Nov. 2, 1937. J. D. HUNTER ET AL 2,098,044

VACUUM EXTRACTOR

Filed Jan. 14, 1937 2 Sheets-Sheet 1

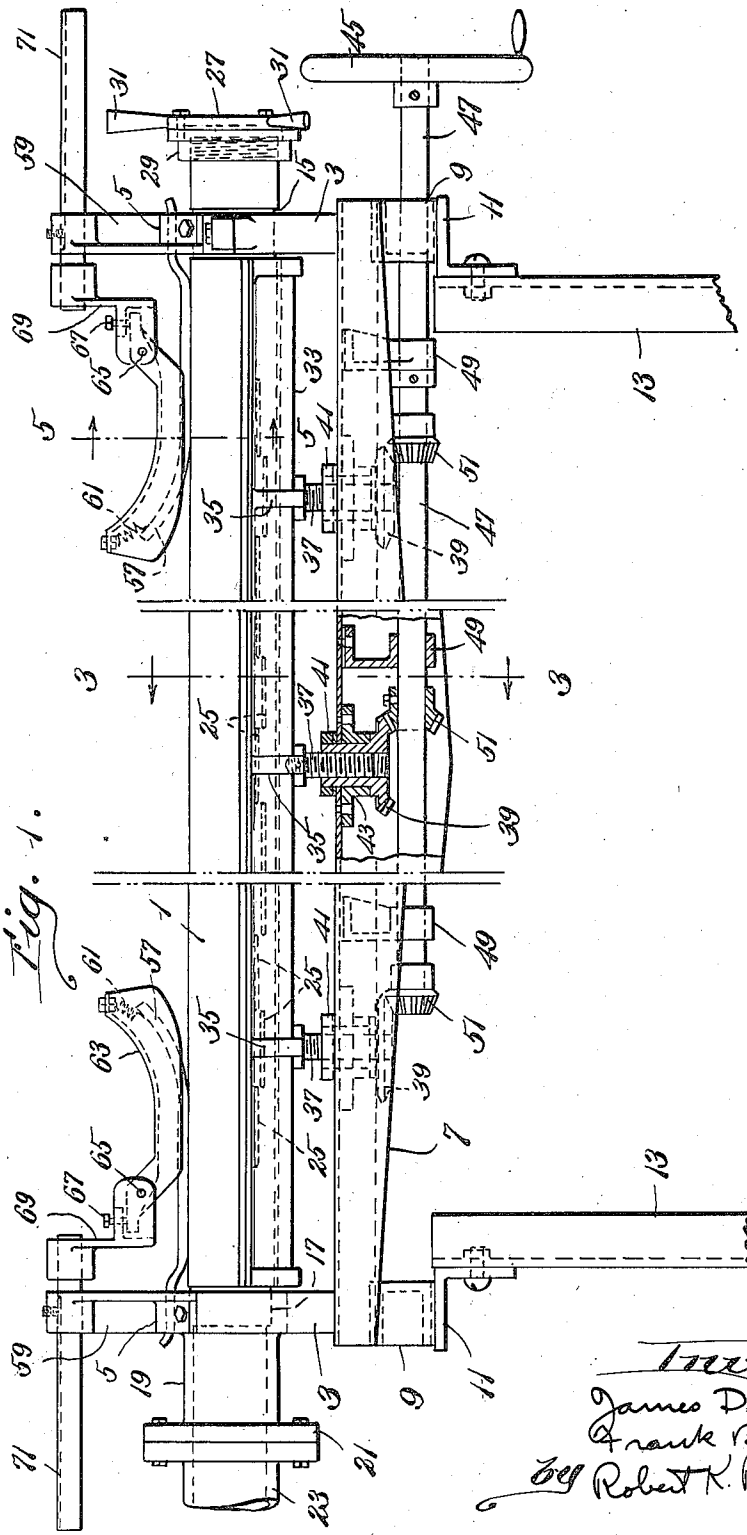


Fig. 1.

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Fig. 2.

