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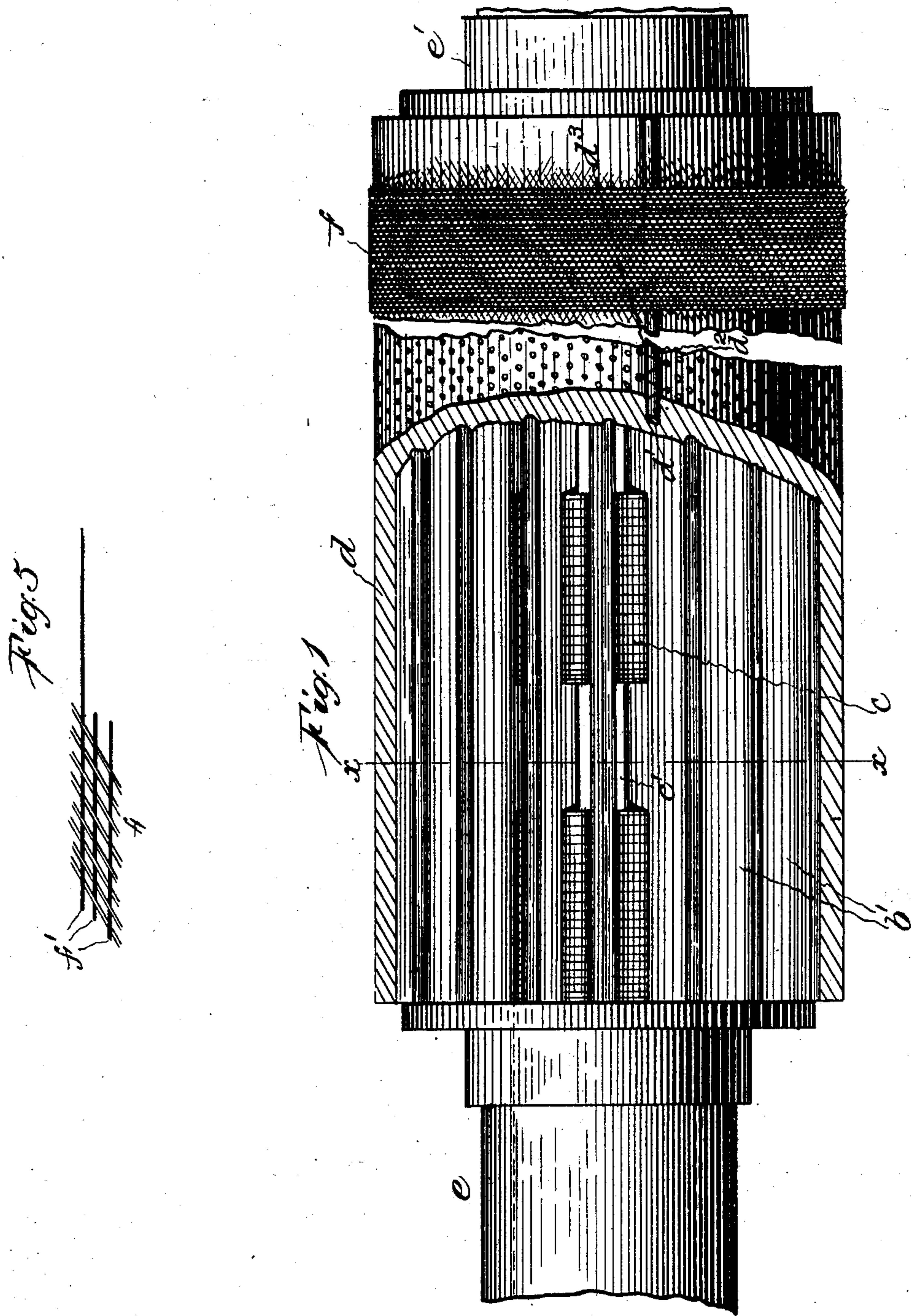
Patented Feb. 25, 1902.

H. PARKER.
COUCH ROLL.

(Application filed June 16, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
W. H. Barker.
Luitgard Morba.

