

April 27, 1926.

1,582,604

E. HOPKINSON ET AL.

PROCESS AND APPARATUS FOR DRYING UNSTABLE LIQUIDS

Filed July 18, 1923

4 Sheets-Sheet 1

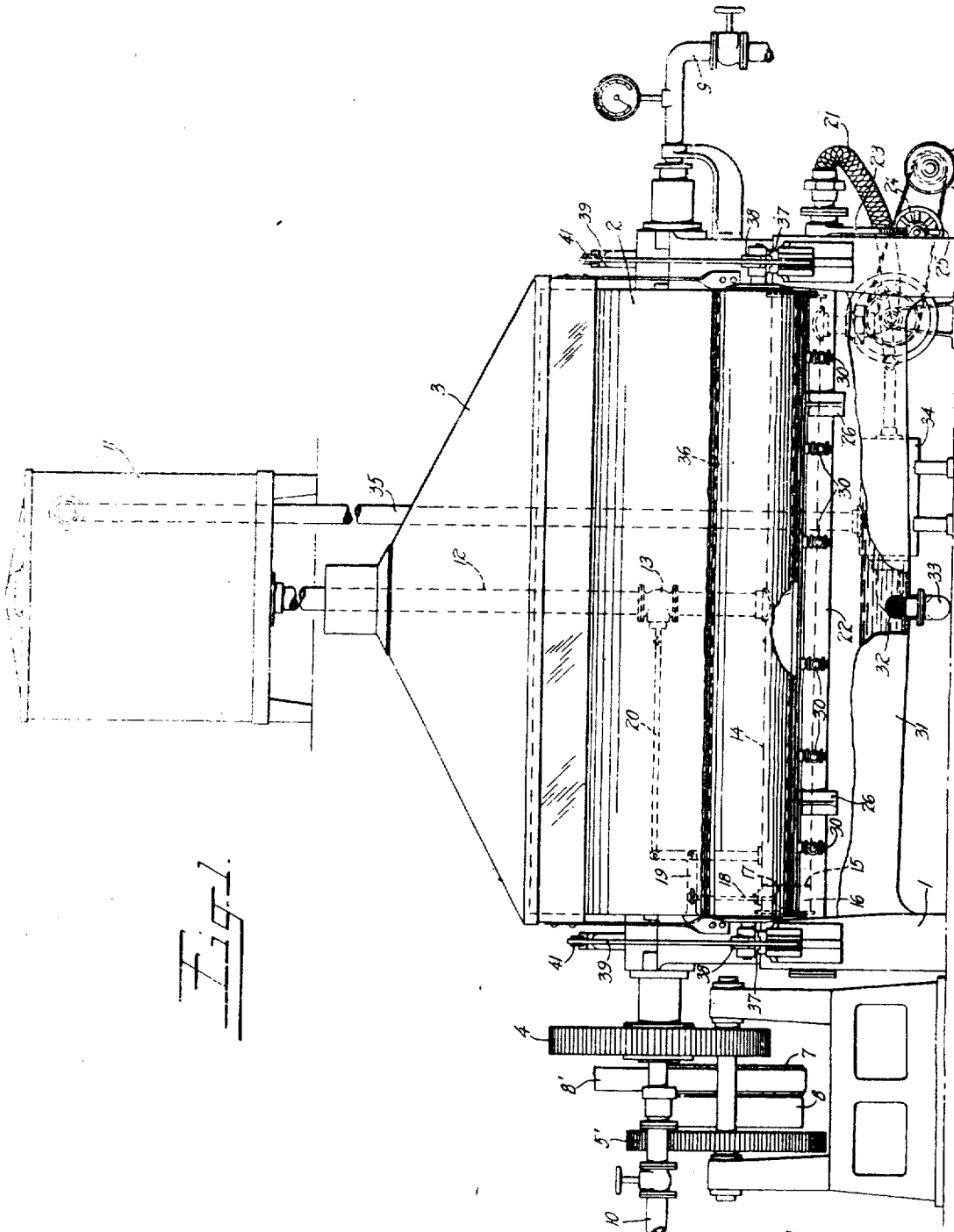


Fig. 1.

