Furthermore, the efficiency of the apparatus is increased and the useless leakage of air into the suction box is diminished.

I claim:—

1. A vacuum couch roll, having a suction chamber, a perforated drum surrounding said chamber, spaced longitudinal packing strips forming the sides of said chamber, means for holding said strips in contact with the drum, transverse members forming the ends of said chamber, said transverse members contacting snugly with the longitudinal packing strips from the bottom of the chamber to the upper edges of said transverse members, there being tight joints formed between the bottom of the chamber and the end members and between the end members and the longitudinal packing strips, there being a transverse groove in the top of each end member, a transverse packing member seated in the groove in each end member extending from one longitudinal packing strip to the other longitudinal packing strip, there being a tight joint formed between said transverse packing and the drum, means for holding said transverse packing members in contact with the drum, said packing members and the longitudinal packing strips being arranged to move independently of each other, and means for moving said end members toward and from each other, substantially as described.

2. A vacuum couch roll having a fixed inner suction box capable of angular adjustment, a perforated drum rotatably mounted on the box, spaced longitudinal packing strips for maintaining the joints between the box and drum, pressure means for holding said strips in contact with the drum, transverse packing members located between the longitudinal strips and completely bridging the space between them, said packing members being relatively adjustable toward and from each other and each comprising a holder, packing mounted on the holder and engaging the drum, yielding means for maintaining the packing in contact with the drum and packing forming a tight joint between the holder and box and permitting the adjustment of said holder.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

ROBERT MARX.

Witnesses:
HERBERT D. JAMESON,
CLARENCE P. LIDDON.