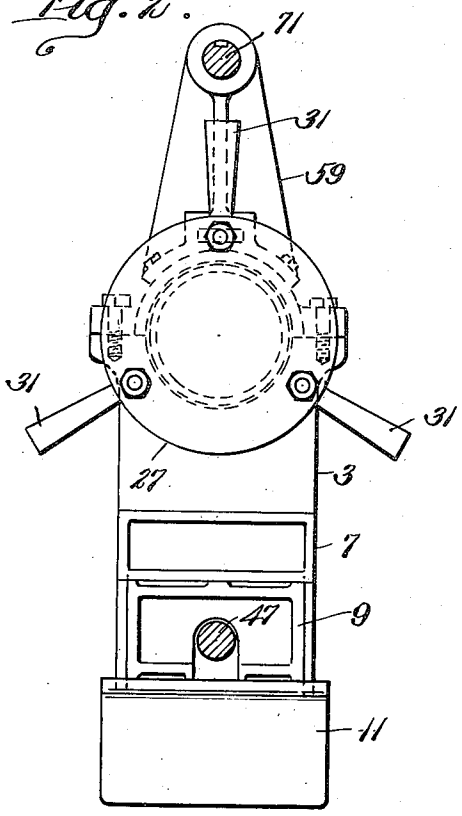


Fig. 3.

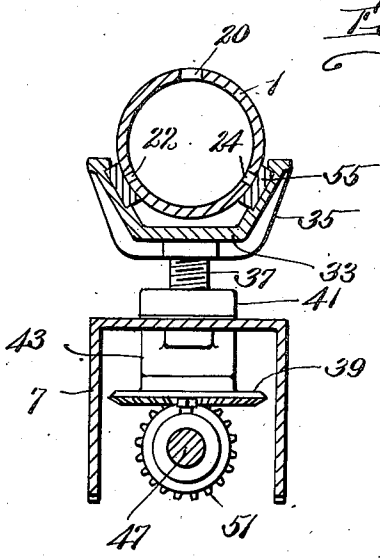


Fig. 4.

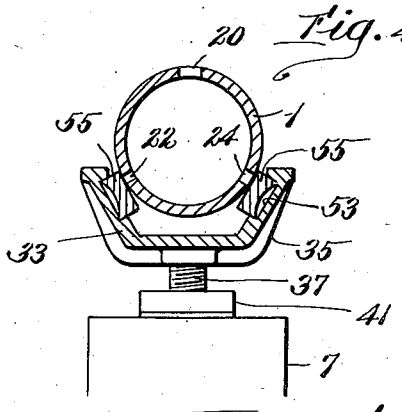
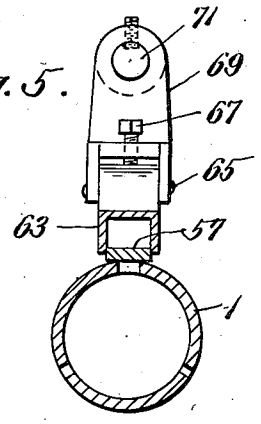


Fig. 5.



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VACUUM EXTRACTOR

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Application January 14, 1937, Serial No. 120,637

7 Claims. (Cl. 34—48)

The invention relates to vacuum extractors, which are used in cloth finishing operations and in other connections to suck water and other solutions and liquids out of web materials while traveling in spread-out relation.

The efficiency of the action of the vacuum extractor in removing the water or other liquid more or less completely from the fabric is proportional to the velocity of the flow of the air through the fabric. High velocity necessitates a fairly high degree of vacuum. On light-weight fabrics the resistance of the cloth to the passage of the air therethrough is so slight that the degree of vacuum needed for proper extraction cannot be built up if the slot or suction port across which the fabric is passed for extraction has any great degree of width. On the other hand, heavy weight fabrics offer considerable resistance to the flow of the air therethrough and therefore permit the building up of a high vacuum even with the use of a relatively wide slot. Thus on these heavy weight fabrics it is possible and desirable to have a wider slot than that needed for light-weight fabrics, so that each unit of area of the fabric will be subjected to the flow of air through it for a greater period of time than would be possible in the case of a narrow slot, and thus will be more thoroughly dried. It thus is desirable, in the extracting of liquids from different weights of fabrics, to utilize the widest possible slot which is compatible with the maintenance of adequate vacuum to insure ample velocity through the given thickness of fabric.

Since it is not practicable for obvious reasons either to change the capacity of the vacuum pump or to run it efficiently at other than its rated capacity, efficiency and economy have been sacrificed in favor of simplicity, and a single width of slot connected with a vacuum pump of fixed capacity has been made to do duty throughout a wide range of fabric weights, as no very useful means of doing otherwise was available.

