P. TURLUR.

YARN DRESSING MACHINE.

APPLICATION FILED AUG. 30, 1906.

951,858. Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

FIG. 1

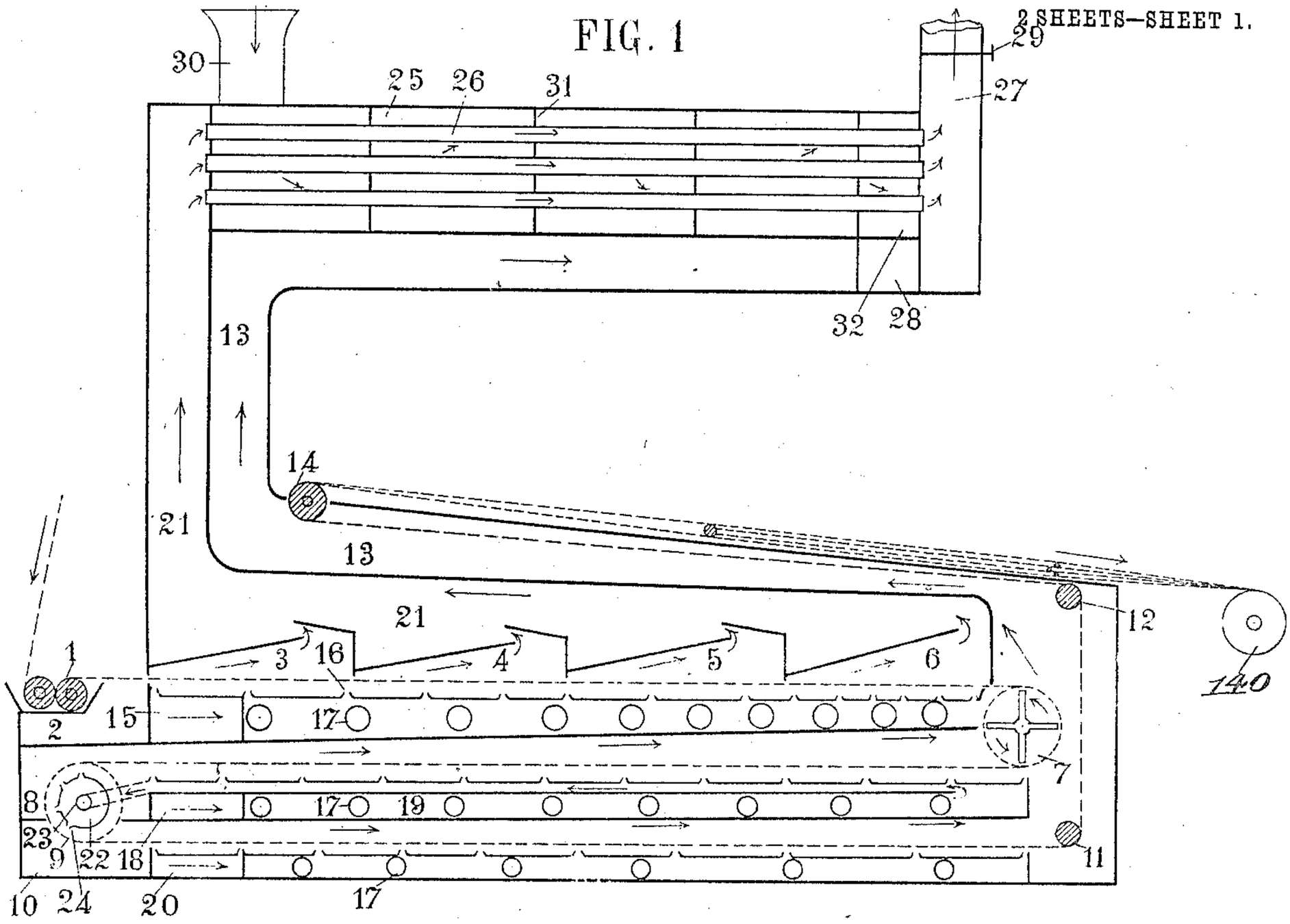
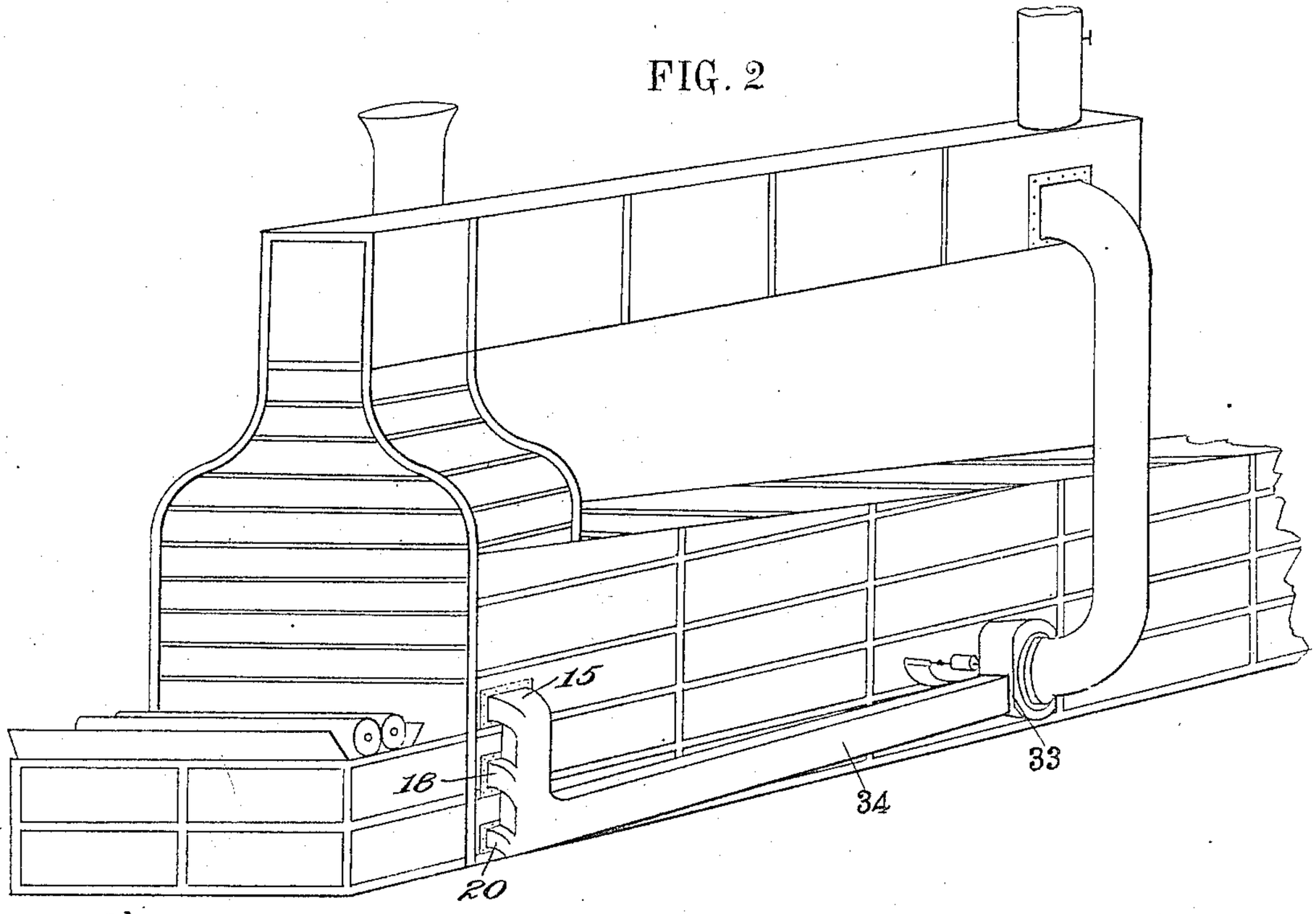


