

F. I. DU PONT.
 REMOVAL OF ACIDS FROM NITROCELLULOSE AND CENTRIFUGAL MACHINE THEREFOR.
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2 SHEETS-SHEET 1.

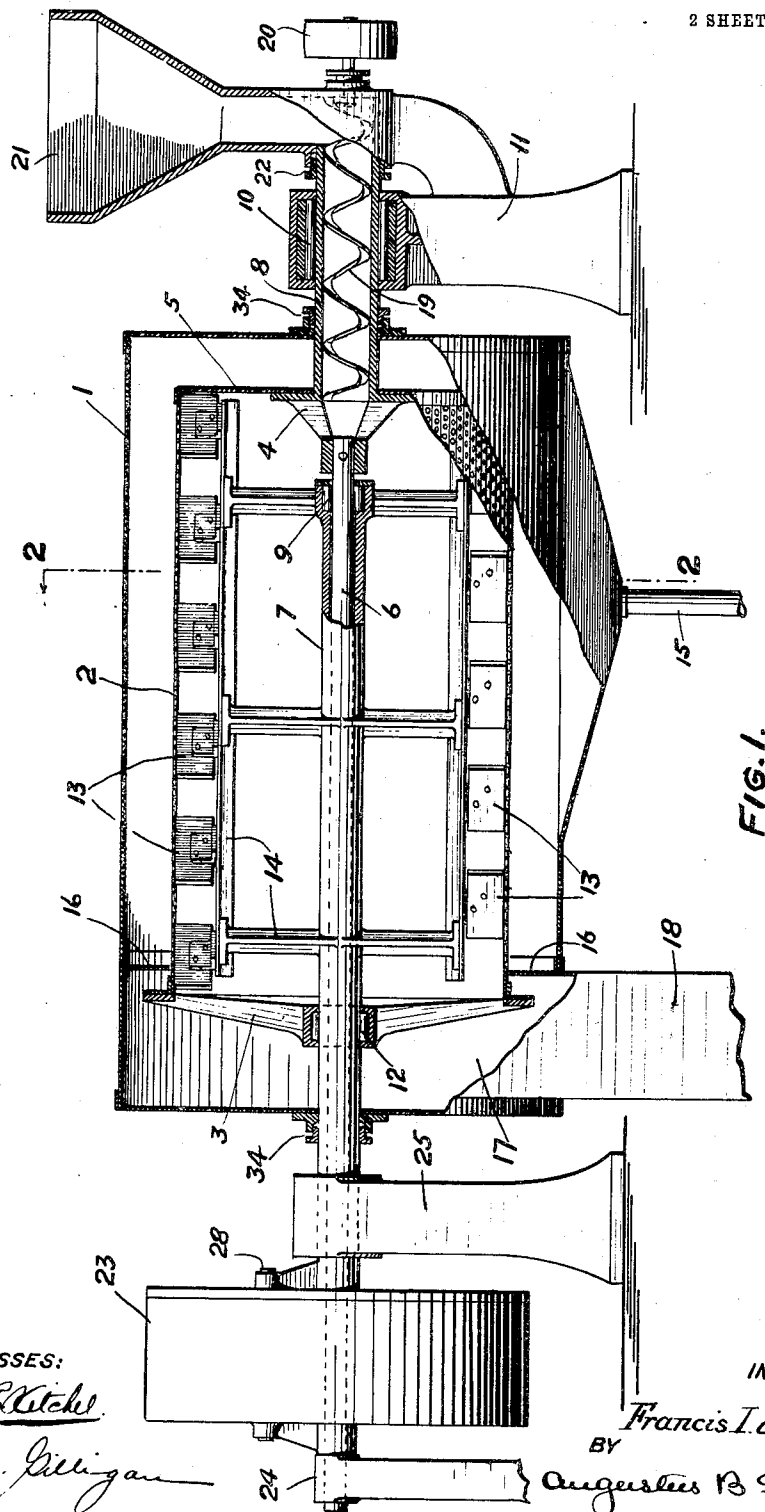


FIG. 1.

