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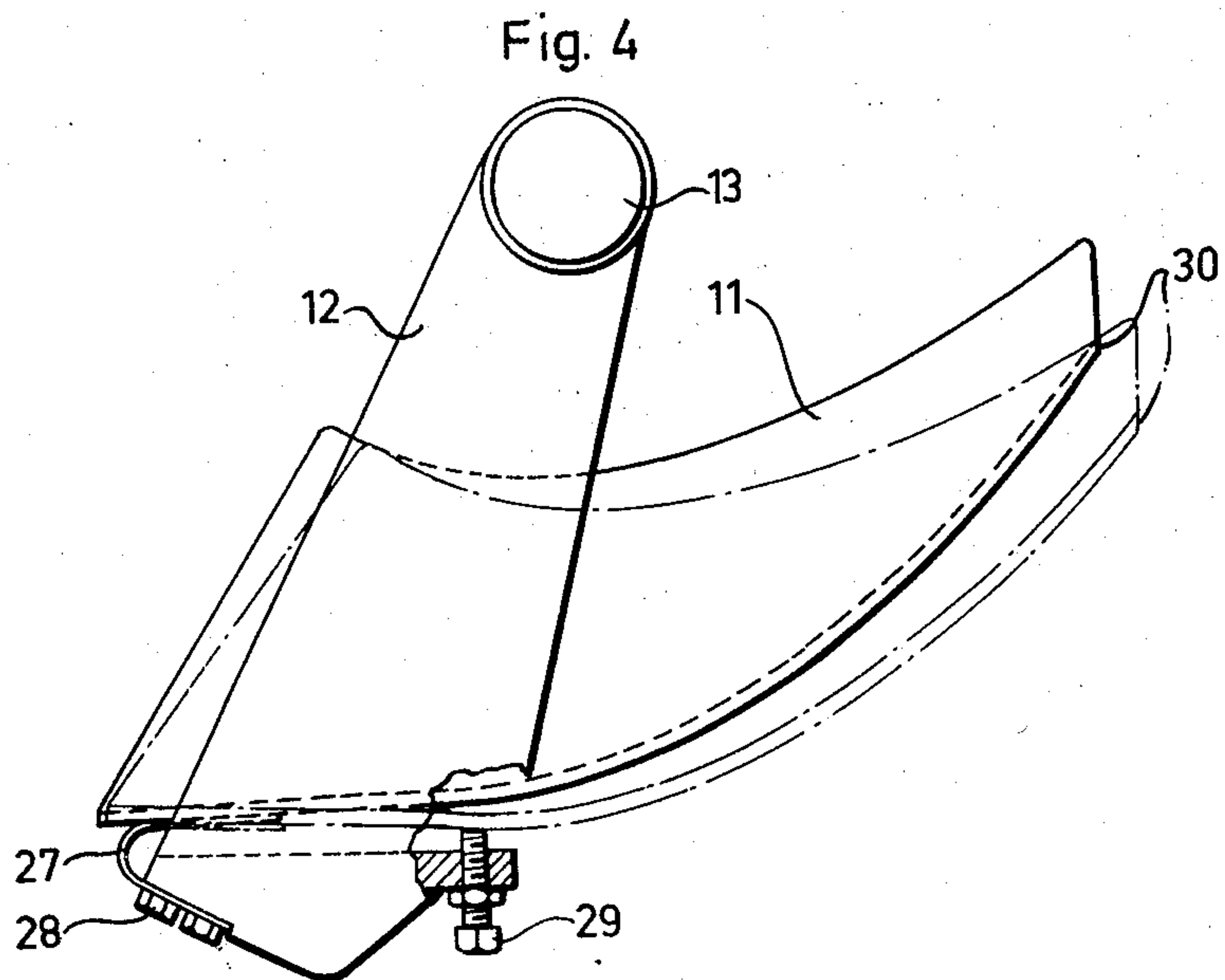