In order to make it possible to adapt the width of the slot of a vacuum extractor more or less closely to that best fitting the capacity of the vacuum pump with respect to any given weight of fabric, I have provided an extractor of this type in which there are a plurality of slots of different widths, of which the most suitable one may be brought into operation upon the given fabric, while means are provided for cutting off the inflow of air into the system through the slots which it is not desired to use at such time.

In the preferred form, though not necessarily, the several slots of different widths are made in the same extractor tube, with provision for rotation of such tube upon its own axis to bring the selected slot into working relation with the fabric while being passed over such tube in contact therewith in spread-out relation, such selection desiredly being made possible without detaching the extractor tube from its operating and air-tight connection with the piping of the vacuum system. Cut-off means are provided to stop the flow of air through the unused slots, and in the preferred embodiment of the single tube having several slots of different widths such cut-off means is employed to hold the tube against rotation and with its selected slot in operative relation to the fabric.

Other aims and features of the invention are as will be made plain hereinafter.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which

Fig. 1 is a side elevation of the improved vacuum extractor.

Fig. 2 is a view in elevation from the right-hand end of Fig. 1, with the wheel which operates the sealing means removed.

Fig. 3 is a section on line 3—3 of Fig. 1, showing the unused slots fully sealed.

Fig. 4 is a corresponding view to Fig. 3, showing the sealing means in partially-applied relation.

Fig. 5 is a section on line 5—5 of Fig. 1, giving details of the end-seal for the slot.

Referring to the drawings:

The extractor tube 1 is rotatably mounted in bearings in connection with brackets 3, mounted on a channel-member or girth 7 suitably secured to blocks 9 which in turn are affixed to angles 11 attached to supports 13. At the right-hand end, as viewed in Fig. 1, the tube is mounted directly in a closely-fitting and correspondingly-shaped bearing in the bracket 3, and confined therein by a cap 5, the tube being reduced near its end as indicated at 15 to form shoulders preventing endwise movement of the tube in its mounting. The other end of the tube is also reduced as indicated at 17, and is seated within the closely-fitting counterbored inward end of a tubular member 19 forming a part of bracket 3. This member 19 is equipped with a flange 21, to which is bolted the end-member 23 of the vacuum pipe line attached to the intake port of the vacuum pump (not shown) which may be of any usual or preferred type.

As shown in Figs. 3, 4 and 5, the extractor tube 1 is provided with a plurality of slots 20, 22, 24, or, more accurately speaking, a plurality

of rows of slots, as each "slot" is in reality a series of relatively short disjoined longitudinally-disposed slots **25** arranged in staggered relation in a longitudinally-extending row with the proximate ends of each pair in the same radial plane of the tube, to retain more of the strength of the tube, as is common in known vacuum extractors. The term "slot" in this description and in the appended claims is to be understood to signify both the continuous and the illustrated discontinuous types of slot. In the present instance, the slots **20**, **22**, **24**, or rows of slots, are three in number, disposed in equidistant relation about the circuit of the tube, and being respectively of large, small, and medium width.

In use, the tube is rotated about its axis to locate at top center the slot selected for use on a particular fabric to be extracted. For this purpose the clean-out cap **27** which is bolted to collar **29** threaded onto the end of the extractor tube is provided with handles **31** coinciding in alignment with the several slots, and thereby quickly indicating the position of the latter.

To close the slots which are not in use, in order to prevent waste of air or "vacuum", a trough **33** is disposed beneath the extractor tube, being fixed to U-shaped members **35** which are screwed and pinned onto jack-screws **37** in screw-threaded engagement with the interior bores of bevel-gears **39** rotatably mounted by means of their sleeves and collars **41** in bearings **43** fixed within the channel of girth **7**. A hand-wheel **45** on the outward end of a shaft **47** journalled in bearings **49** also within the channel imparts rotation to the bevel-gears to raise and lower the trough **33**, by means of bevel pinions **51** fixed on shaft **47**.