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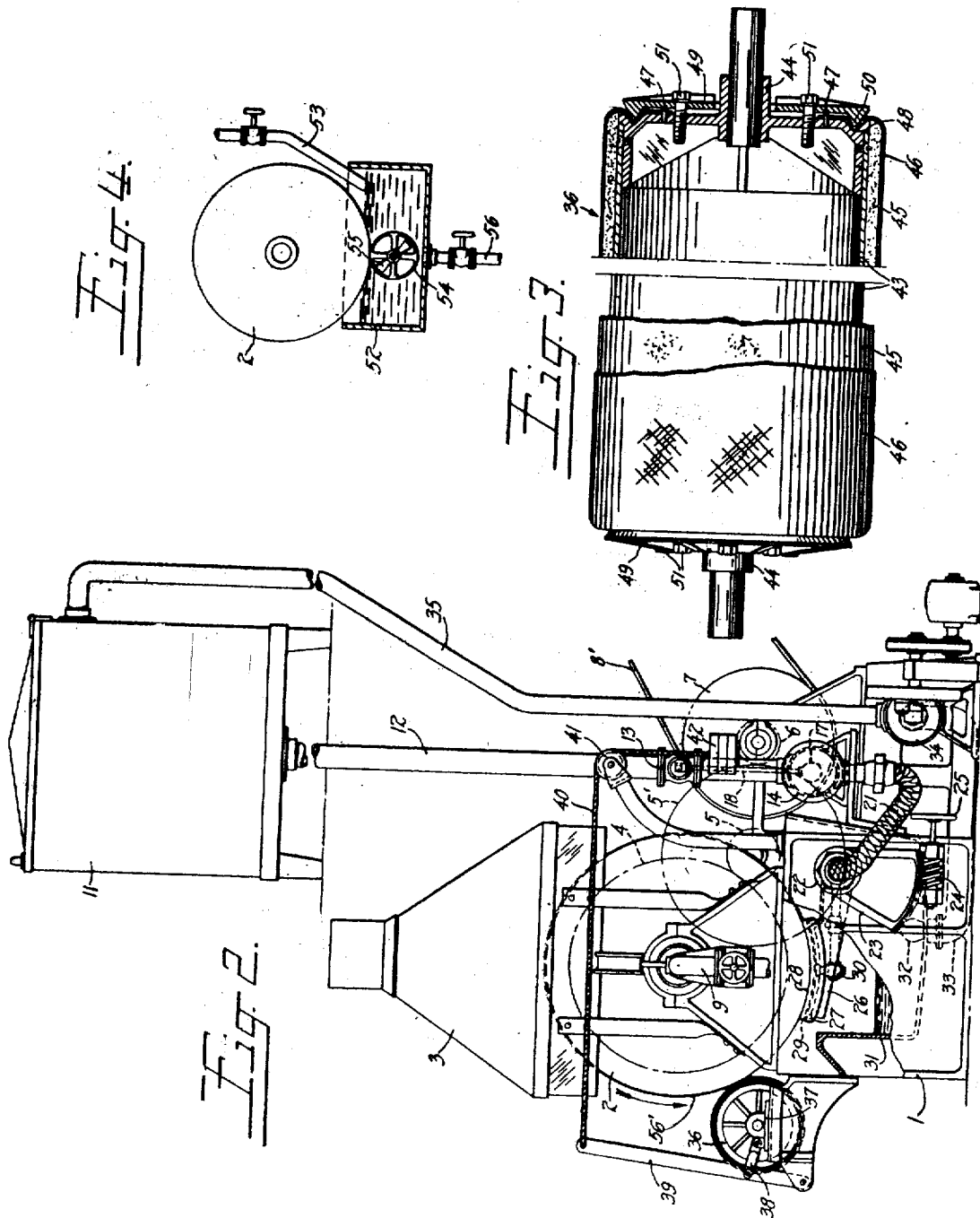
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PROCESS AND APPARATUS FOR DRYING COAGULABLE LIQUIDS

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4 Sheets-Sheet 2



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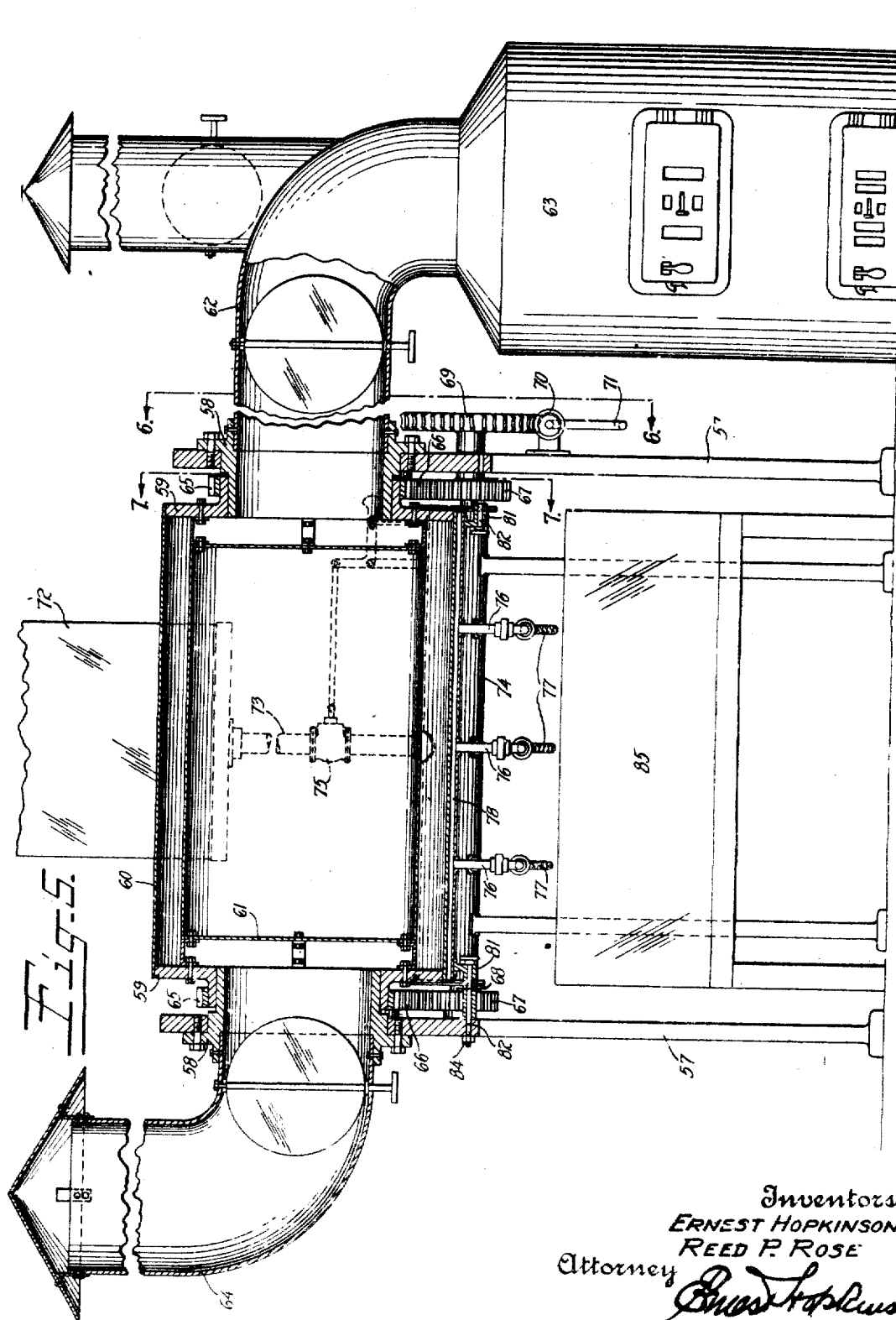
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4 Sheets-Sheet 4

