(No Model.) 2 Sheets—Sheet 1.

A. C. HARRISON.

APPARATUS FOR MIXING SUGAR.

No. 259,684. Patented June 20, 1882.

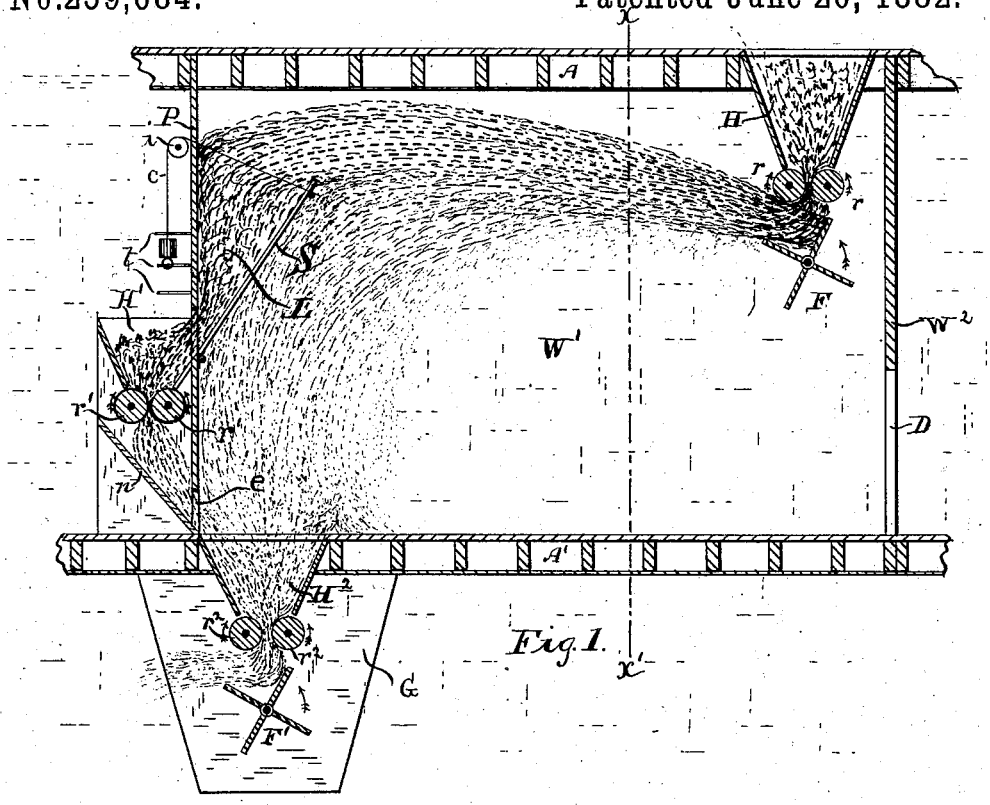

Fig. 1.

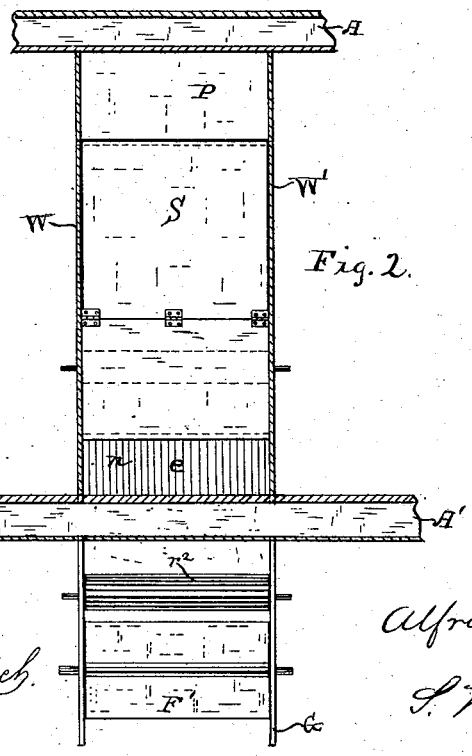

Fig. 2.

WITNESSES:
Paul C. Seeber
Jacob C. Muench.