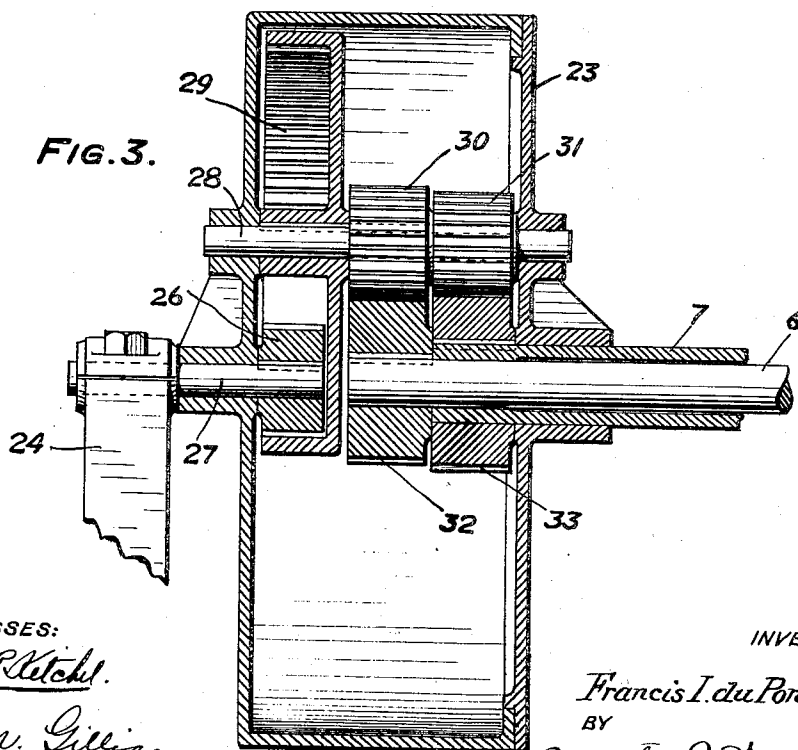
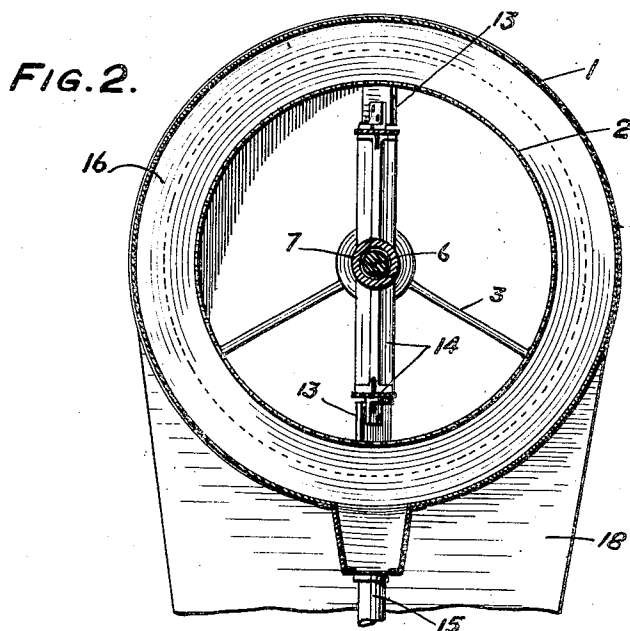
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REMOVAL OF ACIDS FROM NITROCELLULOSE AND CENTRIFUGAL MACHINE THEREFOR.

1,024,624.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANCIS I. DU PONT, a citizen of the United States, and a resident of Wilmington, in the county of Newcastle and State of Delaware, have invented certain new and useful Improvements in the Removal of Acids from Nitrocellulose and in Centrifugal Machines Therefor, of which the following is a specification.

Objects of the invention are, first, to provide an efficient and reliable continuous working centrifugal machine, or more specifically stated, to provide a centrifugal machine for continuously separating acid from gun cotton; second, to effect a saving of labor and to insure a constant efficiency of operation in the separation of acid and gun cotton, third, to provide efficient means for continuously feeding in a proper manner the material through the centrifugal machine, and fourth, to provide simple mechanism of which the gears move relatively slowly for driving the parts of the centrifugal machine at high speed, yet with the necessary relative difference of speed between them.

To these and other ends hereinafter set forth the invention comprises the continuous working centrifugal machine, as well as certain other improvements to be presently described and finally claimed.

In the following description, reference will be made to the type of embodiment of the invention chosen for illustration in the accompanying illustrative drawings forming part hereof, and in which—

Figure 1, is a side elevation, partly in section, of a continuous working centrifugal machine embodying features of the invention. Fig. 2, is a transverse sectional view taken on the line 2—2 of Fig. 1, looking toward the left, and Fig. 3, is a view principally in central section, drawn to an enlarged scale, and illustrating the driving mechanism shown at the left-hand side in Fig. 1.