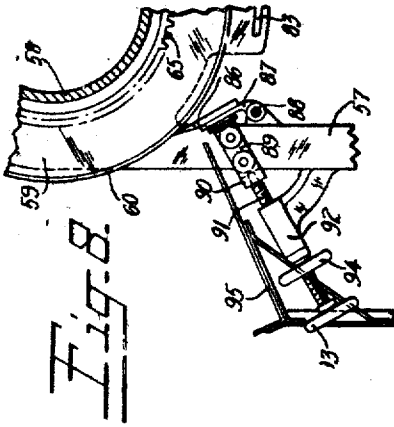
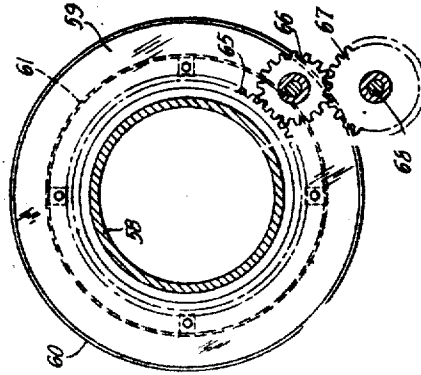
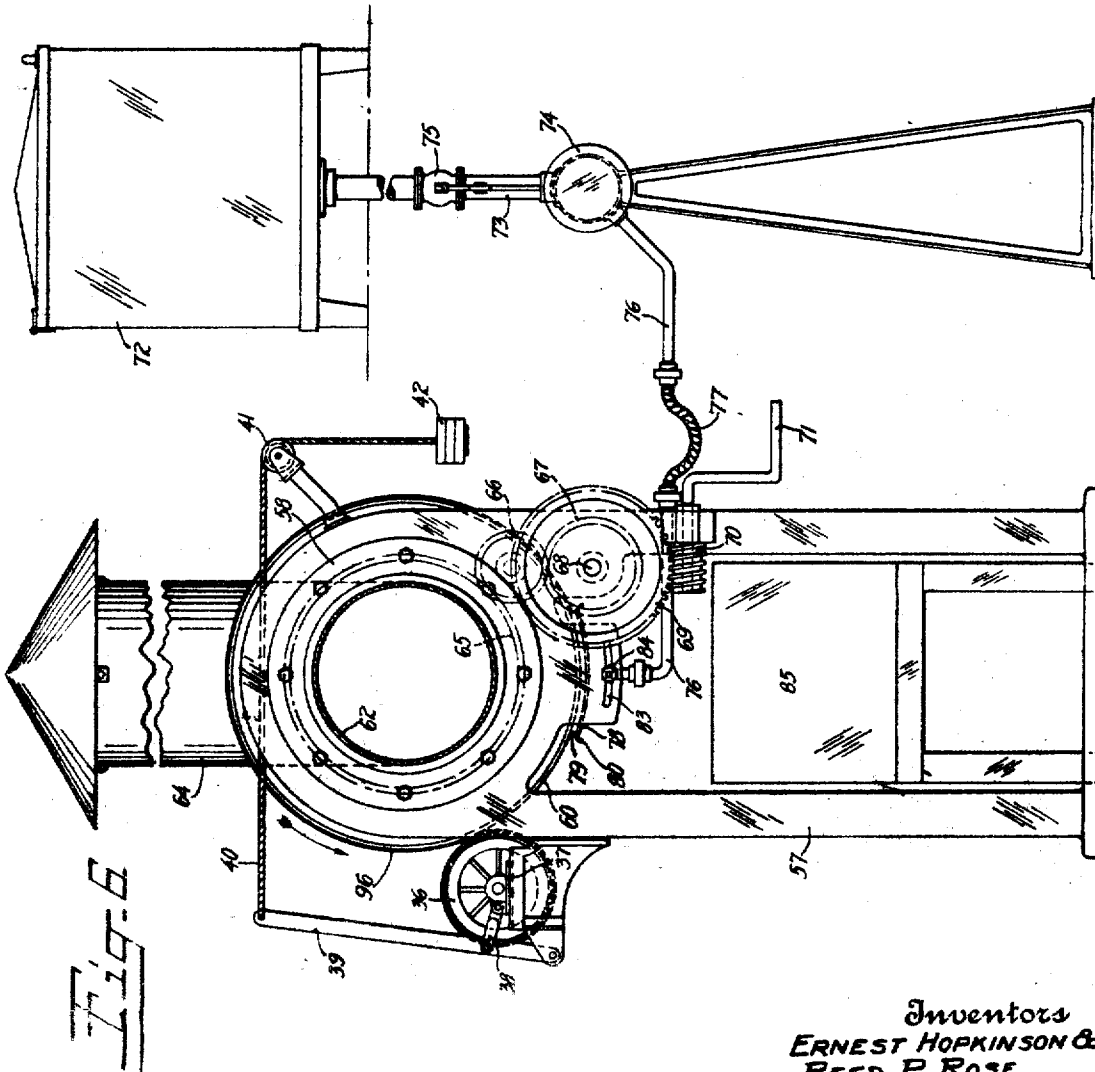