Inventor:
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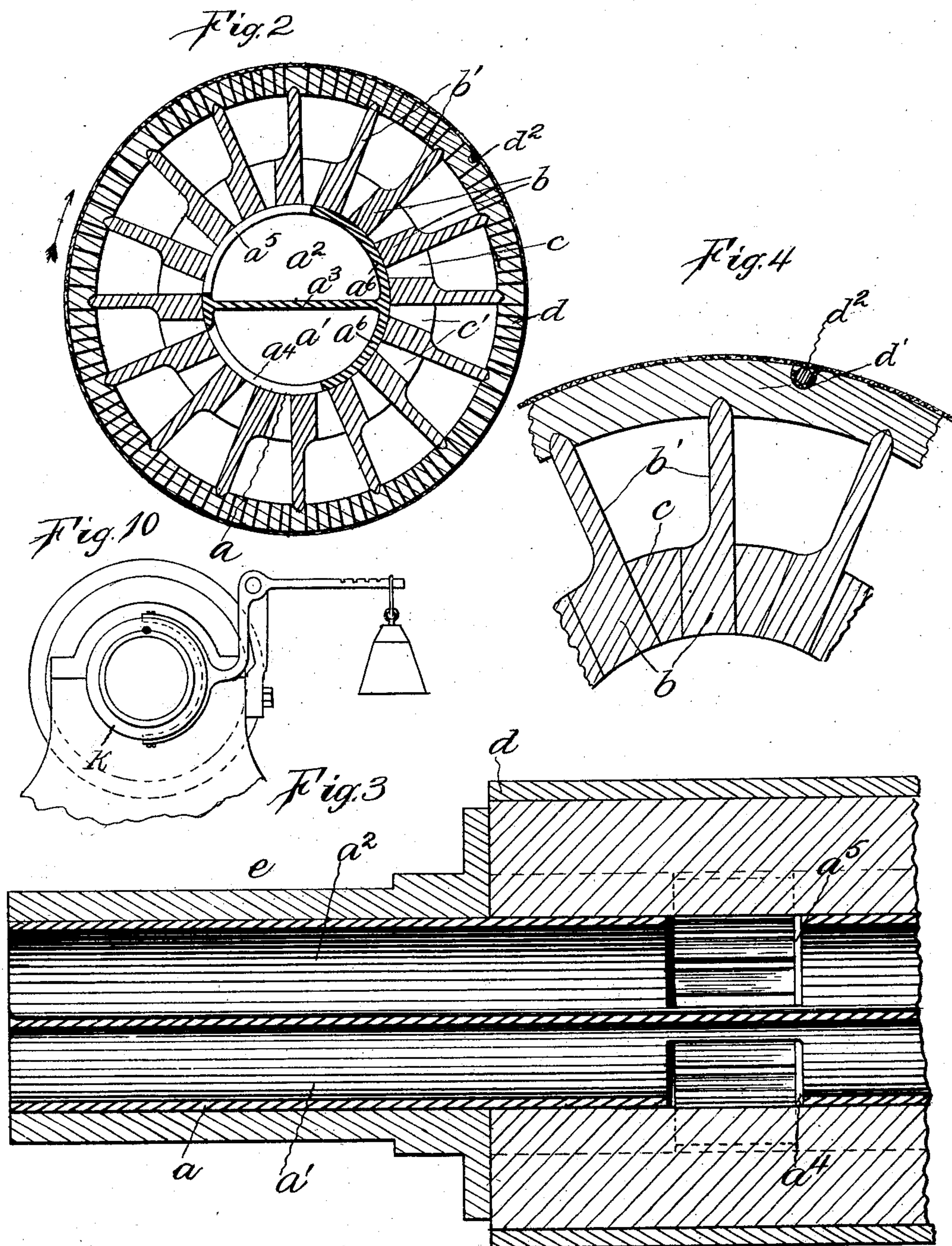
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