

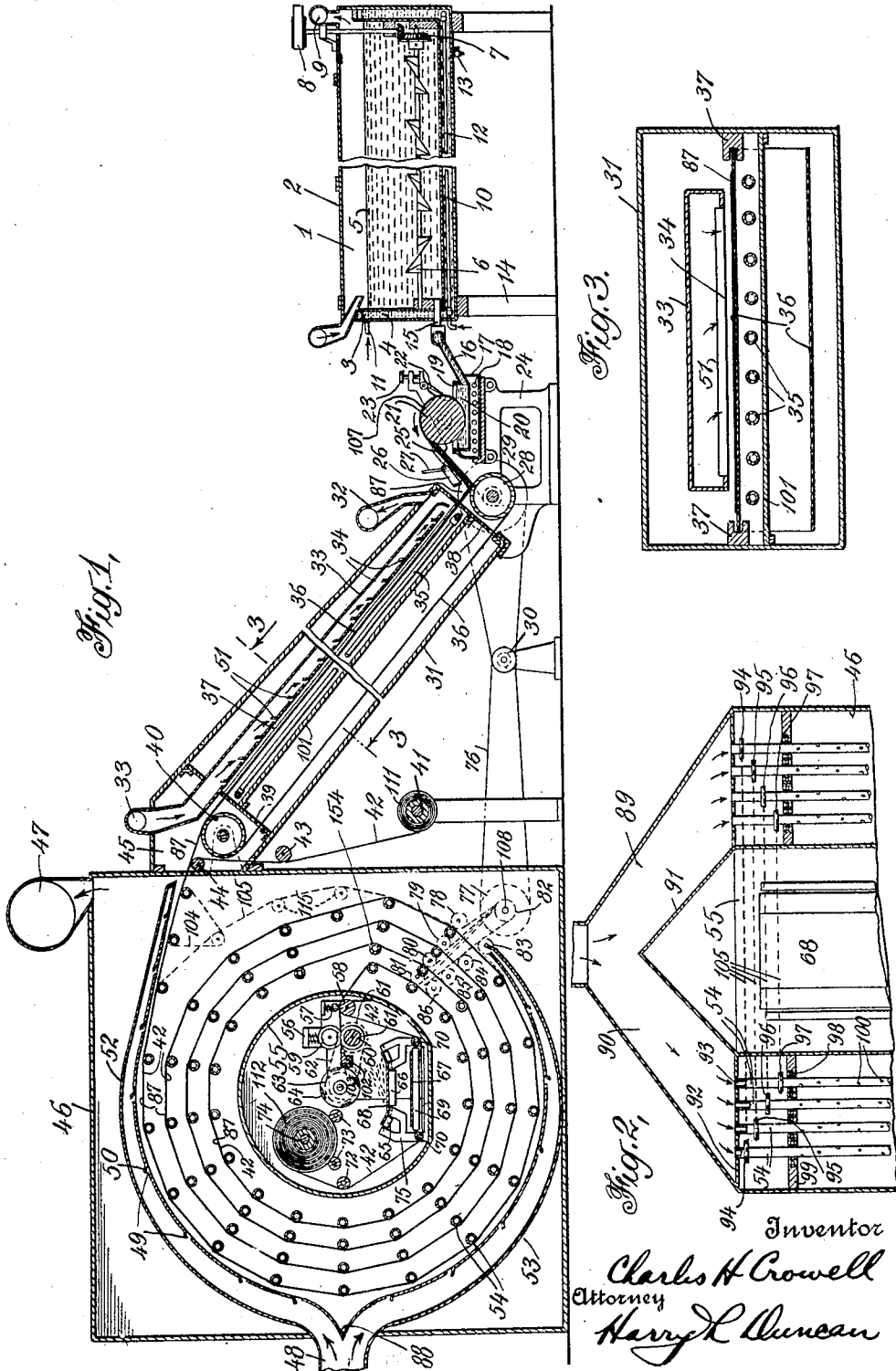
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APPARATUS FOR MANUFACTURING GLUE.

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR MANUFACTURING GLUE.

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Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, CHARLES H. CROWELL, a citizen of the United States, and residing in the borough of Brooklyn, county of Kings, city and State of New York, have made a certain new and useful Invention Relating to Apparatus for Manufacturing Glue, of which the following is a specification taken in connection with the accompanying drawing, which forms part of the same.