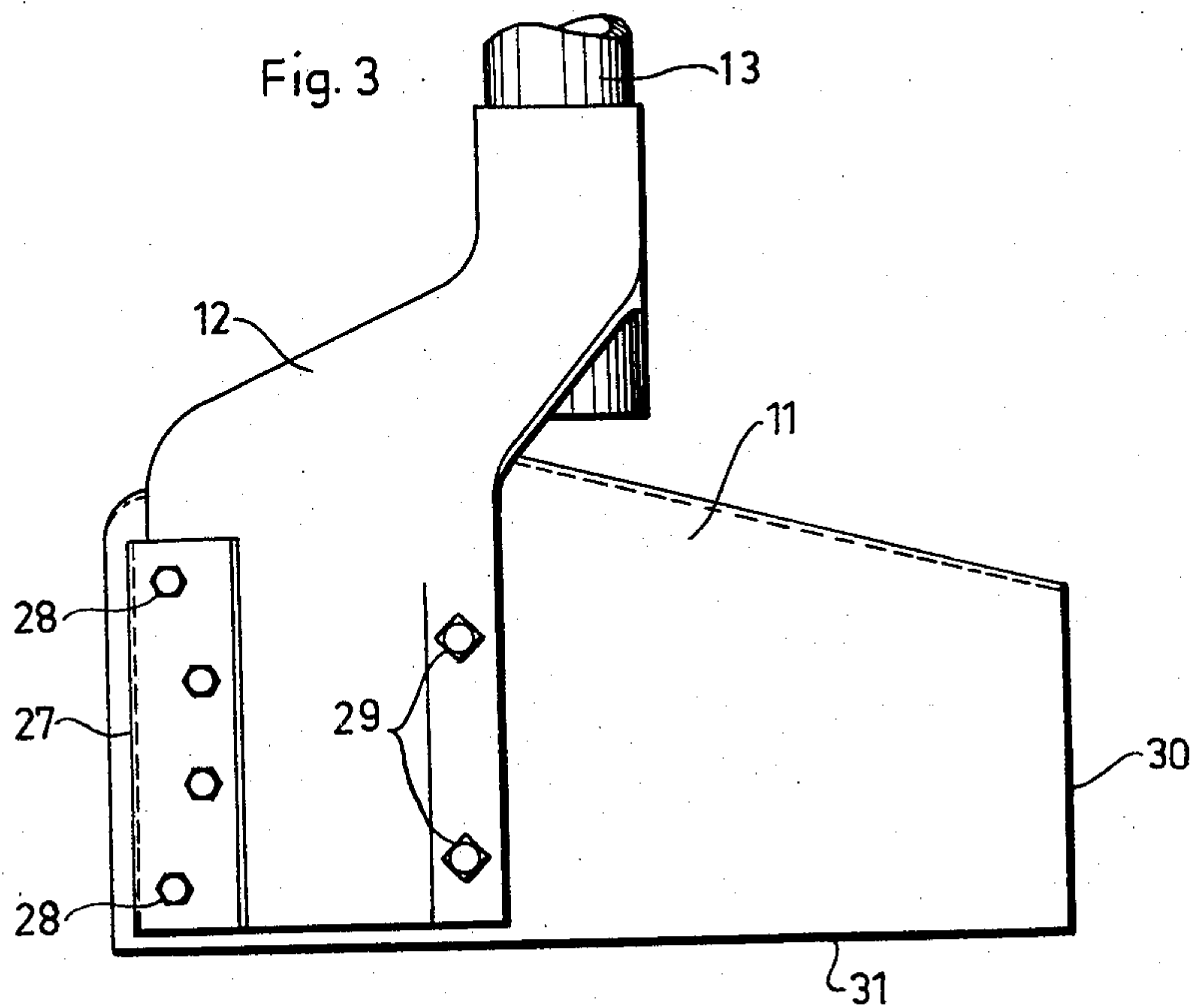
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CENTRIFUGES