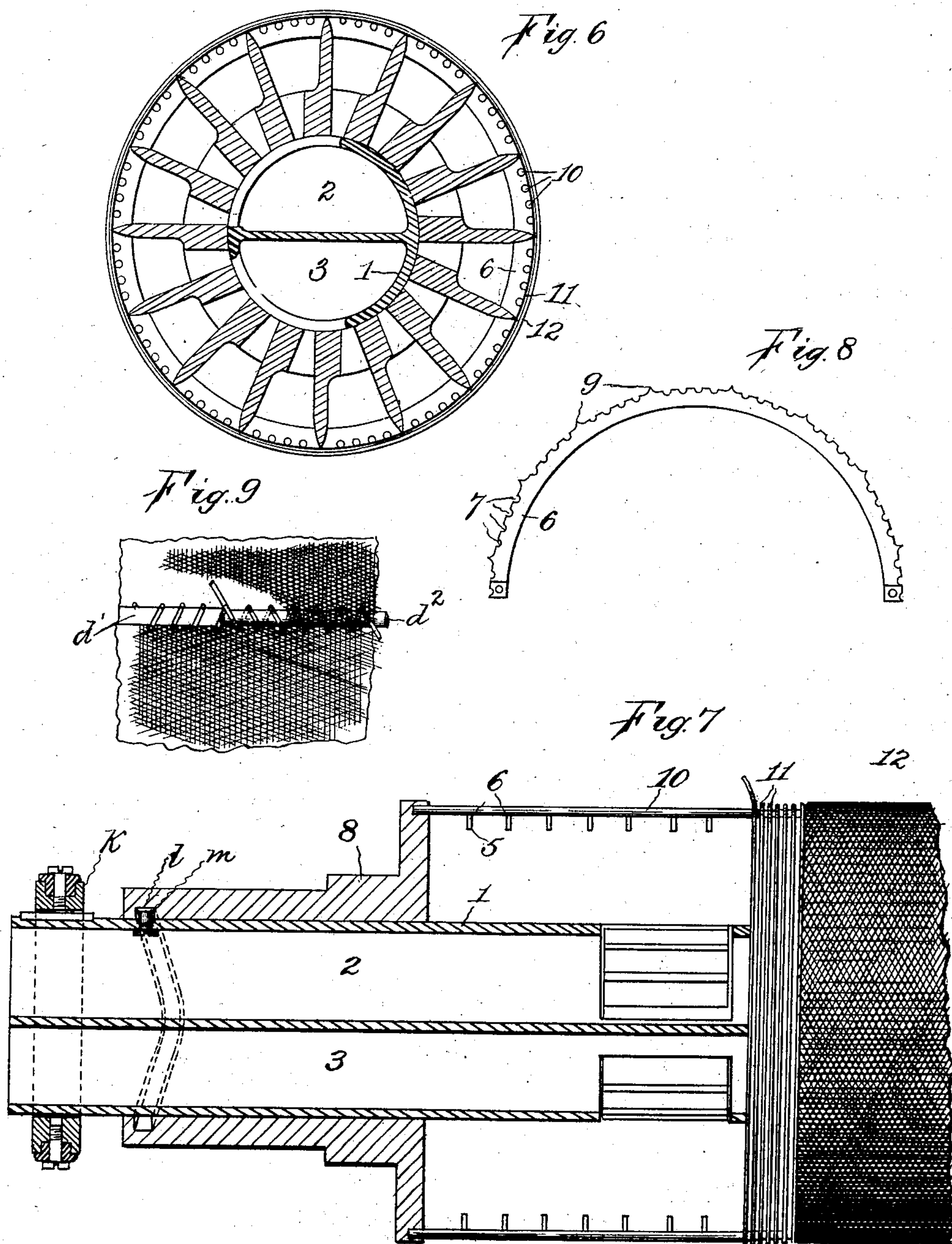
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UNITED STATES PATENT OFFICE.