Fig. 7



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ERNEST HOPKINSON AND REED P. ROSE, OF NEW YORK, N. Y., ASSIGNORS TO GENERAL RUBBER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

PROCESS AND APPARATUS FOR DRYING COAGULABLE LIQUIDS.

Application filed July 18, 1923. Serial No. 652,311.

To all whom it may concern:

Be it known that we, ERNEST HOPKINSON and REED P. ROSE, both citizens of the United States, and both residing in New York, county of New York and State of New York, have invented a certain new and useful Process and Apparatus for Drying Coagulable Liquids, of which the following is a full, clear, and exact description.

This invention relates to a process and apparatus for drying coagulable liquids, more particularly as applied to the drying of rubber and similar latices, and is a continuation in part of the application of Rose and Hopkinson, Serial No. 508,408, filed October 17, 1921.

After the cultivation of rubber was begun on an extensive scale it was found necessary to provide a more rapid and efficient method for obtaining the crude rubber from the latex than the widely employed method of the South American natives of dipping a paddle in a vessel of latex and holding it over a fire of smoke producing material and alternating these steps until a mass of coagulated rubber of the desired size was obtained. The process of coagulating the latex by the use of chemicals, such as acetic acid, therefore came into wide use, but is open to many objections. An important one of these is that a considerable proportion of the valuable soluble constituents of the latex are lost in the mother liquor. The chemical coagulating processes are also expensive by reason of the cost of the chemicals, and on account of the extended washing necessary to remove them after coagulation, and the rubber must of course also be dried. A number of processes and apparatus have also been devised for coagulating the latex by supplying it in a thin film to a moving endless surface such as a rotating drum, coagulating this film by the use of smoke or smoke in conjunction with other coagulating material, and as each film of latex is coagulated superposing another film thereon and continuing the process until a relatively thick mass of coagulated rubber has collected on the drum and then cutting the rubber away. This method is also open to numerous objections, since the smoke is ordinarily supplied at a relatively low temperature and the process is essentially one of coagulating and not drying. Due to the slowness of the

action a considerable portion of the soluble constituents escapes, and the material after removal from the drum must then be dried in order to prevent the action of bacteria. However, if the mass is in the thickened condition as taken from the drum it is not easy to entirely remove the moisture, and as a consequence such rubber is deleteriously effected. The smoke coagulated product is also undesirable for some purposes. It has also been proposed to dry as well as coagulate latex by supplying it in a thin film to a moving surface such as a drum, in one form of which method the latex is supplied in a film to the exterior of a drum while heat is applied from the interior thereof. However, as the successive films are dried on the drum in superposed relation the mass of rubber disposed between the drum and the film of latex on the exterior prevents a proper transmission of heat to the film, with the result that the rubber is only imperfectly dried. In addition there is danger of overheating the layer next to the drum, and the intermediate layers reabsorb moisture to a certain extent from the exterior film of latex which is in the process of being dried. Drum drying processes have also been proposed in which the heat for drying is directly applied to the exterior of the film of latex disposed on the drum, but even in this case the objection as to the absorption of moisture from the latex by the underlying films of dried rubber still holds. Moreover, in any of these drum drying or coagulating processes of the prior art in which the mass of coagulated or dried and coagulated rubber is allowed to build up layer by layer, the process cannot be continuous, since the apparatus must be stopped at intervals to cut away the rubber. It has been found very advantageous to retain all the soluble constituents of the latex in the crude rubber and processes and apparatus have been devised, such as those disclosed in patents to Hopkinson, No. 1,423,525, July 25, 1922, and Bradley and Coffin, No. 1,428,526, Sept. 12, 1922, for directly and rapidly obtaining from the latex a crude rubber containing all of the soluble constituents by spraying the latex into a heated drying medium and compacting the dried particles. On some of the smaller plantations, however, the output of latex is not sufficiently large to warrant con-

tinuous operation of the drying apparatus or the expense involved in a large installation.

An object of the invention is to provide an improved process for film drying rubber latex. Another object is to provide a process for film drying latex in which a dried product containing a minimum amount of moisture may be obtained when desired. A further object is to provide a continuous process for film drying latex in which the film is dried independently of the previously dried material. A still further object is to provide a process for drying latex in such manner as to form a crude rubber which is easy to mill. A still further object is to provide a simple, cheap and easily manipulated apparatus for carrying out the process.

The process consists broadly in continuously supplying latex in a thin film to a moving surface, withdrawing moisture from the film, continuously removing the dried film from the drying area, and if desired superposing the film on itself in layers under pressure. The apparatus comprises a moving continuous surface, such as a drum or belt, means for supplying a film of latex thereto, means for drying the film, and means for continuously removing the dried film as a film from the moving surface before supplying latex thereto again.