This invention relates especially to apparatus for manufacturing glue by evaporating the glue solution to a thick condition and then feeding a uniform sheet or layer of such hot glue solution as by a feed roll dipping into the same and transferring such layer or sheet as by a scraping inclined feeder board to a metallic carrier belt on which the glue is quickly congealed by chilling action of the belt and by currents of cooled dry air which may also exert a drying action on this thin sheet or web of glue which may be thus rendered coherent and fairly strong. The coherent glue web is then while resting on a supporting web of specially prepared paper, if desired, carried around a drying chamber on supporting rolls which are preferably hollow and arranged to discharge air jets or currents so that the moisture is rapidly withdrawn from the glue web as it passes a number of times around the drying chamber before being divided into flakes or pieces as by slitting and cutting devices for shipment and sale.

The drawings show in a somewhat diagrammatic way illustrative embodiments of this invention, and Fig. 1 is a longitudinal sectional view of a form of apparatus.

Fig. 2 is a partial horizontal section through the drying chamber; and

Fig. 3 is a transverse section through the belt casing taken substantially along the line 3-3 of Fig. 1.

The thin aqueous solution of glue prepared in the usual way from hides or other suitable waste animal material, etc. is preferably evaporated considerably to increase its consistency and thereby minimize the proportion of moisture which must be subsequently removed. For this purpose any suitable evaporating apparatus may be used, such, for instance, as the evaporator 1 which may have a tightly fitting removable cover

2, and into which the glue solution 5 may be fed from time to time or preferably in a continuous manner and the moisture evaporated therefrom as by the action of the heating jacket 10 to which water or other suitable heating liquid 4 may be supplied as through the pipe 11 and withdrawn when the tank is to be entirely drained through the drain cock 13. Suitable heating coils, such as 12, may be arranged in this heating jacket so as to heat the liquid therein and thereby supply heat to the glue within the tank which is preferably kept thoroughly agitated by suitable devices, such as the agitator 6 rotated as by the gears 7 connected with a suitable drive pulley, such as 8, driven by a belt or other means. The evaporation of the glue solution may be promoted by supplying to the evaporator relatively dry air and also, if desired, by exhausting the vapor space of the evaporator as by an exhaust connection 9 communicating with an exhaust fan or vacuum pump. By this means the hot glue solution may be concentrated to the desired extent without injury and while in a thick condition in which it flows about like molasses may be withdrawn from the tank through the feed cock 15 and pipe 16 so as to supply the glue feed tank 19 with this concentrated glue solution 20 which is preferably kept hot by suitable heating pipes 18 in the jacket 17.

The concentrated glue solution from the tank may be formed into a substantially uniform layer or thin sheet by suitable feeding devices and while in this condition preferably transferred to or spread upon a carrier belt of metal on which it is cooled and thus congealed and preferably simultaneously further dried to produce a coherent and fairly strong web which can be subsequently dried by passing through with any suitable continuous dryer. For this purpose a feed roll, such as 21, may be rotated by suitable means and the lower part of this roll dipping into the glue 20 in the tank continuously carries up an adherent coating of glue 107 which is rendered uniform by a suitable doctor or scraper 22 adjusted in position with respect to the roll as by the adjusting screws 23. This glue sheet 107 may then be carried around the roll until removed therefrom by the scraper or feeder board 25 over which the glue sheet may flow or pass so as to be applied to the carrier belt 36 of any

suitable material, such as thin steel or aluminum, and form thereon a practically uniform thin glue web 87. This feeder board may, of course, be considerably shorter than as indicated in the drawing for the sake of clearness and in order to illustrate the co-operation therewith of the cut-off gate 26 which as indicated may be swung down against the feeder board by the handle 27 so as to promptly stop the supplying of glue to the carrier belt in stopping or readjusting the machine. This carrier belt 36 may be supported on the belt rolls 28, 40 mounted in suitable bearings at the ends of the casing 31, the belt entering this casing through suitable slots adjacent its lower end and being preferably guided at the sides in the wood or other guides 37 which may be secured to the casing, as shown in Fig. 3. The upper run of this belt on which the glue web 87 rests is chilled by any suitable means so as to congeal the glue and for this purpose a series of chilling pipes 35 may be arranged between the carrier belt and the partition 101 as shown in Figs. 1 and 3. By this means the metallic belt and the thin layer or web of glue thereon are quickly chilled which tends to congeal the glue web and render it more coherent and at the same time less strongly adherent to the carrier belt so as to allow its more easy removal therefrom. This action may be promoted by the discharge of cooling air jets or currents on the glue web for which purpose a suitable air box or distributor 33 may be arranged above the belt and formed with a series of air slots 34 and cooperating directing ribs 51, if desired, so as to preferably direct the air jets or currents angularly against the glue web to further cool and congeal the same or to remove moisture therefrom, or to effect both these actions simultaneously. Air for this purpose may be supplied through the air supply pipe 33, this air having been preferably dried by removing the desired amount of moisture therefrom by the freezing process or by chemical or other means and then the air brought to the proper temperature to exert the desired cooling and congealing effect on the glue web while simultaneously evaporating considerable moisture therefrom and thus promote the coherent and fairly strong condition of this glue web when it is stripped or removed from the carrier belt after a run of the desired number of feet. If desired, the glue web on the carrier belt may be treated under reduced pressure by exhausting this part of the casing to the desired extent through the exhaust connection 32 which also serves to remove the treating air and moisture from the casing.