HOWARD PARKER, OF BELLOWS FALLS, VERMONT.

COUCH-ROLL.

SPECIFICATION forming part of Letters Patent No. 693,894, dated February 25, 1902.

Application filed June 16, 1900. Serial No. 20,557. (No model.)

To all whom it may concern:

Be it known that I, HOWARD PARKER, of Bellows Falls, in the county of Windham and State of Vermont, (having a post-office address at Bellows Falls, Vermont,) have invented certain new and useful Improvements in Couch-Rolls, of which the following is a full, clear, and exact description, whereby any one skilled in the art may make and use the same.

As implied by the name, my invention relates to what is commonly known in the art as a "couch-roller," and more particularly to the specific class of such devices known as "suction-action couch-rolls." These devices are ordinarily used in the arts for transferring unfinished materials from one portion of a machine to another, the transfer usually being made while the material is in semi-plastic and finely-divided condition. A device of this sort is very commonly used, and, in fact, had its origin in paper-making machines. In machines of this class the couch-roll is used to take up the flake of the imperfectly-compacted pulp made from various materials, from an apron, felt, making-cylinder, cylinder-mold, or other portion of a machine upon which it has been formed and transfer it to a second apron, to the drying-rolls, or to such mechanism as may be necessary to compact, to dry, or to act upon the pulp to produce a finished paper.

The object of my improvement is to produce a roll for the purposes named which has very material advantages over devices of the prior art and eliminate many faults which have heretofore been considered unavoidable. For instance, great difficulty has been experienced in producing rolls of this class which, while they were originally made perfectly true, would not long maintain a proper alinement and high degree of vacuum to secure the best results, as through weaknesses they soon became warped and practically unfit for use.

A special object of my invention is to so construct the roll and so mount it upon its shaft that an even suction may be applied to hold the "stuff" upon the surface of the roll during a portion of its revolution and at the same time make such provision that excessive moisture, which may at any time be

withdrawn from the stuff, cannot come into contact with the material which is being transferred.

To this end my invention consists in the device as a whole, in the details of the parts, and in the combination of such parts, as hereinafter described, and more particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a plan view of a roll embodying my invention, with portions broken away to show the construction. Fig. 2 is a cross-sectional view on the line xx of Fig. 1. Fig. 3 is a detailed longitudinal section of one end of the roll. Fig. 4 is a detailed view, on enlarged scale, showing the method employed for securing the screen upon the periphery of the roll. Fig. 5 is a diagram view showing the manner in which the wire screen is woven. Fig. 6 is a cross-sectional view of a modified form of the device. Fig. 7 is a view in side elevation of one end of the roll partially cut in section. Fig. 8 is a side elevation of one-half of one of the circumferential rims. Fig. 9 is a detail view illustrating one method of attaching the screen to the periphery of the roll. Fig. 10 is an end view of the couch-roll, showing the bearing and the means for forcing the tubular shaft against the bearing of the couch-roll.

In the accompanying drawings the letter a denotes a tubular shaft about which the couch roll proper rotates. This tubular shaft is divided throughout its length into two compartments a^1 a^2 by a web a^3 . Openings a^4 a^5 are arranged through the walls of each of these compartments at intervals along the tube and are arranged to coincide with apertures formed in the hub of the roll, as hereinafter described. When the roll is in use, this tubular shaft is located with its web a^3 lying in a substantially horizontal position.

The roll proper comprises a number of radial members b , having reduced portions b' at their greatest distance from the center to give unbroken perforated surface to the roll, and these members extending from end to end of the roll form the support for the rim. It is obvious that by having the radial members reduced at their outer ends they will meet the interior of the peripheral jacket or screen in a single line, which will not in any way in-

interfere with the perforations formed in the peripheral jacket or screen. Filling-wedges c are arranged between the members b and are preferably cast about the latter. At intervals along the roll openings c' are formed through these filling-wedges and between the members b , the position of the openings corresponding in number and position with the apertures a^4 a^5 in tubular shaft, and these openings c' are clearly shown in Figs. 1, 2, 3, 6, and 7 of the drawings, and while but two sets of these openings are shown it is obvious that any number may be used and that they may be disposed along the length of the roll, as necessity may require. It will be seen from this construction that as the roll revolves upon the tubular shaft one after another of the openings c' will pass off from the unbroken peripheral portion a^6 of the tubular shaft and will come into registering position with the openings a^4 a^5 , thus connecting the several compartments formed by the members b' with the interior of the tubular shaft and the compartments a' a^2 .