In the drawings 1, is a stationary cylinder or housing surrounding or inclosing a cylinder 2, arranged for rotation about a horizontal axis. The curved wall of the cylinder 2, is perforated and the ends of the cylinder 2 consist, generally speaking, of spiders 3 and 4, although the spider 4 carries a head 5, which is connected with the

curved wall of the cylinder. The shaft 6 is revoluble in the sleeve 7, and it is connected with the spider 4 and with an intake or feed tube 8. The shaft 6 has appropriate bearings, shown at 9 as of the roller variety, within the sleeve 7 and the tube 8 has appropriate bearings, also shown as of the roller variety at 10, within the pedestal or support 11. The spider 3, is revoluble in respect to the sleeve 7 and as shown roller bearings 12, are interposed between the two. Thus when the shaft 6 is turned it causes the perforated cylinder 2 to revolve about a horizontal axis. The sleeve 7 carries slanting blades or feeders 13, arranged at an inclination to the axis of the cylinder 2 and disposed so as to cooperate with its perforated wall. These slanting blades or feeders 13 are shown as attached to a cage 14, the radial arms of which are connected with the sleeve, 7 and the longitudinal arms of which carry the slanting blades or feeders 13. The stationary cylinder or housing 1 is provided with an inclined bottom which communicates with an offtake 15 and it may be said to be internally divided as by the partition 16, so as to form a chamber 17 at its outlet end, which chamber 17 communicates with an offtake 18.

19, is a feed screw which, when present, may be driven by means of the pulley 20.

21, is a stationary hopper which communicates with the intake or feed tube 8. Provisions are shown at 22, in the nature of a gland or stuffing box, which enable the tube 8 to rotate in respect to the part 21. The shaft 6 and the sleeve 7 are driven at a high speed, for example, the shaft may run at six hundred revolutions per minute and the sleeve is driven at a high speed but somewhat more slowly than the cylinder 2, for example, the speed of the sleeve may be ten or twelve revolutions per minute less than the speed of the cylinder 2. Of course the revolutions per minute of the sleeve and of the slanting blades or feeders are the same, so that while the feeders or slanting blades run at high speed they run somewhat more slowly than the speed of the perforated cylinder 2.

To drive the described parts at high speed, yet with the required difference in speed between them, use is made of the mechanism which will now be described: 23, is a hollow

pulley or drum intended to be driven by a suitable belt or the like, and it is revolvably supported by means of the pedestals 24 and 25, or perhaps more accurately, by means of parts carried by these pedestals. Within the pulley there is a gear 26 fast to a spud 27 held by the pedestal 24, so that the gear 26 is fixed. Rotatably mounted within the drum, as on the shaft 28 carried thereby, is an internally toothed wheel 29 meshing with the gear 26. Connected with the internal gear 29, for example, fast upon the shaft 28, are gear wheels 30 and 31. The gear wheel 30 meshes with a gear wheel 32 fast to the shaft 6 and the gear wheel 31 meshes with a gear wheel 33 fast to the sleeve 7. The relative number of teeth on the intermeshing gear wheels 30 and 32, and the intermeshing gear wheels 31 and 33, is such that the shaft 6 and the sleeve 7 are driven at the required speed and at the required difference in speed. The described mechanical or differential device is possessed of advantages and among which it may be pointed out that the gears relative to each other are slow running gears and yet their effect is to materially increase the speed from the driver to the driven parts. It may be said that the described roller bearings are advantageous because they are arranged in locations where proper lubrication of ordinary bearings would be difficult.

The mode of operation of the described continuous working centrifugal machine will be explained in connection with the separation of gun cotton from acid; but its use is not to be thereby unduly limited.

Gun cotton and acid are continuously fed through the hopper 21 and tube 8, through the spaces between the arms of the spider 4 into the interior of the rapidly rotating perforated cylinder 2. In some instances this material may continuously flow through the described passages, but if it does not flow properly use may be made of the feed screw 19, which, when present, may advantageously be revolved somewhat slower than the intake or tube 8. The material being thus continually fed into the perforated cylinder 2, which is rapidly rotating about a horizontal axis, is subjected to centrifugal action, the acid passing through the perforated wall of the cylinder and escaping into the casing 1 and thence by the offtake 15, and the gun cotton remaining in the perforated cylinder. As the gun cotton is thus freed from acid, it is fed through the horizontally rotating cylinder 2 and escapes at the left-hand end thereof, past the arms of the spider 3 into the chamber 17 and thence by way of the offtake 18. The feed of the material through the rapidly rotating horizontal cylinder is accurately controlled and properly governed by the speed of the slanting blades or feeders 13, which, as has been