For a full and complete disclosure of the invention reference is had to the accompanying specification and drawings, in which latter:

Fig. 1 is a front elevation of one form of an apparatus for carrying out the process,

Fig. 2 is a side elevation of Fig. 1,

Fig. 3 is an elevation, partly in section, of one means for continuously removing the dried film of rubber latex,

Fig. 4 is an elevation, partly in section, of a modified means for supplying latex to the drum,

Fig. 5 is a front elevation, partly in section, of a modified form of drying apparatus,

Fig. 6 is an end view thereof on the line 6—6 of Fig. 5,

Fig. 7 is a section on the line 7—7 of Fig. 5, and

Fig. 8 is a detail of a modified means for removing the dried film.

Referring to Figs. 1 to 3, the numeral 1 designates a base or frame, in which is mounted for rotation a drying drum 2, above which latter is disposed a hood 3. The drum is driven at a relatively slow speed by reduction gearing comprising a gear 4 mounted on the shaft of the drum, which gear meshes with a gear 5 mounted on the shaft of a gear 5', the latter in turn meshing with a gear 6 secured to a shaft on which are also mounted fast and loose pulleys 7 and 8, and

cooperating with these pulleys is a drive belt 8' which may be actuated from any suitable source of power. In the present instance the drum is adapted to be internally heated by steam, and for this purpose the hollow shaft at one end of the drum communicates with a valve controlled steam inlet pipe 9 and that at the other end with the exhaust pipe 10.

Latex to be dried is supplied from the tank 11 through a pipe 12, provided with an automatically controlled valve 13, to a cylindrical auxiliary tank 14. At one end of this tank there is provided a perforated partition 15 forming a float chamber 16, in which latter is disposed a float 17, the stem 18 of which passes through the wall of the tank and has a pin and slot connection with one arm of a bell crank lever 19, while the other end of said lever is connected by a link 20 to the valve 13. The horizontal arm of the bell crank lever 19 is provided with an extension as shown in Fig. 1, by which it may be manually operated when desired. Leading from the reservoir 14 is a flexible pipe 21 which is connected at its other end to a manifold 22 pivotally mounted in the frame 1. Rigidly secured to the manifold is a gear segment 23 meshing with a worm 24 operable by the hand wheel 25. Extending from the manifold 22 are bracket arms 26 which carry a shallow latex pan 27, the bottom of which is curved on an arc concentric with the periphery of the drum 2 and of a radius slightly greater than that of the drum. The upper edges of the end walls of the drum are curved on an arc having a radius substantially that of the drum, as shown at 28, so as to prevent escape of latex at the ends. The pan is not provided with side walls, and the edges of the bottom at the sides are curved downwardly as shown at 29. Leading from the manifold 22 are a series of pipe connections 30, of any suitable number, which open into the bottom of the pan. Disposed below the pan is an overflow receptacle 31 provided in its bottom with an outlet covered by a screen 32, and leading from said outlet is a return pipe 33 connected to the inlet of a suction pump 34, the outlet of which is connected by a pipe 35 to the receptacle 11.

Mounted adjacent the drum 2 is a pick up roll 36 which is carried on slides 37, each slide being connected by a link 38 to a lever 39 pivoted on the frame, and connected to the free end of each lever is a cable 40 extending rearwardly and passing over a pulley 41, the end of the cable being connected to an adjustable counterweight 42.

In Fig. 3 there is shown in detail a form of pick-up roll which has been found very satisfactory. This roll comprises a cylindrical shell 43 to the ends of which are secured hub members 44. Covering the shell

is a layer of felt 45, over which is disposed a covering 46 preferably of canvas, the ends of the canvas being turned down on the hub members and secured thereto by the fastenings 47. In order that the canvas covering may be drawn taut the hub ends 44 are provided with annular grooves 48, and retaining discs 49, having annular projections 50 adapted to enter the grooves 48, are secured in position on the hubs by screws 51. It will be seen that when these screws are tightened up the canvas covering will be forced down into the grooves 48 and drawn taut.

In certain circumstances it may be desirable to mix compounding ingredients with the latex before drying the latter, and in this case the modified means for applying a film of latex to the pan shown in Fig. 4 has been found suitable. In this form a latex receptacle 52 is provided for containing the mixture of latex and compounding ingredients, which may be supplied by means of the pipe 53, and the receptacle is so disposed that the surface of the drying drum 2 may just dip below the surface of the liquid. Small friction wheels 54 are mounted in the receptacle 52 in a position to frictionally engage the surface of the drum 2 and be driven thereby, and mounted on the same shaft as the friction wheels 54 are propeller blades 55 which by their movement keep the mixture in circulation so as to prevent the separation of the constituents of the mixture. The receptacle 52 may also be provided with a valve controlled drain pipe 56. While in the embodiment just described, the drying drum has been shown as provided with steam heating means, it is obvious that any other suitable means for heating the drum may be used, such as one of the well known circulating oil heating systems.

On those plantations which may not be provided with a power plant or means for steam heating the drying drum, it may be desirable to provide even a simpler drying apparatus than that shown in Figs. 1 and 2, preferably one that may be operated entirely manually, and in Figs. 5 to 7 such an apparatus is shown. This comprises a pair of supports or uprights 57, which adjacent their upper ends are provided with enlarged, removable, tubular journals 58. Mounted for rotation on these journals are the hub ends 59 of the drying drum 60, which latter is provided internally with any suitable form of baffle, that shown in the present instance being a closed cylinder 61. Attached to the outer end of one of the tubular journals 58 is a damper controlled supply pipe 62 for furnishing a heated gaseous medium from the furnace 63. This medium may be heated air, combustion products, or a mixture of the two. Con-

nected to the outer end of the other tubular journal 58 is a damper controlled exhaust pipe 64. Secured to the hub ends 59 of the drying drum are gears 65, which are driven through the pinions 66 from the gears 67 mounted on the shaft 68 journaled in the frames 57. Secured on one end of the shaft 68 is a worm gear 69 meshing with a worm 70 which is operable by the handle 71.