INVENTOR
Alfred C. Harrison,
per
S. Morris Lillie,
ATTORNEY

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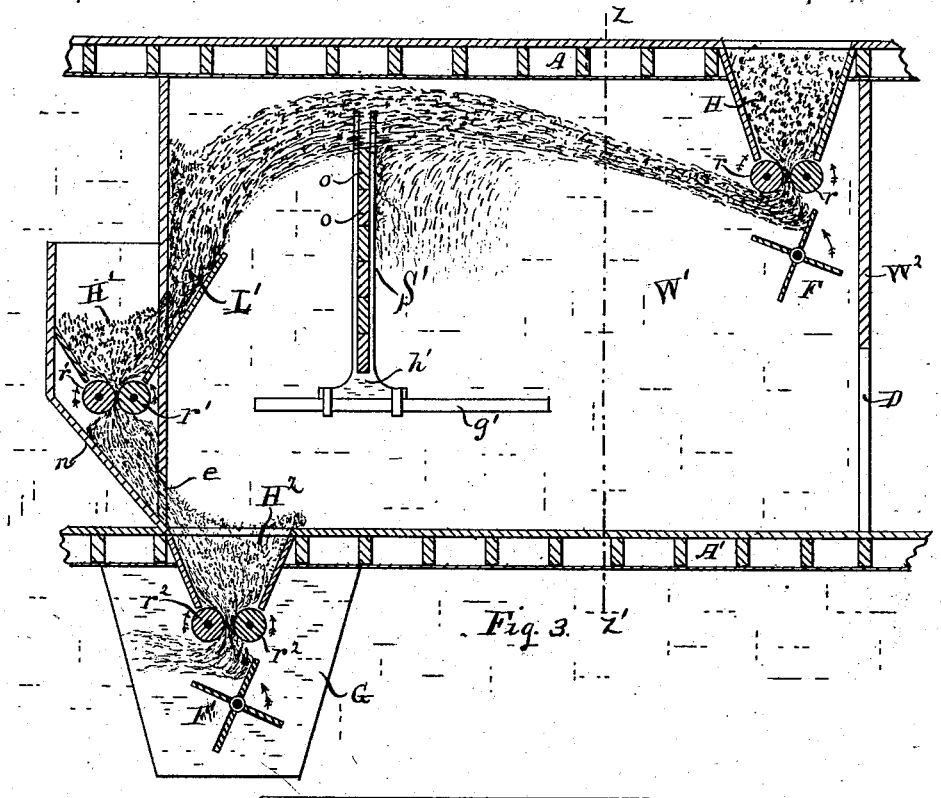

Fig. 3.

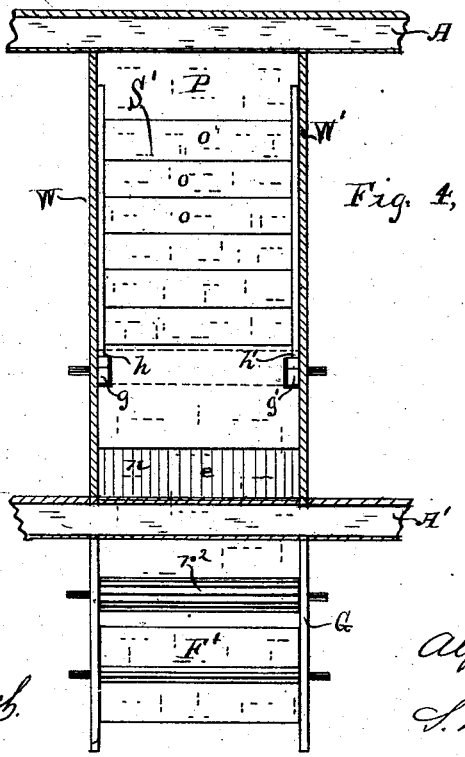

Fig. 4.

WITNESSES:
Paul C. Seeber
Jacob C. Muench.

INVENTOR
Alfred C. Harrison,
per
S. Morris Lillie,
ATTORNEY

UNITED STATES PATENT OFFICE.

ALFRED C. HARRISON, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR MIXING SUGAR.

SPECIFICATION forming part of Letters Patent No. 259,684, dated June 20, 1882.

Application filed April 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALFRED C. HARRISON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Apparatus for Mixing Sugars, more particularly the "soft" or "centrifugal" sugars, preparatory to barreling the same.

The drained sugar, as it is taken from the centrifugal draining-machines, is far from homogeneous, that portion of it which while the sugar was still in the machine rested against the sieve or periphery of the basket being moist and soggy, while that that was nearer the axis of the machine is comparatively dry and free. Before barreling this sugar must be mixed and made as homogeneous as possible; but great difficulty has been found in so thoroughly mixing the sugars, the lower grades especially, that they shall not be pervaded with small lumps of heavy, moist sugar, which it is very desirable to remove.

The object of my invention is to separate these small, moist, and heavy lumps from the otherwise more or less perfectly-mixed sugar, so that they may receive a special disintegrating treatment or be disposed of in any way desired; and the object of my invention is also to thoroughly mash these separated lumps of sugar, and then to return the resulting mashed sugar, free from lumps, to and effectively mix it with the main body of the sugar from which it had been separated.