In making up the roll the members b are first arranged of a proper size and in numbers corresponding to the size of the roll and the work which is to be required of it, the filling-wedges being cast to form between the several arms or the whole being cast integral. The outer jacket or rim d , which is preferably made from gun-metal or a like non-corrosive material, is now properly grooved, heated, and shrunk into place upon the ends of the members b . The hub portion is bored to fit nicely about the finished periphery of the tubular shaft, and the periphery is turned down into perfect cylindrical form. At either end bearings e e' are arranged to provide a support for the roll, which may be driven in any suitable manner. The jacket or rim d is perforated and has upon its periphery a fine screen f , such as is commonly used in paper-making machines. To secure this screen upon the periphery of the roll a slot or groove d' is formed lengthwise of the roll, and in this slot one end of the screen is held by a rod d^2 , the rod and screen being strapped in place by a lacing d^3 , passed through perforations in the rim and over the rod and its retained wire-netting. The netting being secured at one end is drawn snugly about the periphery of the roll and its end trimmed and sewed to the edge of the groove d' . Instead of arranging one end of the screen about the wire rod between its surface and that of the slot or groove d the rod itself may be first secured to the edge of the netting by sewing it on with a wire and cutting away the surface of the roll sufficiently to permit the rod and wire coming into close contact with it. The other end of the screen may be then passed about the surface of the roll and sewed to the first end, where it is attached to the rod. Such a construction is illustrated in Fig. 9 of the drawings, and the wire with which the two ends of the screen are sewed together over

the retaining-rod forms with said rod a convenient means for securing the screen to the roll.

The greatest difficulty has been experienced heretofore in providing a netting and securing it upon the periphery of the roll so that it would maintain its position and remain tight. To obviate this difficulty, I have devised the method above described for fastening the screen to the roll; but to secure the best results I use a specially-prepared netting, in which the wires corresponding to the filling extend about the roll, while those wires which correspond to the warp are arranged lengthwise, or substantially so, of the roll. I have illustrated in Fig. 5 of the drawings the general idea embodied in the wire screen, which when once applied to the roll and drawn taut will remain so during the life of the screen. It is perfectly obvious from a study of Fig. 5 that if the wires corresponding to the warp (as used in weaving) extend about the roll they will soon become flattened, and consequently lengthened somewhat when used under pressure, whereas those corresponding to the filling and denoted by f' are in contact with the periphery when first applied to the roll and being substantially straight will not lengthen enough to materially affect the length of the screen.

It is to be noted that the several compartments formed by the arms b when the roll is in position as shown in Fig. 2 of the drawings are successively brought into position to take up the material upon which they are acting approximately on the line of centers of the rolls between which the material passes. As soon as one of the compartments passes the unbroken peripheral wall of the hollow shaft the suction becomes operative through the ports or apertures formed in the hub of the roll. Thus it will be seen that the position of the unbroken peripheral wall determines the time at which the suction begins and terminates, and by revolving the hollow shaft the point at which the suction becomes operative may be varied to suit different conditions. The suction will of course tend to withdraw any moisture which may be in the "stock" as it is picked up by the roll, and as the roll rotates a sufficient distance to bring the several compartments above the center line of the roll and the web a^3 any moisture which has collected in the compartments will under the force of gravity and of the suction fall into the compartment a^2 of the hollow shaft. Thus when the water has once been withdrawn from the material which is carried by the roll it can never get back into contact with the material, but will be carried out of and away from the roll by the web a^3 , which forms the bottom of the compartment a^2 . In devices of this class it is absolutely essential, to secure the best results, that there shall be no leakage between the tubular shaft and the several compartments during that portion of the revolution of the roll when it is desired