Latex is stored in the tank 72 and passes therefrom through the pipe 73 to a manifold 74, the flow through the pipe 73 being controlled by a float operated valve 75 similar in all respects to the valve 13. Leading from the manifold 74 are a series of pipe connections 76, in each of which is disposed a flexible section 77, and the opposite ends of the pipe connections 76 lead into the bottom of a shallow latex pan 78, the bottom of which is curved on an arc concentric with and having a radius slightly greater than the drum 60. This pan is provided with curved end walls 79 the tops of which closely approach the periphery of the drum 60. The side walls are omitted as in the form shown in Fig. 2, and the bottom wall at its side edges is curved downwardly as shown at 80. Attached to the ends of the pan are supporting brackets 81 through which pass bolts 82, the outer ends of which are movable in curved slots 83 in the side frames 57, by means of which the pan may be adjusted in a direction circumferentially of the drum, and nuts 84 are threaded on the ends of the bolts 82 to secure the pan in adjusted position. While under proper working regulation there will be very little overflow of latex from the pan, a receptacle 85 is provided below the pan for the reception of any overflow or any coagulum. The drum 60 is provided with a pick-up roll 86 and its co-operating parts, which are similar in all respects to those shown in the form disclosed in Fig. 2.

In Fig. 8 there is shown a modified means for removing the dried latex film, this means comprising a scraper or knife 86 co-extensive with the length of the drying drum, this knife being secured to a knife-block mounted on the frame 57 at 88. Pivotally attached at one end to the knife-block is a link 89, the other end of which is pivotally connected to a block 90 in which is rotatable the end of an adjusting screw 91 threaded in a bracket 92 on the frame 57. At the other end the adjusting screw is provided with a hand wheel 93 which may be locked in adjusted position by a hand nut 94. Mounted adjacent the knife 86 is an inclined table or chute 95 for the reception of the film of dried latex as it is removed from the drum 60.

In carrying out the process with the ap-

paratus shown in Figs. 1 and 2, the drum 2 is heated and slowly rotated, and latex is allowed to flow from the tank 11 into the auxiliary tank 14 and from thence into the latex supply pan 27. Steam at about twenty pounds pressure has been found suitable for heating the drum, but this of course may be varied as long as the drum is not heated sufficiently to injure the rubber. The operating mechanism of the float valve 13 is so adjusted that the liquid in the reservoir 14 will be kept at a level slightly higher than the bottom of pan 27, so that the rotating drum 2 will dip slightly into the latex in the pan 27. By reason of this the periphery of drum 2 as it passes out of the pan will carry on its surface a thin film of latex 56, and during the revolution of the drum this film will be dried. By reason of the counter-weights 42 the pick-up roll 36 will contact with the drum 2 under considerable pressure, and as the dried latex film engages the pick-up roll 36 it adheres to the surface of the latter, is stripped from the drum 2 and rolls up on the roll 36. It will be seen that by the process above outlined the film of latex is continuously formed, continuously dried, and continuously removed from the drum. The film of latex is therefore always dried in direct contact with the drum 2, and not while superposed on previously dried films as in the prior art. Hence, the drying is uniform, rapid and thorough, there is no reabsorption of moisture by the portions of film previously dried, the rubber film is not overheated by prolonged contact with the drum, and owing to the rapidity of the drying there is no chance for the mother liquor, containing desirable soluble elements, from separating out, and the resulting dried film is a homogeneous product containing all of the solid constituents of the latex. The speed of rotation of the drum 2 is relatively slow, and a dried product may be obtained with as low a moisture content as 0.3% if desired. However, for certain purposes a product containing a somewhat greater amount of moisture may be desired and by varying the speed of rotation and the degree of heat the moisture content may be readily controlled. It will be seen that only a very small quantity of latex is in direct contact with the heated drum, and by proper regulation of the float valve the latex may be supplied in just sufficient quantity to form the film on the drum, and by reason of this arrangement the amount of coagulum formed in the pan 27 is reduced to a minimum. However, should any coagulum form it is rolled out of the pan and over the downwardly curved side edge of the bottom by the action of the rotating drum. As the supply of latex in the float chamber is en-

tirely removed from the heating zone the float valve arrangement cannot readily become clogged by reason of the formation of coagulum. If by reason of improper regulation of the float valve any overflow of latex occurs from the pan 27 it will be received by the overflow receptacle 31, any coagulum removed by the strainer 32 and the residue pumped back into the tank 11. By reason of the adjustable mounting of the pan it may be readily moved back to inoperative position for purposes of inspection or repair. In certain circumstances it may be desirable to add compounding ingredients to the latex before drying the same and in this case the latex supply means shown in Fig. 4 may be used. In this form the body of latex in the pan 52 will be kept at a level such that the drum 2 will slightly dip below its surface. By reason of the frictional contact of the drum with the wheels 54 the propeller blades 55 will be continually actuated to maintain the latex in motion, preventing the settling out of any of its compounding ingredients. The pick-up roll shown in Fig. 3 has been found to be very satisfactory for the purpose of stripping the dried film from the drying drum, particularly if the canvas outer covering 46 has been preliminarily coated with latex, and as the roll 36 is rotated the dried film is collected thereon in superposed layers which are united under pressure. When a sufficient quantity of dried latex has accumulated on the roll 36, the latter is removed, an empty one substituted and the dried rubber cut and removed from the full roll. As stripped from the drying drum the film of dried latex is in the form of a homogeneous sheet of from 0.1 to 0.4 mm. thickness. While in the present apparatus a drum has been shown for drying the latex film, it is obvious that other forms of devices for drying the latex may be used, such as an endless metallic belt, a rotating plate, etc.