My invention consists in the combination, with certain well-known forms of mixing apparatus in which the mixing is performed, in part at least, by rapidly-revolving fans or paddles, or, so far as my improvements are concerned, any apparatus answering the same purpose, by which the sugar which is fed upon them is thrown to some distance in a cloud or in a more or less finely divided condition, and is thereby more or less thorougly mixed, of a shield or partition or deflecting-plate placed in and extending across the path of the flying sugar, by which the sugar is divided into two parts—viz., that flying over the top of the shield and that intercepted and deflected by the same. The heavy and lumpy portions of the sugar are thrown farther and higher by the fan than the lighter and more homogeneous portions, and consequently that part of the sugar which flies over the top of the shield or partition contains a larger proportion of the objectionable lumps than the part that is intercepted by and falls in front of the same; and by properly adjusting the shield in its position relative to the flying sugar this latter portion of the sugar may be made as free from lumps as desired.

My invention consists, further, in apparatus for mashing the lumpy sugar separated as above, and for mixing it again with the homogeneous sugar from which it was separated by the shield or partition or deflecting-plate.

In the drawings are illustrated apparatus in which are embodied my improvements.

Figure 1 is a vertical longitudinal section through one form of my apparatus. Fig. 2 is a cross-section of the same along the broken line $x\,x'$, Fig. 1. Fig. 3 shows a vertical longitudinal section of another arrangement of the invention, and Fig. 4 a cross-section of it along the broken line $z\,z'$, Fig. 3.

In the apparatus illustrated in Figs. 1 and 2, H is a hopper or chute extending through the floor A. $r\,r$ are a pair of rolls having their axes in the same horizontal plane, supported in any proper manner immediately below the lower opening of the chute H, and revolved by any suitable means in the direction of the arrows.

Underneath the rolls $r\,r$ is a fan, F, consisting of an axle and a series of radiating paddles, $a\,a$, &c., and having its axis parallel to the axes of the rolls above, and preferably a little to the left of the passage between the rolls. The fan is revolved rapidly in the direction of the arrow by suitable means.

At a short distance to the left or in front of the fan F is a fixed vertical partition, P, high enough and broad enough to intercept all flying particles that might be thrown by the fan F. In the drawings this partition forms the end wall of a small compartment, in which the fan F is located, formed of the four walls or partitions P W W′ W² and the ceiling and floor of the room of which this compartment forms a part.

To the inner surface of the partition P and a short distance above the floor is hinged the

lower edge of the inclined shield S, which is as broad as the compartment, and may be fixed at any inclination and consequently its upper edge at any level desired by means of the rope or ropes *c*, which are attached to the upper edge of the shield and pass over the pulleys *i* on the partition P, and may be fastened to the back of the partition, as on the pins *t*, for example, or otherwise, so as to hold the shield S in the position desired.

Just above the line of juncture of the shield S with the partition P there is a horizontal passage through the partition which opens into the hopper H′, beneath which is a pair of rolls, r' r', which are revolved by proper mechanism in the direction of the arrows. Below the rolls r r' an incline, *n*, extends through a second passage, *e*, in the partition P into the interior of the compartment and to the mouth of the hopper H^2, which extends through the floor A′, and delivers upon a third pair of rolls, r^2 r^2, which in turn deliver upon a rapidly-revolving fan, F′.

The operation of the above-described apparatus in the mixing of sugars and the removing of lumps from the same is as follows, viz: The sugar to be mixed is delivered into the hopper H, from which it passes between the rolls r r and falls in a thin sheet upon the rapidly-revolving fan F, the paddles of which throw the sugar as a sort of spray in the direction of the partition P and shield S. In the higher and farther flying portions of this sugary spray is contained most of the small lumps to be found in the sugar after leaving the fan F, and these portions of the sugar pass over the top of the shield S, which has been adjusted and fixed at the proper height by the ropes *c*, into the hopper L, formed by it and the partition P, while the lower flying and more homogeneous sugar is intercepted by the shield and falls, most of it at least, into the hopper H^2, which leads to the rolls r^2 r^2 and fan F′. Whatever portion of this sugar does not fall into the hopper is pushed into the same by means of a suitable pusher introduced into the mixer compartment through the door D in the wall W^2 of the same. The lumpy sugar which flies over the top of the shield S into the hopper L passes through the opening in the partition P into the hopper H′, and thence through the rolls r' r', which are set sufficiently close together to thoroughly mash the small lumps while passing between them, and down the incline *n* through the partition P again into the hopper H^2, in which it meets with the homogeneous portions of the sugar from which it was separated by the shield S, and with it passes between the rolls r^2 r^2 and over the fan F′, the result being to remix the two portions of sugar to form a sugar comparatively homogeneous and free from lumps.