FIG. 2



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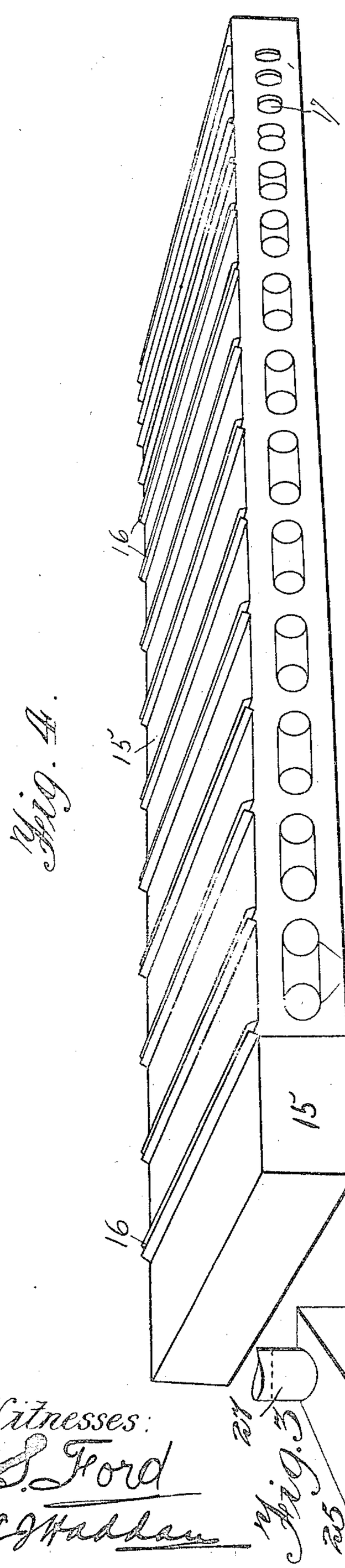