said, rotate rapidly yet somewhat more slowly than the perforated cylinder and this difference in speed between the perforated cylinder and the feeders is important, since it brings about an appropriate yet continuous feed for giving rise to a continuous stream of acids and a continuous stream of gun cotton. Stuffing boxes or glands 34 are shown as applied between the ends of the housing or casing and the intake tube 8 and the sleeve 7. They serve to prevent leakage at these points of both liquid and air so that air is excluded from the casing. According to my invention the nitro-cellulose when subjected to this process is maintained out of contact with the air so that the nitro-cellulose as well as the apparatus itself are prevented from undergoing such chemical changes as are due to moisture in the atmosphere. The point is that better results are attained by the removal of acids from nitro-cellulose when the air of the atmosphere is excluded because the moisture in the atmosphere may be and is likely to bring about undesirable chemical changes.

What I claim is:

1. In a centrifugal machine the combination of a horizontal cylinder carrying shaft, a feeder carrying sleeve mounted thereon, a revoluble drum or pulley concentric with said sleeve and shaft, a fixed gear wheel concentric with said pulley or drum, an internally toothed wheel revolvably carried by said pulley or drum and meshing with said fixed gear wheel, and intermeshing gear wheels interposed between said internal gear wheel and said shaft and sleeve and provided with the requisite number of teeth for imparting the required differential speed to said shaft and sleeve, substantially as described.

2. A continuous working centrifugal machine comprising the combination of a horizontal shaft provided with a spider and with an imperforate cylinder head and with an intake tube, a pedestal in which said tube is revoluble, a sleeve revolvably mounted on said shaft, a pedestal in which said sleeve is revoluble, a perforated cylinder carried by said head and having a spider revoluble on said sleeve, scraper blades carried by said sleeve and arranged for co-operation with the interior of the curved wall of the cylinder and arranged at an inclination to the axis thereof, a revoluble pulley or drum concentric with the axis of the sleeve and shaft, a pedestal carrying a spud on which said pulley is revoluble and which is provided with a fixed gear wheel, an internal toothed wheel revolvably mounted on the pulley or drum and meshing with said fixed gear, and intermeshing gear wheels interposed between the drum and said shaft and said sleeve and having the requisite difference in number of teeth for

producing the required differential speed of said sleeve and shaft, substantially as described.

3. A continuous working centrifugal machine comprising the combination of a horizontal shaft provided with a spider and with an imperforate cylinder head and with an intake tube, a pedestal in which said tube is revoluble, a sleeve revolubly mounted on said shaft, roller bearings interposed between the shaft and sleeve, a pedestal in which said sleeve is revoluble, a perforated cylinder carried by said head and having a spider revoluble on said sleeve, a roller bearing interposed between the spider and sleeve, scraper blades carried by said sleeve and arranged for coöperation with the interior of the curved wall of the cylinder and arranged at an inclination to the axis thereof, a revoluble pulley or drum concentric with the axis of the sleeve and shaft, a pedestal carrying a spud on which said pulley is revoluble and which is provided with a fixed gear wheel, an internal toothed wheel revolubly mounted on the pulley or drum and meshing with said fixed gear, and intermeshing gear wheels interposed between the drum and said shaft and said sleeve and having the requisite difference in number of teeth for producing the required differ-

ential speed of said sleeve and shaft, substantially as described.

4. In apparatus for the removal of acids from nitrocellulose the combination of a perforated cylinder rotatable at a high enough velocity to produce centrifugal force, a conveyer adapted to move the solid material longitudinally through this cylinder moving at a velocity differing but slightly from the velocity of the cylinder so that with reference to the cylinder the conveyer moves slowly, and an inclosing casing which prevents moisture of the atmosphere from affecting the materials in the apparatus, substantially as described.

5. Apparatus for the removal of acids from nitrocellulose which comprises the combination of a perforated centrifugal drier, a conveyer running relatively slowly in respect to the surface of the drier for passing the nitrocellulose through the centrifugal drier, and means for maintaining the whole out of contact with the atmosphere, substantially as described.

In testimony whereof I have hereunto signed my name.

FRANCIS I. DU PONT.

Witnesses:

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