It is impracticable, when large quantities of sugar are to be passed through, to set rolls of any moderate size so closely together as to mash the fine lumps which still remain in the sugar after leaving the first fan, F, of the apparatus above described, or of similar ones. Otherwise the rolls r^2 r^2 might be so set and the desired results obtained without the agency of the shield S and auxiliary rolls r' r'; but as the lumpy sugar caught in the hopper L is comparatively small in quantity the rolls r' r' may be set closely enough together to effectually mash the lumps which would be gathered when even unusually large quantities of sugar were being passed through the machine.

In Figs. 3 and 4 the shield S′ is shown constructed so that it may be adjusted horizontally to increase or diminish, as the case may be, the proportion of sugar passing over it to the auxiliary mashing-rolls r' r'.

The shield S′ consists of a number of horizontal narrow boards, *o*, resting upon each other and supported in the vertical standards *h* *h*′, which respectively rest upon and are movable on the horizontal ways *g* *g*′ respectively attached to the opposite walls W W′ of the mixing-compartment, and at some little distance from the floor of the same. The proportions of sugar flying over and intercepted by the shield S′ are regulated by moving the shield nearer to or farther from the partition P. The sugar that passes over the shield is caught in the hopper I′, which feeds the mashing-rolls r' r'. The shield S′ is also capable of vertical adjustment by adding to or taking from the number of boards *o* in the standards *h* *h*′.

In the case of each of the arrangements shown the partition P is located at such a distance from the fan F, and the passage through the partition to the rolls r' r' at such an altitude, that if not intercepted most of the sugar thrown by the fan would strike the partition above the said passage to the rolls r' r'.

There is another form of mixing apparatus more or less in use in which the axis of the mixing-fan is vertical and its paddles revolve in a horizontal plane, the paddles being comparatively narrow and their faces inclined to the horizontal. The sugar to be mixed is fed upon the paddles from above and is thrown by them radially in all directions. In this case, as in that of the other form of fan, the heavy lumpy portions of the sugar take the higher and more extended flight. For such an apparatus my shield for separating the flying sugar into two portions—the lumpy and that comparatively free from lumps—would be annular and concentric with the fan. The portions of the sugar that would fly over the top of this annular shield would contain a larger proportion of lumps, while that that would remain inside of the shield would consist of the more homogeneous sugar. The lumpy portion collected on the exterior of the shield should be thoroughly mashed by being passed between rolls or otherwise, and then be passed, with the homogeneous sugar collected inside the shield, through a second mixing apparatus, whereby the two portions would be intimately mixed.

The apparatus which I have shown in the

drawings and described herein for separating the flying sugar into two portions I have shown and described as adjustable; but while this adjustability is an advantage, it is not a necessity, and I do not limit the scope of my invention to an adjustable apparatus, but include in it any shield, or its equivalent, fixed or adjustable, by which the sugar during its flight through the air is divided into two portions—a lumpy portion and one comparatively free from lumps—and that irrespective of any particular combination of apparatus by which the sugar is started on its flight.

Other distinctive features of my invention are the combination, with the apparatus for separating the flying sugar into the two portions, of a special apparatus for mashing the lumpy portion, and, further, the combination, with the said separating and mashing apparatus, of a mixing apparatus for intimately mixing the mashed lumps with the main body of the sugar.

The combination of a pair of rolls and a rapidly-revolving fan for crushing and mixing sugar is old, and I do not claim the combination as my invention.

Thus having described my invention, I claim as mine, and wish to secure to myself by Letters Patent of the United States—

1. An apparatus for separating the fine lumps and soggy particles from a sugar, consisting in the combination of an apparatus for throwing the sugar in a cloud or in a more or less finely divided condition and a shield or deflecting-plate, fixed or adjustable, interposed in the path of the flying sugar, and operating to separate the same into two portions, substantially as specified.

2. The combination, with a fixed or adjustable shield, or its equivalent placed in the path of a flying sugar and operating to separate the sugar into two portions, one lumpy and the other comparatively free from lumps, of an apparatus for receiving the said lumpy portion and mashing the same, substantially as specified.

3. The combination, with an apparatus for throwing a sugar in a more or less finely divided condition, and with a shield, S, interposed in the path of the flying sugar, of a hopper, L, for receiving the portion of the sugar that flies over the top of the said shield, and a pair of rolls, r' r', for receiving the said portion of sugar from the hopper L and for mashing the lumps in the same, substantially as specified.

4. In an apparatus for mixing sugars, the combination of, first, apparatus for throwing the sugar in a cloud or in a more or less finely divided condition; second, apparatus interposed in the path of the flying sugar and operating to separate it into two portions, a lumpy portion and one comparatively free from lumps; third, apparatus for mashing the lumps of the said lumpy portion; and, fourth, apparatus for remixing the two portions of sugar, the combination operating substantially as and for the purpose specified.

ALFRED C. HARRISON.

Witnesses:

JNO. B. WHIDDEN,

S. MORRIS LILLIE.