Fig. 4.

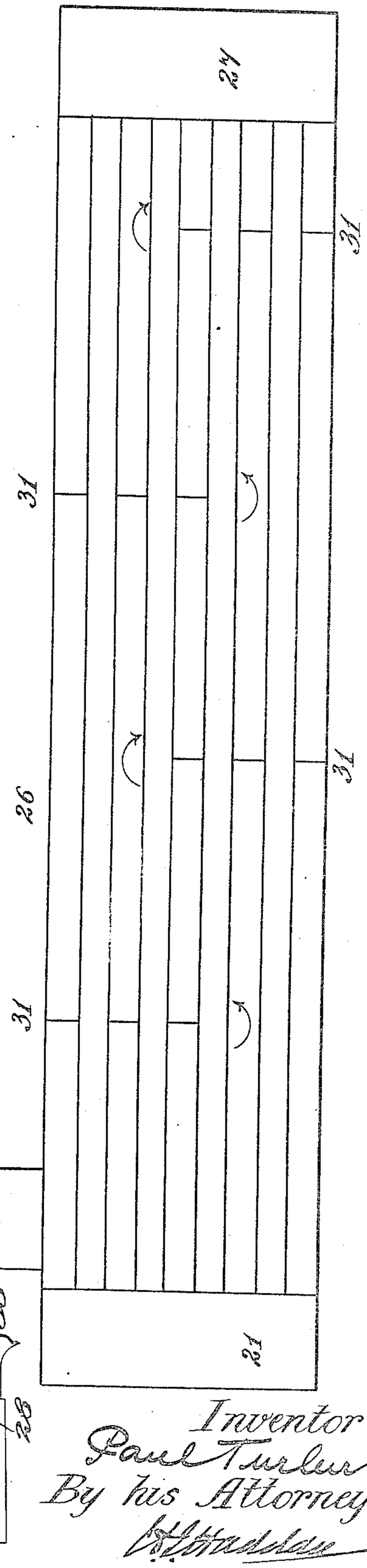

Fig. 5.

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Fig. 3.

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UNITED STATES PATENT OFFICE.

PAUL TURLUR, OF WATTRELOS, FRANCE.

YARN-DRESSING MACHINE.

951,858. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed August 30, 1906. Serial No. 332,643.

To all whom it may concern:

Be it known that I, PAUL TURLUR, a citizen of the French Republic, residing at Wattrelos, in France, have invented certain new and useful Improvements in Yarn-Dressing Machines, of which the following is a specification.

This invention relates to an improved yarn-dressing machine in which hot air under pressure is used for rapidly and effectively drying the yarn, the heat contained in the vapor generated being utilized to assist the drying process.

An example of the invention is illustrated in the annexed drawings, in which—

Figure 1 is a longitudinal section of the machine, and Fig. 2 a perspective elevation thereof. Figs. 3 and 4 illustrate details of the apparatus, Fig. 3 being a perspective view in section through the regenerator, Fig. 4 being a perspective view of the first heated air supply chamber. Fig. 5 is a plan view in section of the regenerator.

The machine comprises three main parts, viz: the drying-chambers, the heat-regenerator, and a centrifugal blast-apparatus or compressor.

The yarn passes from the sizing rollers 1 into the horizontal chamber 2, which is divided into compartments 3 4 5 and 6. After traversing these compartments the yarn passes over a perforated drum 7 into a chamber 8, which it traverses in the opposite direction, whereupon it passes over a perforated drum 9 into a chamber 10 located below the chamber 8. From the chamber 10 the yarn passes upward over guide-rollers 11 and 12 and then traverses an inclined chamber 13, from which it passes over a roller 14 into the open air and is then wound on a beam or drum 140.