The two inclined walls of trough **33** are each recessed as indicated at **53**, Fig. 4, to receive sealing strips or packings **55** of proper length, breadth, and spaced relation to be pressed against and thus to close and seal the two unused slots, herein **22** and **24**, at the under side of the extractor tube, when the wheel is manipulated to force the trough upward toward the tube. These sealing strips are of rubber or other suitable impervious material, and are so shaped either inherently or by nature of their engagement with the recess **53** that, as shown in Fig. 4, when not pressed against the tube they will present a concave surface toward the bottom of the recess **53** and a flat or convex surface to the tube. Fig. 4 shows the shape-relation of the sealing strips, during the raising of the trough as the sealing strips come into contact with the tube at and adjacent the two unused slots. As the raising of the trough continues, the strips are pressed flat into their recesses **53** and their surfaces toward the tube conform to the surface of the tube, extending their engagement over the full height of the strips as shown in Fig. 3, and effectually sealing the unwanted slots completely over their full length.

The frictional engagement of the sealing strips **55** with the exterior of the extractor tube holds the tube in the selected position against rotation under the pull of the cloth or under vibration.

When a change in the nature of the fabric being extracted indicates the need for a different width of slot, it requires only an instant's manipulation to lower the trough by the hand-wheel and bring the handle **31** corresponding to the desired width of slot into topmost and vertical position, whereupon the trough is again raised to seal the other slots and fix the tube in working position.

For sealing the unused excess length of the working slot, strips of rubber or other suitable material **57** are fixed in the bases of the upward extensions **59** on brackets **3**, with their inward ends attached by light contracting springs **61** to the turned-up inward ends of U-section supports **63** pivotally mounted for adjustment of their elevation above the tube by pivot-pins **65** and stop-screws **67**, on arm **69** carried by rods **71** sliding in hubs at the tops of extension **59**.

While we have illustrated and described a certain form in which the invention may be embodied, we are aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, we do not wish to be limited to the particular form shown, or to the details of construction thereof, but

What we do claim is:—

1. A vacuum extractor for web material having in combination means defining a vacuum chamber adapted to be connected to a vacuum pump and having a plurality of extracting slots of different widths, means for selectively bringing one of such slots into working relation with a traveling web, and means for closing the remaining slots against ingress of air.

2. A vacuum extractor for web material having in combination an extractor tube adapted to be connected to a vacuum pump and having a plurality of slots of different widths at spaced intervals about its periphery, means providing for rotation of the tube to bring a selected slot into working relation with a traveling web, and means for fixing the tube in non-rotating operative position and for closing the remaining slots against ingress of air.

3. A vacuum extractor for web material having in combination an extractor tube adapted to be connected to a vacuum pump and having a plurality of slots of different areas, means for selectively placing a given slot in working relation with a traveling web, and means excluding all ingress of air into the tube except through the web.

4. A vacuum extractor for web material having in combination an extractor tube adapted to be connected to a vacuum pump, and having a plurality of slots of different areas, means for mounting the tube with capacity for rotation to present a selected one of such slots to a traveling web, and means partially surrounding the tube to prevent ingress of air through the remaining slots.

5. A vacuum extractor for web material having in combination an extractor tube having a plurality of lengthwise slots of different areas disposed at spaced intervals about its periphery, the tube being adapted to be attached to a vacuum pump, means supporting the tube with capacity for rotation about its axis, and means for simultaneously sealing all but one of such slots, adapted to be alternatively advanced into sealing contact with the tube along the latter slots and to be retracted out of contact with the tube to permit rotation of the tube.

6. A vacuum extractor for web material having in combination an extractor tube having a plurality of lengthwise slots of different areas disposed at spaced intervals about its periphery, and having one of its ends closed and the other open and adapted to be attached to a vacuum pump, means supporting the tube with capacity for rotation about its axis, sealing elements for

all but one of the slots, supporting means for such sealing elements, and manually operable means for bringing such elements into sealing engagement with the slots in the tube and for retracting them therefrom.

7. A vacuum extractor for web material having in combination an extractor tube having a plurality of lengthwise slots of different areas disposed at spaced intervals about its periphery, and having one of its ends closed and the other open and adapted to be attached to a vacuum pump, means supporting the tube with capacity for rotation about its axis, a trough fitting around the tube, sealing material in connection with the trough to close all but one of the slots, screw means to advance and retract the trough and thus the sealing material into and out of contact with the tube adjacent the slots, bevel gears operating the screw means, and a hand-wheel and shaft driving the bevel gears.

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