to destroy the suction action in the several compartments. It is obvious that no matter how well the rotary member might be fitted to the tubular shaft when the machine was constructed the wear of the parts would soon cause sufficient leakage to very materially affect the amount of vacuum which could be maintained in the several compartments where it is desired. As a convenient method for always insuring a tight joint between the rotary member and the tubular shaft at the desired point the latter is so arranged that it may be constantly crowded against the inner surface of the rotary member in the proper direction to insure a tight joint between the parts at the desired points. In the present instance, as illustrated in the drawings, a collet *k* is splined to the tubular shaft, and a weighted lever or other suitable device is used to constantly force the tubular shaft against the rotary member, the latter being of course held against transverse movement in its bearings. It is evident also that if the tubular shaft were to remain absolutely fixed in relation to the rotary member it might become unevenly worn from the constant wearing action of said member, and to obviate this difficulty and decrease the liability of leakage from uneven wearing the tubular shaft is given a slight reciprocating movement with relation to the rotary member. This movement may be affected by any suitable means; but a convenient method is shown in the drawings where a tortuous path or groove *l* is cut on the interior of the rotary member and is engaged by a pin *m*, projected through the tubular shaft. The operation in this case is apparent. As the roll revolves the pin *m* is compelled to follow the groove *l*, and thus a slight reciprocation is given to the tubular shaft within fixed limits, which insures an even wear throughout its entire length.

In the modified form of the device shown in Figs. 6, 7, and 8 instead of forming a peripheral shell of cast metal and shrinking it upon the arms a lighter construction is used, which operates with the best results. In this form of the device a tubular shaft 1, having compartments 2 3, is arranged in the manner and in the same relation to the roll proper as in the case of the device above described. The hollow cast-metal core is constructed in the same manner as previously described, but has the outer ends of its radial arms tapered down to a thin edge. Through the several radial arms forming the side walls of the compartments are cut notches 5, and within these notches are located rings 6, which have peripheral markings 7, adapted to support a series of wires or rods which extend from end to end of the roll and are firmly secured in the heads 8 in suitable recesses drilled for the purpose. The rings are preferably made in two sections of the same form, as shown in Fig. 8, and are provided with reduced ends which overlap and may be secured, as by riveting. At points along the outer edge of these rings and coin-

cident with the radial arms of the roll are projections 9, which extend far enough to come into close contact with the wire screen which forms the outer surface of the roll, and thus prevents the breaking of the suction between any two adjacent compartments. In assembling this form of roll the rings are first set into their grooves. The wire rods 10 are then sprung into the heads and rest in the recesses formed in the rings. This forms a sort of peripheral surface, which, after it is scored by a groove cut much after the fashion of a screw-thread, is wrapped about by a wire 11, which forms the surface to which the outer wire screen 12 is applied. This screen 12 may be attached in any suitable manner, but preferably as described in connection with Figs. 4 or 9.

While I have described in detail numerous features of my improved couch-roll, it is obvious that the same results might be obtained even though the details were changed to some extent, and I do not wish to limit myself to the precise construction herein shown and described. My invention would include any device in which a cast-metal core or hub provided with arms forming longitudinal compartments and having ports adapted to connect the several compartments with a hollow shaft is provided with longitudinal compartments and has a perforated shell shrunk upon the arms forming the compartments. My invention would also include any device comprising a cast-metal core provided with arms forming longitudinal compartments and having orifices connecting the several compartments with a hollow shaft having longitudinal compartments and a perforated periphery made up as described in the modified form of the device shown in Figs. 6, 7, and 8.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a suction-action couch-roll, a hollow cast-metal core with radial webs extending continuously along said core, compartments formed between these webs, a tubular shaft on which said core rotates, longitudinal compartments within said shaft, ports adapted to connect the compartments between the webs with those at the interior of the tubular shaft, and a perforated covering arranged upon the outer ends of said webs, substantially as described.

2. In a suction-action couch-roll, a tubular shaft having a web forming longitudinal compartments therein, a core adapted to rotate on said shaft, said core having continuous longitudinal partitions, ports connecting the compartments formed by said partitions with the compartments formed in the tubular shaft, and a perforated shell supported on the ends of the longitudinal partitions and securely attached thereto, substantially as described.

3. A perforated couch-roll comprising a series of radially-disposed cast-metal members forming radial compartments extending longitudinally throughout the length of the roll,

ports formed between said members, a tubular shaft having continuous longitudinal compartments, openings through the outer walls of the compartments of the tubular shaft, a
5 perforated metallic shell shrunk upon the outer ends of the radially-disposed members, and means for subjecting the several compartments to a suction action during the rotation of the roll.