The coherent glue web 87 may be withdrawn from the upper carrier roll 40 since it preferably has at this point about the

strength and consistency of a web of forming paper and this continuous sheet or glue web may then be subjected to the drying action of air currents preferably while the glue web is fed round and round a suitable drying chamber in a spiral course determined by supporting rolls preferably rotated to have the desired feeding action on the glue web. If desired, the glue web may in some cases be more or less supported during this supplemental drying action by resting on a supporting web, such as 42, of suitable material, such as properly coated paper or fabric which may be completely filled with an adhering high talc filling composition in which has been incorporated sufficient paraffin or other water-repellant waxy material so that when highly calendered this supporting web repels water sufficiently so as to prevent the undesirable adhesion of the glue web thereto. A roll 111 of such supporting web may be mounted on the roller 41 so that the web 42 may be withdrawn therefrom and passed around suitable guide rolls, such as 43, 44, and thus brought as closely adjacent the point of withdrawal of the glue web 87 from the carrier roll 40 as is convenient so that the glue web in the transfer chamber 45 quickly rests on and is supported by this supporting web which travels therewith through the subsequent drying apparatus.

A drying chamber, such as 46, may be provided for this purpose and formed with the desired number of spirally arranged rows of supporting rolls, such as 54, of which four rows are shown for the sake of clearness, although, of course, eight or ten rows of rolls may be conveniently arranged in a chamber ten or twelve feet square, for instance, so as to secure within convenient space several hundred feet of web on which the drying action may take place, although it is, of course, understood that any suitable form of continuous dryer may be employed, if desired. It is desirable that the glue web passing around these supporting rolls with or without the supporting web beneath the same should be subjected to the drying action of air jets or currents preferably of specially dry air of such temperature as to withdraw the moisture from the thin glue web without undesirably softening or melting the same. It is advantageous for this purpose to have the supporting rolls hollow so that they can have an air discharging action and deliver air jets from the series of holes or perforations 100 formed in these rolls as indicated in Fig. 2. For this purpose it is desirable to have the rolls which may, as indicated, be mounted in ball bearings 98 in the partition 99 in the drying chamber, extended so that their hollow ends extend through or are substantially flush with the partition 92 and receive air from the conical air space or

manifold 90 between the conical end 89 of the drying chamber connecting with the air feed pipe 109 and the spreader cone 91 closing the end of the central delivery chamber 55. In this way jets of dry air of the desired temperature are discharged against practically all parts of the glue web moving through the drying chamber and over these supporting rolls which are preferably rotated at substantially uniform surface speed so as to facilitate the proper feed of the glue web through the chamber. These air jets also tend to gently disengage the glue web from the supporting rolls and thus minimize undesirable sticking or breaking of the web during the drying operation. In this way by proper control of the degree of moisture and temperature of the air jets or currents acting on the glue web, the drying of the glue may be rendered practically independent of atmospheric or weather conditions. The supporting rolls may be rotated by any suitable means, such, for instance, as a series of sprockets on the roll extensions with which sprocket chains may cooperate, and as indicated in Figs. 1 and 2 each substantially concentric row of these supporting rolls may be provided with aligned sprockets, such as 94, 95, 96 and 97 with which one of the sprocket chains 105 may cooperate so as to drive all the rolls of one of these series or rows in unison and at practically the same surface speed. It is, of course, understood that suitable idlers, such as 115, may be used to fill out any gaps in the series necessitated by the spiral course of the web over the rolls and additional supporting rolls may be readily driven by auxiliary sprocket chains, such as 104, driving the two supporting rolls over which the web first passes on entering the drying chamber. The sprocket chains may be driven by suitable sprockets, such as 82, on the shaft 108 and these sprockets may be so proportioned as to drive the inner series of supporting rolls at slightly less speed to compensate for the contraction of the glue web on drying which is sometimes desirable where no separate supporting web is used. These sprocket chains may, of course, pass over suitable idler pulleys, such as 78, 79, 80, 81, 83, 84, 85 and 86 shown in Fig. 1 to properly direct them into engagement with the sprockets on the supporting rolls themselves. For some reasons it is desirable to have the web first entering the drying chamber and when it contains more moisture acted on by air of a different quality from that acting on the web after it has become dryer and stronger. For this purpose one or more special air trunks, such as 52, 53, may be arranged around the first or outer series of supporting rolls and may be supplied from the pipe 48 with more thoroughly dried air or other desired drying medium