The floor of the chamber 2 is formed by the oblong air heating and distributing box 15 (Fig. 4). The upper face of this box has a plurality of transverse slits 16 formed with oblique sides and opening into the chamber 2. The box 15 is also traversed by heating pipes 17. Air forced into the end of the box 15 thus passes over the pipes 17 and escapes at the slits 16 where it impinges on the yarn passing along the chamber 2. The farther the air passes along box 15 before escaping at the slits the higher will be the temperature imparted to it by the pipes 17 and consequently the yarn is subjected to increased heat as it approaches the farther end of the chamber 2. From a box 18 beneath the chamber 8 heated air passes in a similar manner into the chamber 8, but the box 18 is divided into two compartments by a horizontal partition 19, so that the air forced into the box must pass all the heating pipes 17 before it enters the compartment above the partition 19, and thence passes at a high, uniform temperature through the slits in the top of the box 18 into the chamber 8. Below the chamber 10 is a similar air box 20. The air passing from box 20 into the chamber 10 is heated to a less degree than the air in the upper boxes.

The arrangement of the three superposed drying-chambers 2, 8 and 10 allows, firstly, of effecting the progressive drying of the yarn in the manner described, and secondly, of separately discharging the vapors generated in the drying chambers, so that the wet vapors produced during the first stage of the drying operation are not mixed with the drier vapors produced at the later stages. The roofs of the compartments 3, 4, 5 and 6 of box 2 are inclined and provided with apertures so arranged that the vapors generated in the said compartments flow into an up-take 21 in the manner indicated by arrows in Fig. 1. The vapors generated in the chamber 8 traverse the perforated drum 7 and thus have a powerful drying effect on the yarn passing over the said drum; these vapors then flow into an up-take 13. The vapors generated in the chamber 10 flow past the drum 7 and also enter the same up-take 13. The drum 7 may contain vanes adapted to be rotated in the direction indicated in Fig. 1 by arrows, in order to accelerate the flow of the vapors through the drum and up-take 13, and to increase the force with which these vapors are projected against the yarn; the said vanes are, however, not essential.

The drum 9 contains a cylinder 22 to which hot air is supplied by means of pipes 23 communicating with the box 18, the said pipes serving as axles for the cylinder and the drum. The hot air passes out of the cylinder through slits 24.

The up-take 21 conducts the wet vapors to the regenerator 25, and a centrifugal fan 33 connected at 28 to the up-take 13 and at 32 to the air chambers of the regenerator sucks dry gases from the said up-take and heated air from the regenerator, the said gases and air being mixed and conducted

by the delivery-conduit 34 to the boxes 15, 18 and 20 as shown in Figs. 2 and 3. All the vapor from the two lower chambers flows through the up-take 13 at 28, and fresh air from outside, entering at 30, flows into the box 32 and is heated by the tubes 26, so that the fan sucks simultaneously at both places. The mixture is produced in the tube 35 and between the vanes of the fan 33 (Fig. 3).

The regenerator is provided with a funnel 30 which allows of sucking dry air from the upper part of the work-room, where the temperature is high, or from above boilers or the like, if such are adjacent, or from any chamber or locality containing hot air which is not otherwise utilized. The vapors produced in the dressing machine have in some cases a temperature of 100 degrees centigrade, and the heat contained in these vapors is, in the case of ordinary dressing-machines dissipated in the atmosphere. By causing these vapors to pass through the regenerator their temperature is lowered by the transfer of heat to dry air sucked through the air chambers of the regenerator. This dry air may thus be raised to a temperature of say 80 degrees centigrade without additional consumption of fuel. The air thus sucked through the regenerator and the drier vapors from uptake 13 are further heated by the pipes 17 to the highest temperature to which the yarn can be exposed without injury. The dressing on the yarn forms a protective coating which renders it possible to use a higher temperature than would otherwise be admissible. Superheated steam may, therefore, be used for heating the air, more particularly in view of the fact that the air under pressure is not in contact with the steam-pipes 17 for a sufficient length of time to be raised to the same temperature as the steam.

In the above described construction the heating of the air is performed solely in the drying apparatus itself the air drawn into the regenerator by the fan 33 flowing through the conduit 34 to the boxes 15, 18 and 20, in which the pipes 17 heat the air as it circulates between them. If the heating of the air is performed outside the drying apparatus, that is to say if air heated to the desired temperature is supplied to the boxes, the heating may take place in various ways.