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CENTRIFUGES

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2 Claims. (Cl. 210—375)

The present invention refers to centrifuges and relates to a contrivance for the removal of the material remaining in the centrifuge drum. Contrivances of this kind are previously known, wherein the material is removed by means of a blade-like scraper carried by a fixedly arranged, rotatably and displaceably guided rocking shaft adapted to perform a rocking movement substantially radially with respect to the centrifuge drum by a rotary movement of said shaft and a displacing movement along the inside of the drum by a displacement of the shaft in its longitudinal direction. The present invention has for its object by a suitable construction of the scraper and its motion mechanism to improve the mode of operation of the scraper and to facilitate complete removal of the remaining material in a manner to spare the strainer screen on the inside of the centrifuge drum as far as possible. The invention is principally distinguished by the feature that the scraper is pivotally connected to an arm extending from the rocking shaft thereof, at a point of the arm which is located, relatively to the rocking shaft, on the opposite side of the radial plane extending through the axis of rotation of the centrifuge and the point of contact of the scraper on the inside of the drum.

The invention will be described more closely with reference to the accompanying drawings, which illustrate a sugar centrifuge provided with a scraper contrivance according to the invention. Fig. 1 is a vertical view of the contrivance together with adjacent parts of the centrifuge. Fig. 2 is a cross section along a horizontal plane *a—a* in Fig. 1. Fig. 3 is a vertical view of the scraper proper, and Fig. 4 is a horizontal view of the same.

The centrifuge drum 1 is mounted with its shaft 2 and the driving motor 3 in a frame consisting substantially of a girder system 5 arranged on legs 4. The cylindrical jacket of the drum is perforated and provided with a strainer screen 6 on the inside thereof. It is covered by a cap 7, which is provided with an opening for the scraper. The drum is surrounded by a cylindrical mantle 8, which is likewise provided with a cap 9. The caps 7 and 9 are omitted in the plan view shown in Fig. 2.

During the centrifugation the sugar juice escapes through the strainer screen and the jacket of the drum to a non-illustrated collecting receptacle arranged beside the mantle 8, whereas the remaining solid sugar mass forms a cylindrical body 10 on the inside of the strainer screen. The removal of this material is effected by means of a blade-like scraper 11, which is secured to the lower end of a shaft 13 paralleling the centrifuge shaft. The shaft 13 is rotatably and displaceably mounted in a concentric guide sleeve 14, which is secured to the girder system 5 as well as to a bracket 15 extending from the leg 4. The upper end 16 of the shaft 13 is threaded and guided in a sleeve 17. The shaft 13 is adapted to be raised and lowered by means of a motion transmitting contrivance built into a hous-

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ing 18 and comprising a rotating nut screwed onto the threaded portion 16 as well as a worm gearing connected to said nut, the driving shaft of which gearing is adapted to be driven from an electric motor 19 through a belt transmission arranged within a casing 20. The motor 19 is adapted to operate automatically under the control of limit switches 21 and 22, which are actuated by pin 23 movable with the worm shaft 16. Arranged on the non-threaded portion of the shaft 13 is guide pin 24 provided with a roller engaging a guide slot 25 in the sleeve 14, said guide slot comprising a spiral-shaped portion 26 and a straight portion connected thereto.

As will appear from Figs. 3 and 4, the scraper 11 consists of a sheet-metal member having an outwardly curved vertical portion and an upper plane portion forming an inwardly directed flange intended to force the scraped-off material downwardly toward the bottom of the drum. The scraper 11 is pivotally connected to the vertical outer end of the arm 12 by means of a leaf spring 27, which is welded on the one side thereof to the scraper while being secured on the other side thereof to the arm by means of screws 28. The spring normally tends to keep the scraper in the position shown by full lines in Fig. 4. When the scraper is brought into engagement with the material cylinder 10, the working pressure of the scraper will shift the latter into the position shown by broken lines in Fig. 4, wherein the scraper bears on two screws 29 arranged on the vertical portion of the arm 12, by means of which screws the operative position of the scraper relatively to the strainer 6 may be accurately adjusted. The scraper has a vertical edge 30, which is operative during the outward swinging movement of the scraper toward the inside of the centrifuge drum, and is also provided with a lower horizontal edge 31, which is operative during the axial displacing movement of the scraper.

During centrifugation the scraper assumes the position shown by full lines in Fig. 2. The centrifugation having been terminated, the centrifuge drum is braked to a number of revolutions suitable for the emptying of the centrifuge. At this number of revolutions the motor 19 is automatically brought into operation, to commence with at a relatively low number of revolutions, the shaft 13 being screwed downwardly thereat and the scraper performing first a swinging movement, while the guide pin 24 moves in the guide slot 26 from the position A into the position B, wherein the guide pin is at the upper end of the straight portion of the guide slot. The scraper will then have moved from the position A1 into the position B1 shown by broken lines. During this movement the scraper will have cut out an annular groove in the upper end of the material cylinder 10 and will have removed a corresponding quantity of the material. Under the influence of the pressure of the material on the scraper the latter is shifted into the position shown by broken lines in Fig. 4. At the termination of the swinging movement the scraper is caused to bear lightly with its vertical edge against the strainer screen 6. By means of the set screws 29 the position of the scraper relatively to the strainer screen may be accurately adjusted, so that the strainer screen will not be subjected to any appreciable wear. If desired, the position of the edge 30 may be adjusted so that a slight play is provided between the edge and the strainer screen.