The carrying out of the process when using the form of apparatus shown in Figs. 5 to 7 is identical with the process as carried out by the apparatus shown in Figs. 1 and 2, the dried film 96 winding up on the roll 36 as before. As before stated this modification is suitable for any plantations which are not provided with a power plant, and in this form the heated drying medium may be readily produced by the combustion of any suitable fuel by the furnace 63, and the drying medium is then compelled to travel closely adjacent to the surface of the drum 60 by the baffle 61, and is then exhausted through the pipe 64. The drum may be given a desired slow movement of rotation by the operative turning the handle 71. In this form of apparatus, the mount-

ing of the latex supply pan is slightly modified so that by adjusting it in the slots 83 the side of the pan at which the drum enters can be raised to a slightly higher level than the side by which it leaves, which aids in the removal of stringers of coagulum formed in the pan, these stringers being then more easily rolled out of the lower side of the pan. If desired any other suitable form of pick-up roll may be substituted for that shown in Fig. 3 or the knife shown in Fig. 8 may be used with either of the forms of drying apparatus shown. When using the knife the film of dried latex cut from the drum rolls up on itself as it passes down the table 95. Either of the latex supply pan adjusting means shown may also be substituted for the other.

It may be seen that by our process a homogeneous, thoroughly dried film of rubber latex containing all of the solid constituents thereof may be obtained, and that the process is easily regulated and rapid and economical for smaller plantation in which the cost of the spray drying apparatus would be prohibitive. While as before stated it may be desirable for some purposes to retain a variable small amount of moisture in the product, the latter is essentially a dried rubber as distinguished from a wet coagulum, and it is obtained by a single drying operation carried out between the formation of a latex film on a surface and the removal of the film in a predetermined dried condition from said surface.

It is evident that with the above detailed disclosure of the invention many modifications will suggest themselves to those skilled in the art, and it is not desired to limit the invention otherwise than as set forth in the appended claims.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:—

1. The process of drying latex comprising evaporating a layer of latex on a surface, and continuously removing the evaporated layer from the surface.

2. The process of drying latex comprising evaporating a thin film of latex on a heated moving surface, and continuously removing the thin film after evaporation.

3. The process of drying latex which consists in continuously forming a thin film of latex directly on a supporting surface, drying the film while in contact therewith, and continuously removing the dried film.

4. The process of drying latex comprising supplying a thin film of latex to a rotating surface, evaporating fluid from said thin film, and removing the dried residue before one complete revolution of said rotating surface.

5. The process of drying latex which consists in withdrawing moisture therefrom

while in a thin film, and bodily removing and simultaneously compacting the dried film.

6. The process of drying latex which consists in continuously forming a thin film of the latex, withdrawing moisture therefrom while in such form, and continuously bodily removing and simultaneously compacting the dried film.

7. The process of drying latex which consists in forming a thin film of the latex, withdrawing moisture therefrom while in such form, and continuously superposing the dried film in layers.

8. The process of drying latex which consists in forming a thin film of the latex, withdrawing moisture therefrom while in such form, and rolling up the dried film on itself.

9. The process of drying latex which consists in continuously forming a thin film of the latex, withdrawing moisture therefrom while in such form, and continuously superposing the dried film in layers under pressure.

10. The process of drying latex comprising supplying a thin film of latex to the outer curved surface of an internally heated rotating cylinder by causing the cylinder to continuously rotate through a small supply of latex, supplying a uniform flow of latex thereto at a rate equal to its removal therefrom by the cylinder, and continuously removing the dried latex from the cylinder.

11. The process of drying latex comprising supplying a thin film of latex to the outer curved surface of an internally heated rotary cylinder by causing the cylinder to continuously rotate through a small supply of latex, supplying a uniform flow of latex thereto at a rate equal to its removal therefrom by the cylinder, removing any coagulated latex from the latex supply by the rotation of the cylinder, and continuously removing the dried latex from the cylinder.

12. The process of drying latex comprising supplying a thin film of latex to the outer curved surface of an internally heated rotary cylinder by causing the cylinder to continuously rotate through a small supply of latex in a small pan positioned beneath the cylinder, maintaining a constant level of latex in the pan by supplying a uniform flow of latex thereto at a rate equal to its removal therefrom by the cylinder, and continuously removing the dried latex from the cylinder.