The heat contained in the vapors produced in the dressing machine may be recovered in two ways. One method consists in using a regenerator (Fig. 1) consisting of an elongated closed chamber 25 containing metal pipes 26 through which the vapors flow, the air to be heated being sucked through the funnel 30 by the action of the fan 33, and caused by baffles 31 to flow obliquely between the pipes 26, by which it is heated. The vapors flow from the pipes 26 to the discharge-funnel 27. The construction of this regenerator may, of course, be modified in various ways. The vapors flowing through the uptake 21 may be caused to circulate about the pipes 26, for example in the box 25, instead of flowing through the said pipes, whereupon they pass away through the chimney 27. In this case cold, dry air from outside, entering at 30, flows through the pipes 26. Another method of utilizing the heat contained in the vapors consists in directly mixing a portion of the latter with comparatively dry air. At a temperature of 100 degrees centigrade air is capable of absorbing 591 grams of water-vapor per cubic meter. The gases discharged from the dressing-machine usually contain 10 per cent., say 59 grams, of water-vapor, and are therefore capable of absorbing more. If, therefore, during each passage of the vapor through the machine the fan sucks in half the total quantity of vapor the other half being directly discharged into the atmosphere, and if the vapor sucked in is mixed with an equal quantity of comparatively dry air containing an average of 10 grams of water-vapor per cubic meter, the moisture will, after the twentieth passage of the vapors, remain stationary at 20 per cent., and cannot increase beyond this, as can easily be ascertained by calculation. Since separate up-takes are provided for the wet vapor and the practically dry vapor it is easy to arrange for the circulation of the former in the regenerator, for the purpose of heating dry air, which is then mixed with the dry vapor. The up-takes are connected to the rear of the machine, instead of using a single up-take in front, as has hitherto usually been done, the purpose of the former arrangement being to secure a progressive drying action. The said up-takes extend from the rear to the front of the machine in order to conduct the vapor to the regenerator and to leave space for the rings through which the yarn passes.

A valve or damper 29 is arranged in the funnel 27 to allow of regulating the discharge of the vapor in accordance with the requirements of the drying operation.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

1. In a yarn dressing machine the combination of a plurality of separated drying chambers communicating with one another in series, with separate self contained means located in each drying chamber for supply of air at different temperatures to said chambers.

2. In a yarn dressing machine the combination of a plurality of drying chambers communicating with one another in series, with means for supply of air at different temperatures to said drying chambers re-

spectively, separate uptakes for the wetter and drier vapors respectively from said chambers, a regenerator chamber extending from the top of said uptakes and means for interchange of heat from the hot wetter vapors to the feed air.

3. In a yarn dressing machine the combination of a plurality of drying chambers, separate uptakes for the wetter and drier vapors respectively from said chambers, a regenerator chamber extending from the top of said uptakes for interchange of heat from the hot wetter vapors to the feed air, means for feed of air to the drying chambers, and connections permitting a proportion of the drier vapors to be mixed with the feed air.

4. In a yarn dressing machine the combination of a plurality of superposed drying chambers communicating with one another in series, an air chamber extending along the base of each said drying chambers and having slits for discharging therein, means for guiding the yarn successively through said chambers, and means for feed of air at different temperatures to said air chambers.

5. In a yarn dressing machine the combination of a plurality of drying chambers separate uptakes for wetter and drier vapors respectively from said chambers placed at the back of the machine, a regenerator chamber extending from the top of said uptakes toward the front of the machine for interchange of heat from the hot wetter vapors to the feed air.

6. In a yarn dressing machine the combination of a plurality of drying chambers communicating with one another in series, a separate air feed for each said drying chambers means for guiding the yarn successively through said chambers, and separate uptakes for the wetter and drier vapors respectively from said chambers.

7. In a yarn dressing machine the combination of a plurality of drying chambers communicating with one another in series, means for supply of air to each of said drying chambers, means comprising perforated hollow rollers for guiding the yarn successively through said chambers, and uptakes from the latter.

8. In a yarn dressing machine the combination of a plurality of drying chambers, separate uptakes for the wetter and drier vapors respectively for said chambers a regenerator to which said uptakes lead and a damper for controlling the outlet of vapors.

9. In a yarn dressing machine the combination of a plurality of superposed drying chambers communicating with one another in series, an air chamber having slots in its wall extending along the base of each said drying chamber and discharging therein through said slots, means for guiding the yarn successively through said chambers, separate uptakes for the wetter and drier vapors respectively from said chambers placed at the back of the machine, a regenerator chamber extending from the top of said uptakes toward the front of the machine means for interchange of heat from the hot wetter vapors to the feed air, means for feed of air and connections permitting a proportion of the drier vapor to be mixed with the feed air.

In witness whereof I have signed this specification in the presence of two witnesses.

PAUL TURLUR.

Witnesses:

GEORGES LE COA,

ALFRED C. HARRISON.