which may be discharged through the slots 49 in an angular direction determined by the directing ribs 50 so as to move at a slight angle toward the glue web and effect the desired preliminary drying thereof. 70

The substantially dry glue web which may be no more than several thousandths of an inch thick may be withdrawn from the last supporting roll used by suitable delivery rolls, such as 57, 58, which may be spring pressed together and positively rotated at the desired speed by any suitable means, and it is, of course, understood that the extent of travel of the glue web through the drying chamber may be regulated by withdrawing the web from the drying chamber as soon as it passes one of the supporting rolls, such as 154, in an outer row so that the rows of rolls inside are not then used. The glue web which is sufficiently flexible because of its thinness may thus be withdrawn from the drying chamber, together with the supporting web 42. This web 42 may be withdrawn by the delivery rolls referred to and then wound up by any suitable means, such as the surface rewinding rolls 73 rotating this supporting web roll 112 and its core 74 at practically uniform surface speed so as to withdraw this supporting web over the guide rolls 70, 72 from the delivery rolls and wind it up for reuse. The dried glue web 87 may be divided into the small flakes or pieces desired for commercial purposes by any suitable means, such, for instance, as the slitting rolls 59, 60, mounted in the frame 56 to divide the web into relatively narrow strips which may pass over the support 102 and be cut into separate pieces by the knives 64 on the cutter wheel which may cooperate with the stationary knife 103 at the end of the table. This cutter wheel may be rotated with the slitter roll 60 by a sprocket or belt 62 engaging the pulleys 61 and 63 on these rolls. The glue flakes may fall or be guided by any desired means upon the discharging delivery belt or device 68 having its discharge run mounted on the rolls 65, 66 to laterally discharge the finished glue from the delivery chamber while the lower entering run 67 of the belt is carried in the usual way on supporting rolls 69 mounted in the frames 75. The operating parts of the machine may, of course, be rotated or driven in any suitable way, and as indicated the shaft 108 for the driving sprockets 82 may be driven by the belt or sprocket chain 76 passing over the pulley 77 on this shaft and over the pulley 30 belted or geared to the wheel 29 of the carrier roll 28, for example. 125

This invention has been described in connection with a number of illustrative forms, proportions, parts, arrangements, devices, steps, conditions and materials, to the details of which disclosure the invention is 130

not of course to be limited, since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

5 1. In apparatus for manufacturing glue, an evaporator for heating and concentrating glue solution, a connected glue feed tank provided with a feed roll dipping into said feed tank and having a cooperating doctor and a scraping feeder board cooperating with said feed roll to form a substantially uniform layer or sheet of glue and discharge the same along said feeder board, a metallic carrier belt to receive said layer of glue from said feeder board and form a substantially uniform glue web on said belt, a casing substantially enclosing the side of said carrier belt on which said glue web rests, chilling means to chill and congeal said glue web, an air box cooperating with said carrier belt and glue web to discharge against said web currents of cold dry air to remove moisture from said glue web and render the same coherent, a drying chamber formed with a number of spirally arranged rows of perforated supporting rolls, means to rotate the supporting rolls, a delivery chamber formed in said drying chamber within said supporting rolls and an air manifold supplied with dry air and communicating with the open ends of said perforated supporting rolls to discharge air therefrom against said glue web, an air trunk discharging cooled dry air against the glue web entering said drying chamber, delivery rolls and discharging devices within said delivery chamber to withdraw the glue web from the inner supporting rolls.