13. The process of drying latex comprising supplying a thin film of latex to the outer curved surface of an internally heated rotary cylinder by causing the cylinder to continuously rotate through a small supply of latex in a small pan positioned beneath the cylinder so that one of its rims will be lower than the other, thereby facilitat-

- ing the removal of coagulated latex formed in the pan by causing it to be forced over the lower rim by the rotation of the cylinder, maintaining a constant level of latex in the pan by supplying a uniform flow of latex thereto at a rate equal to its removal therefrom by the cylinder, and continuously removing the dried latex from the cylinder at a line near the higher rim of the pan.
14. Apparatus for drying latex comprising a movable carrier having a continuous surface, means for continuously supplying latex thereto in a thin film, means for drying the film, and means disposed in advance of said supply means for continuously stripping off the dried film and superposing it on itself under pressure.
15. Apparatus for drying latex comprising movable means having an endless drying surface, means for continuously supplying latex thereto in a thin film, means for drying the film, and means adapted to adhesively contact with the film in advance of said supply means for continuously stripping it from said surface.
16. Apparatus for drying latex comprising movable means for drying latex in a continuous thin film, and means exteriorly contacting with the dried film for simultaneously removing and superposing it in layers.
17. Apparatus for drying latex comprising a carrier having a continuous surface, means for continuously supplying latex thereto in a thin film, means for drying the film, and a roll adapted to adhesively press against and remove the dried film.
18. Apparatus for drying latex comprising a rotatable drum, means for supplying latex in a thin film thereto, means for drying said film, and a pick-up roll adapted to yieldingly contact with, remove and roll up the dried film.
19. Apparatus for drying latex comprising movable means having a latex film receiving surface, means for supplying a latex film thereto, means for drying the film, a pick-up roll adapted to adhesively contact with the dried film, and means whereby the roll may be yieldingly urged under variable pressure against said film.
20. Apparatus for drying latex comprising a rotatable drum, a shallow latex pan cooperating therewith to supply a thin film of latex thereto, said pan being formed to permit the automatic removal of coagulum therefrom by the drum, means for drying the film, and means for continuously removing the dried film.
21. A pick-up roll for film dried latex comprising a roll body, a resilient covering therefor, and a detachable outer covering adapted to adhere to freshly dried latex.
22. A pick-up roll for film dried latex comprising a roll body, a felt covering therefor, and a detachable fabric outer covering adapted to adhere to freshly dried latex.
23. A pick-up roll for film dried latex comprising a roll body, a felt covering therefor, a canvas outer covering, and means for detachably retaining said outer covering in position and under tension.
- Signed at New York, county and State of New York, this 17th day of July, 1923.
- ERNEST HOPKINSON.
Signed at New York, county and State of New York, this 16th day of July, 1923.
REED P. ROSE.

ing the removal of coagulated latex formed in the pan by causing it to be forced over the lower rim by the rotation of the cylinder, maintaining a constant level of latex in the

5 pan by supplying a uniform flow of latex thereto at a rate equal to its removal therefrom by the cylinder, and continuously removing the dried latex from the cylinder at a line near the higher rim of the pan.

10 14. Apparatus for drying latex comprising a movable carrier having a continuous surface, means for continuously supplying latex thereto in a thin film, means for drying the film, and means disposed in advance

15 of said supply means for continuously stripping off the dried film and superposing it on itself under pressure.

15 15. Apparatus for drying latex comprising movable means having an endless drying surface, means for continuously supplying latex thereto in a thin film, means for drying the film, and means adapted to adhesively contact with the film in advance of said supply means for continuously stripping it

20 16. Apparatus for drying latex comprising movable means for drying latex in a continuous thin film, and means exteriorly contacting with the dried film for simultaneously removing and superposing it in layers.

30 17. Apparatus for drying latex comprising a carrier having a continuous surface, means for continuously supplying latex thereto in a thin film, means for drying the film, and a roll adapted to adhesively press

35 18. Apparatus for drying latex comprising a rotatable drum, means for supplying latex in a thin film thereto, means for drying said

film, and a pick-up roll adapted to yielding- 40 ly contact with, remove and roll up the dried film.

19. Apparatus for drying latex comprising movable means having a latex film receiving surface, means for supplying a latex film 45 thereto, means for drying the film, a pick-up roll adapted to adhesively contact with the dried film, and means whereby the roll may be yieldingly urged under variable pressure against said film. 50

20. Apparatus for drying latex comprising a rotatable drum, a shallow latex pan cooperating therewith to supply a thin film of latex thereto, said pan being formed to permit the automatic removal of coagulum 55 therefrom by the drum, means for drying the film, and means for continuously removing the dried film.

21. A pick-up roll for film dried latex comprising a roll body, a resilient covering 60 therefor, and a detachable outer covering adapted to adhere to freshly dried latex.

22. A pick-up roll for film dried latex comprising a roll body, a felt covering therefor, and a detachable fabric outer covering 65 adapted to adhere to freshly dried latex.

23. A pick-up roll for film dried latex comprising a roll body, a felt covering therefor, a canvas outer covering, and means for detachably retaining said outer covering in position and under tension. 70

Signed at New York, county and State of New York, this 17th day of July, 1923.

ERNEST HOPKINSON.

Signed at New York, county and State of New York, this 16th day of July, 1923.

REED P. ROSE.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,582,604, granted April 27, 1926, upon the application of Ernest Hopkinson and Reed P. Rose, of New York, N. Y., for an improvement in "Processes and Apparatus for Drying Coagulable Liquids," errors appear in the printed specification requiring correction as follows: Page 2, line 102, for the word "drum" read *pan*, and line 122, for the misspelled word "cable" read *carle*; page 3, line 19, for the word "pan" read *drum*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of June, A. D. 1926.

[SEAL.]

M. J. MOORE,

Acting Commissioner of Patents.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,582,604, granted April 27, 1926, upon the application of Ernest Hopkinson and Reed P. Rose, of New York, N. Y., for an improvement in "Processes and Apparatus for Drying Coagulable Liquids," errors appear in the printed specification requiring correction as follows: Page 2, line 102, for the word "drum" read *pan*, and line 122, for the misspelled word "caple" read *cable*; page 3, line 19, for the word "pan" read *drum*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

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