

(No Model.)

J. & F. FIRMENICH.

STARCH WASHER.

No. 260,380.

Patented July 4, 1882.

FIG. 1.

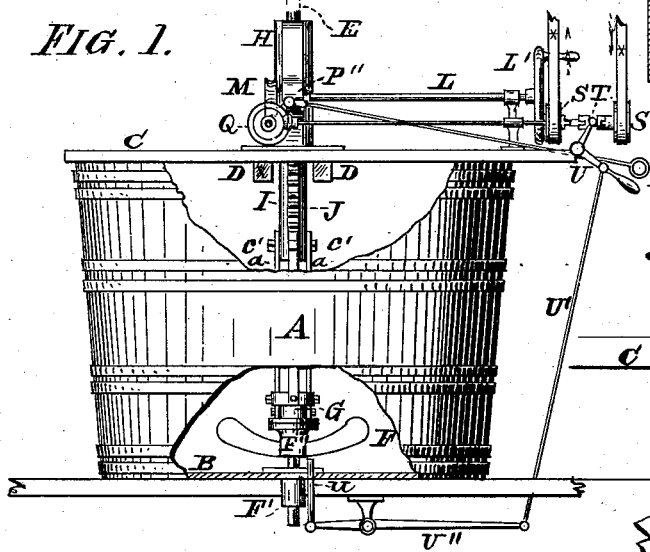


FIG. 2.

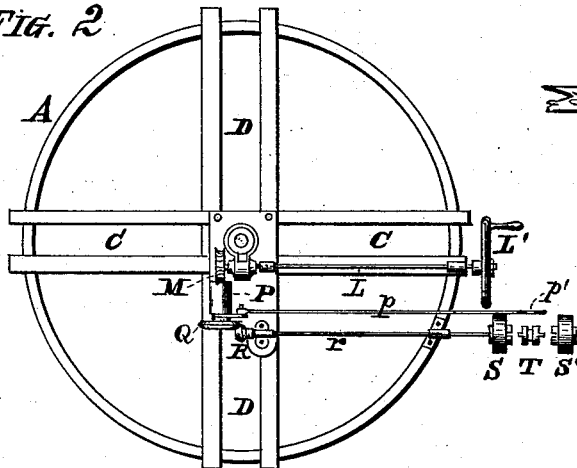


FIG. 5.

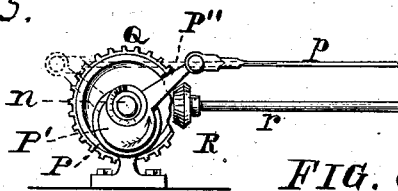
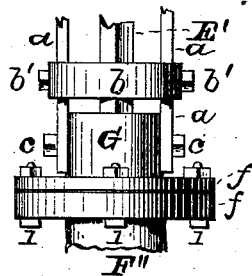


FIG. 6.



Witnesses:

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# UNITED STATES PATENT OFFICE.

JOSEPH FIRMENICH AND FRANK FIRMENICH, OF BUFFALO, NEW YORK.

## STARCH-WASHER.

SPECIFICATION forming part of Letters Patent No. 260,380, dated July 4, 1882.

Application filed May 16, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH FIRMENICH and FRANK FIRMENICH, of Buffalo, in the county of Erie and State of New York, have jointly invented certain new and useful Improvements on a Starch-Washer; and we do hereby declare that the following description of our said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

Our present invention has general reference to apparatus for washing starch; and it consists essentially in such novel and peculiar combination of parts and details of construction as hereinafter first fully set forth and described, and then pointed out in the claims.

In the drawings already mentioned, which serve to illustrate our said invention more fully, Figure 1 is a front elevation of our improved starch-washer, part of the tub being shown as broken away to expose interior parts. Fig. 2 is a plan. Fig. 3 is a sectional elevation of the mechanism for operating the agitator. Fig. 4 is a sectional plan in line *xx* of Fig. 3. Fig. 5 is a sectional elevation in line *yy* of Fig. 4. Fig. 6 is an elevation of the lower portion of the agitating mechanism.

Like parts are designated by corresponding letters of reference in all the figures.

The object of this invention is the production of an automatic device for agitating and washing the starch in the washing-tank. This starch, as is well known, when allowed to settle in the tank, soon becomes very solid, so that the liquid containing the impurities can be drawn off and fresh liquid (water) added, after which the settled starch has to be stirred up again in order to thoroughly mix the same with the water.

Heretofore agitating devices have been made in which the agitator was lowered down upon the comparatively-compact mass of starch by hand. In this operation it frequently happens that the agitator is lowered down too fast, so as to become embedded in the starch, resulting in frequent breakage of machinery, loss of time in replacing thrown-off belting, and many other obvious and well-known drawbacks.

To overcome most, if not all, the objections against hand-fed agitators, we construct our

automatic agitator in substantially the following manner:

A in the drawings represents the washing-tank, having the usual bottom, B, and on its top a suitable frame or timber work, C D, to receive the operating mechanism hereinafter specified. In the interior of this tub or tank we provide an upright shaft or spindle, E, Fig. 3, having on its lower end an angular portion or section, E', and below said portion E' a circular or cylindrical part, E'', operating in a spindle step or bearing, F', in any well-known and approved manner.