2. In apparatus for manufacturing glue, a connected glue feed tank provided with a feed roll dipping into said feed tank and having a cooperating doctor and a scraping feeder board cooperating with said feed roll to form a substantially uniform layer or sheet of glue and discharge the same along said feeder board, a metallic carrier belt to receive said layer of glue from said feeder board and form a substantially uniform glue web on said belt, chilling means to chill and congeal said glue web and render the same coherent, a drying chamber formed with a number of spirally arranged rows of perforated supporting rolls, means to rotate the supporting rolls, a delivery chamber formed in said drying chamber within said supporting rolls and an air manifold supplied with dry air and communicating with the open ends of said perforated supporting rolls to discharge air therefrom against said glue web, an air trunk discharging cooled dry air against the glue web entering said drying chamber, delivery rolls and discharging devices within said delivery chamber to withdraw the glue web from the inner supporting rolls.

3. In apparatus for manufacturing glue, means to form a substantially uniform layer or sheet of glue, a metallic carrier belt to receive said layer of glue and form a substantially uniform glue web on said belt, chilling means to chill and congeal said glue web and render the same coherent, a drying chamber formed with a number of spirally arranged rows of perforated supporting rolls, means to rotate the supporting rolls, a delivery chamber formed in said drying chamber within said supporting rolls, means cooperating with the open ends of said perforated supporting rolls to discharge air therefrom against said glue web, and delivery rolls and discharging devices within said delivery chamber to withdraw the glue web from the inner supporting rolls.

4. In apparatus for manufacturing glue, a metallic carrier belt, means to supply thereto molten glue to form a substantially uniform glue web on said belt, a casing substantially enclosing the side of said carrier belt on which said glue web rests, chilling means beneath said carrier belt to chill said glue web, an air box cooperating with said carrier belt and glue web to discharge angularly against said web currents of cold dry air to remove moisture from said glue web and render the same coherent, a drying chamber formed with a number of rows of perforated and discharging supporting rolls to support said glue web, means to rotate the supporting rolls in each row at substantially the same surface speed and to rotate the rolls in the final rows at a somewhat slower speed than the first supporting rolls, and an air trunk discharging cooled dry air against the glue web entering said drying chamber.

5. In apparatus for manufacturing glue, a metallic carrier belt, means to supply thereto molten glue to form a substantially uniform glue web on said belt, chilling means to chill said glue web, an air box cooperating with said carrier belt and glue web to discharge against said web currents of cold dry air to remove moisture from said glue web and render the same coherent, a drying chamber formed with a number of rows of perforated supporting rolls to support said glue web, means to rotate the supporting rolls and an air trunk discharging cooled dry air against the glue web entering said drying chamber.

6. In apparatus for manufacturing glue, a metallic carrier belt, means to supply thereto molten glue to form a substantially uniform glue web on said belt, chilling means to chill said glue web, means to remove moisture from said glue web and render the same coherent, a drying chamber formed with a number of rows of perforated supporting rolls to support said glue web and means to rotate the supporting rolls.

7. In apparatus for manufacturing glue, 130

an evaporator for heating and concentrating glue solution, a connected glue feed tank provided with a heating device, a feed roll dipping into said feed tank and having a cooperating doctor and a scraping feeder board cooperating with said feed roll to form a substantially uniform layer or sheet of glue and discharge the same along said feeder board, a cutoff gate cooperating with said feeder board, a metallic carrier belt to receive said layer of glue from said feeder board and form a substantially uniform glue web on said belt, a casing substantially enclosing the side of said carrier belt on which said glue web rests, means to chill and congeal said glue web and render the same coherent and to remove said web from said belt and a drying chamber to continuously receive and dry said glue web and means to guide a supporting web adjacent said carrier belt to receive and support said glue web during the first drying of said web.

8. In apparatus for manufacturing glue, a glue feed tank provided with a heating device, a feed roll dipping into said feed tank and having a cooperating doctor and a scraping feeder board cooperating with said

feed roll to form a substantially uniform layer or sheet of glue and discharge the same along said feeder board, a cut-off gate cooperating with said feeder board, a metallic carrier belt to receive said layer of glue from said feeder board and form a substantially uniform glue web on said belt, a casing substantially enclosing the side of said carrier belt on which said glue web rests, means to chill and congeal said glue web, and render the same coherent and to remove said web from said belt.

9. In apparatus for manufacturing glue, a glue feed tank provided with a heating device, a feed roll dipping into said feed tank and having a cooperating doctor and a scraping feeder board cooperating with said feed roll, a metallic carrier belt to receive said layer of glue from said feeder board and form a substantially uniform glue web on said belt, means to chill and congeal said glue web and render the same coherent and to remove said web from said belt.

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Witnesses:

J. HEUTER,  
M. BETTER.