10 4. In combination in a couch-roll, a non-rotary tubular shaft having continuous longitudinal compartments and openings through the outer walls of said compartments, a rotary cast-metal frame comprising radially-disposed members, a perforated metallic shell
15 shrunk upon and borne by said members, continuous longitudinal compartments bounded by the radially-disposed members and the metallic shell, and ports adapted to register with
20 said openings so as to connect the several compartments of the rotary frame with the compartments of the tubular shaft at predetermined periods during the revolution of the rotary member.

25 5. In combination in a suction-action couch-roll a tubular shaft having a horizontally-disposed web dividing the shaft into two compartments, apertures in the walls of the compartments, a cast-metal frame rotarily mounted
30 with relation to the tubular shaft and having a peripheral shell of non-corrosive metal, and ports connecting the rotary frame and the tubular shaft at predetermined positions during the revolution of the rotary members.

35 6. In combination in a suction-action couch-roll having a peripheral shell of non-corrosive material and longitudinal compartments located within the shell, a tubular shaft having
40 a horizontally-disposed web dividing it into two compartments, said shaft supporting the shell, ports connecting the compartments within the peripheral shell with those of the tubular shaft at predetermined positions during the revolution of the shell, and a screen
45 attached to the outer surface of the shell.

7. In combination in a suction couch-roll, a tubular shaft having a longitudinal partition, a metal frame provided with partitions supporting a perforated shell of non-corrosive
50 metal, bearings attached to either end of the cast-metal frame, means connecting the compartments of the tubular shaft with the exterior of the shell at predetermined points during the rotation of the latter.

55 8. In combination in a roll of the class specified comprising a rotary and stationary member, a wire screen applied to the periphery of the rotary member with the wires constituting the filling arranged circumferentially on
60 the periphery and those constituting the warp arranged substantially lengthwise of the roll, and means for retaining the screen on the periphery.

9. In combination in a suction-action couch-roll having longitudinal compartments and a
65 perforated shell inclosing said compartments,

a groove formed in the periphery of the shell and lengthwise thereof, a wire screen having one end located in the groove, a rod confining the end of the screen within the groove, 70 means for retaining the rod and screen within the groove so arranged as to permit the fastening of the free end of the screen about the roll.

10. In combination in a roll of the class 75 specified a frame supported upon a tubular shaft and provided with compartments, the tubular shaft, ports connecting the several compartments with the interior of the tubular shaft and a peripheral surface formed by a
80 wire screen applied to the exterior of the surface made up of a system of wires and rings substantially as specified.

11. In combination in a suction-action couch-roll, a tubular shaft, a rotary frame 85 mounted upon a tubular shaft, and having a series of compartments, ports connecting the compartments of the rotary member with the tubular shaft and means for crowding the tubular shaft against the rotary member in
90 one direction and means for reciprocating one of said parts with relation to the other.

12. In combination in a device of the class specified, a tubular shaft provided with ports and having an unbroken peripheral surface 95 upon one side, a rotary member mounted upon the tubular shaft and having a series of compartments, ports in the rotary member adapted to connect the several compartments with the interior of the tubular shaft at predetermined points during its rotation, means for
100 maintaining a constant and close contact between portions of the tubular shaft and the surface of the rotary member adjacent thereto, and means for reciprocating the rotary
105 member and tubular shaft in relation to each other.

13. In combination in a device of the class specified two members, one rotarily mounted with respect to the other, said rotary member 110 being provided with a series of compartments and having ports connecting said compartments with the interior of the first-named member, and the non-rotary members adapted to have a slight reciprocating motion in relation to the rotary member. 115

14. In combination in a device of the class specified, two members, one of which is rotarily mounted with respect to the other and has a series of compartments and ports connecting its several compartments with the interior of the non-rotary member, the second member being fixed against rotation relatively to the rotary member but adapted to have a slight reciprocating movement with relation
120 thereto and means for maintaining a forced contact between certain portions of the non-rotary and rotary members. 125

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Witnesses:

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