When the guide pin 24 reaches the position B, the circuit of the motor 19 is switched by means of the contact 21, so that the motor will rotate at a considerably higher number of revolutions. During the continued movement the shaft 13 is guided by means of the pin 24 in the straight portion of the slot 25, the shaft being thus displaced downwardly in its longitudi-

nal direction without being turned. Hereby the remaining portion of the material cylinder 10 is scraped off during the movement of the scraper from the position B1 into the bottom position C1, the guide pin 24 having thus reached the position C. In the position the contact 22 is actuated, and the motor circuit is interrupted while a time relay is switched in at the same time. During a period of time controlled by this time relay the scraper remains in the bottom position, until all of the material has been removed. At the end of this period the motor circuit is switched, and the scraper is raised into its initial position at a guidance of the shaft 13 in the slot 25. After that, the number of revolutions of the centrifuge drum is increased, and a further quantity of material is supplied, which is then subjected to centrifugation.

After the scraper has been relieved of the pressure of the material in the bottom position of the scraper, the latter will spring back into the position shown by full lines in Fig. 4. During the vertical return movement the edge 30 of the scraper will thus take a position in which it is raised from the strainer screen, whereby the latter is spared. The swinging movement of the scraper in a direction inwardly from the strainer screen under the influence of the leaf spring 27 is rendered possible by the fact that the scraper 11 is pivotally connected to the arm 12 at a point of the arm near the spring 27, which in the working position of scraper 11 is located behind the radial plane extending through the axis of rotation 2 of the centrifuge and the contact point of the scraper on the inside of the drum, counted in the rotational direction of the drum. Under certain circumstances, depending for instance on the consistency of the material, the scraper might be subjected to so powerful a pressure that the torsional moment exerted on the scraper shaft 13 becomes greater than the moment created by the torsional forces in the shaft 13. The scraper will thereby be swung about the axis of the shaft 13 over an angle, which is obviously comparatively small, the scraper will be removed from the strainer screen, but which is sufficient to move the outer end of the scraper out of contact with the strainer screen, whereby damage of the strainer screen is prevented. This is made possible by the fact that the rocking shaft 13 of the scraper is located in front of the radial plane extending through the axis of rotation of the centrifuge and the contact point of the scraper on

the inside of the drum, counted in the rotational direction of the drum.

The rocking shaft 13 of the scraper and the swinging axis determined by the leaf spring will thus be located on opposite sides of said radial plane. The rocking shaft 13 is preferably located inside the jacket of the centrifuge drum but may possibly be disposed outside the same, provided that the scraper carrying arm 12 is extended sufficiently in the vertical direction.

What is claimed is:

1. In a centrifugal separator, the combination comprising a centrifuge drum mounted on a vertical driving shaft, a fixed guide member, a vertical scraper shaft movable in said guide member, a laterally-projecting arm secured to the lower end of the scraper shaft, a blade-like scraper disposed to remove solid material from said drum, said scraper being swingably connected at one end to the outer end of said arm and being acted upon by a spring to allow the free end of the scraper to be swung outwards against the action of the spring, a stop member on said arm for limiting the outward swinging motion of the scraper relatively to said arm, a driving mechanism for displacing the scraper shaft longitudinally, and means for rocking the scraper shaft and swinging the scraper to and from the inside of the centrifuge drum and for guiding the scraper along the inside of the drum; said scraper shaft and said spring being disposed on opposite sides of the radial plane extending through the axis of rotation of the centrifuge and the free end of the scraper when brought in contact with the inside of the drum.

2. A centrifugal separator as defined in claim 1, wherein said means comprises a cam slot formed in said fixed guide member and a projecting guide pin provided on said scraper shaft and extending through said cam slot, a threaded portion on said scraper shaft and a driving nut receiving said threaded portion for displacing the scraper shaft longitudinally.

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