Upon the angular portion E' of the vertical spindle E is placed an agitator, beater, or propeller-wheel, F, of any desirable construction, the latter well-known expedient (the propeller-wheel) being preferred, as the simplest and the one best adapted for the purpose mentioned. On the hub F'' of this agitator is formed a recessed flange, *f*, and upon this is secured, by means of bolts 1, a ring, *f'*, the recess in the flange *f* and the aperture in the ring *f'* being occupied by a carrier, G, in such manner that while the said agitator is rotated the said carrier G is prevented from rotating by two or more vertical rods, *a*, Fig. 6, secured to the said carrier G by means of screw-bolts *c c* on one end, and to a hollow spindle or sleeve, I, Figs. 1 and 3, by means of screw-bolts *c' c'* on their other end. This hollow spindle or sleeve I receives the vertical shaft E through its central aperture, and it (the sleeve I) is passed into a long socket, H, as clearly shown in the figures. The hollow sleeve I is fitted with a rack, J, and the socket H is provided with a casing, K', wherein operates a pinion, K, engaging the said rack J, as illustrated in Figs. 3 and 4.

The pinion K is fixed to a shaft, L, one end of which carries a hand-wheel, L', while the other end receives a worm-wheel, M. This worm-wheel M is engaged by a worm or screw, N, fixed upon a spindle, *n*, Fig. 5, which spindle revolves within an eccentric, P', operating within a bearing, P, in such manner that when said eccentric P' is in the position shown in said Fig. 5 the worm N will engage the wheel M, while if the eccentric is revolved in the direction indicated by an arrow in Fig. 5, so that the operating-lever P'' is in the position indicated in dotted lines, the said worm N will have liberated the said worm-wheel M, so that

the hollow sleeve I may be raised or lowered within the casing H by simply turning the hand-wheel L'.

Upon the spindle *n* is secured a bevel-wheel, Q, engaging a bevel-pinion, R, fixed upon a shaft, *r*, said shaft having a hand-wheel, R', as shown in Fig. 4, or a set of driving-pulleys, S S', as illustrated in Figs. 1 and 2, for rotating said shaft *r*.

To the eccentric-lever P'' is fitted a hand-rod, *p*, for operating said eccentric from any convenient place.

In operation the starch and water in a milky consistence are run into the tank A, the agitator set in operation, and the contents of the tank well agitated, after which the agitator is raised high enough that when stopped and the starch allowed to settle it will not reach the wheel F. Now, the liquid containing the impurities already mentioned is drawn off and fresh water added, after which the agitator is again set in motion and the wheel F lowered down upon the mass of starch, so as to stir the same up again. If in its downward movement the wheel F strikes the solid starch, breakage may result, which is very likely to happen if the wheel F is fed downward by hand. To avoid this we set the shaft *r* in motion by means of one of the pulleys S S' and the clutch T, its speed being such as to communicate a very slow downward movement to the wheel F through the pinion R, bevel-wheel Q, worm N, wheel M, wheel K, and the rack J, in a manner readily comprehended. If at any time during the operation of the agitator it is desired to temporarily suspend its downward movement, the lever U, Fig. 1, is operated to throw the clutch T out of gear, while if it should be necessary to rapidly elevate the agitator F the rod *p* is pushed so as to throw the worm N out of gear with the worm-wheel M, after which the shaft L may be revolved in the proper direction by the hand-wheel L'.

It will thus be readily observed that the operation of this starch-washer is automatic, as far as the lowering of the wheel F into the mass of starch is concerned. After the wheel has reached the lowest part of the tank and stirred up the starch, an automatic device may be attached to the machine to prevent the

wheel from moving farther down, and thereby to injure the mechanical portion of the apparatus. We have illustrated such an automatic device in Fig. 1, where a stop-rod, *u*, pivoted to a lever, U'', actuates the clutch T through the intervention of a connecting-rod, U', and a lever, U, the stop-rod *u* being pushed downward by the hub F'' of the wheel F and the clutch T disengaged in an obvious manner. Other mechanism, however, may be devised to accomplish the desired result, without departing from our invention.

Having thus fully described our invention, we claim as new and desire to secure to us by Letters Patent of the United States—

1. A starch-washer having an automatic lowering mechanism for the agitator, as and for the object specified.

2. A starch-washer having an automatic stopping device for the agitator, as stated.

3. A starch-washer having an automatic lowering mechanism and an automatic stopping device for the agitator, as stated.

4. In starch-washers, the combination, with the agitating-wheel F, of the holder G, rods *a*, hollow sleeve I, and mechanism for raising and lowering said sleeve I, as specified, for the object stated.

5. The combination, with the hollow sleeve I, having the rack J, of the gear-wheel K, spindle L, worm-wheel M, worm N, eccentric P', with lever P'' and rod *p*, spindle *n*, with bevel-wheel Q and shaft *r*, with bevel-pinion R, and the means for rotating said shaft *r*, substantially as described, for the object stated.

6. The combination, with the shaft *r*, of the pulleys S S', clutch T, push-rod *u*, lever U'', rod U', and lever U, as described, for the purpose of automatically arresting the downward movement of the agitating device in starch-washers, as stated.

In testimony that we claim the foregoing as our invention we have hereto set our hands in the presence of two subscribing witnesses.

J. FIRMENICH.  
FRANK FIRMENICH.

Attest:

MICHAEL J. STARK,  
JOHN C. DUERR.