Feb. 13, 1962 G. LINDEN 3,020,656

BUCKET WHEEL

Filed Sept. 28, 1959 2 Sheets-Sheet 1

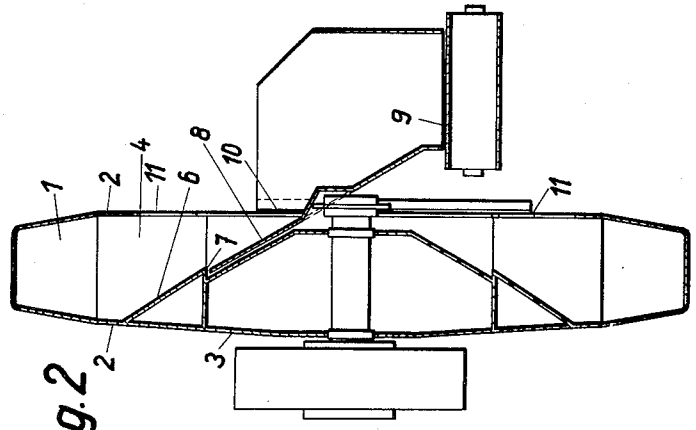


Fig. 2

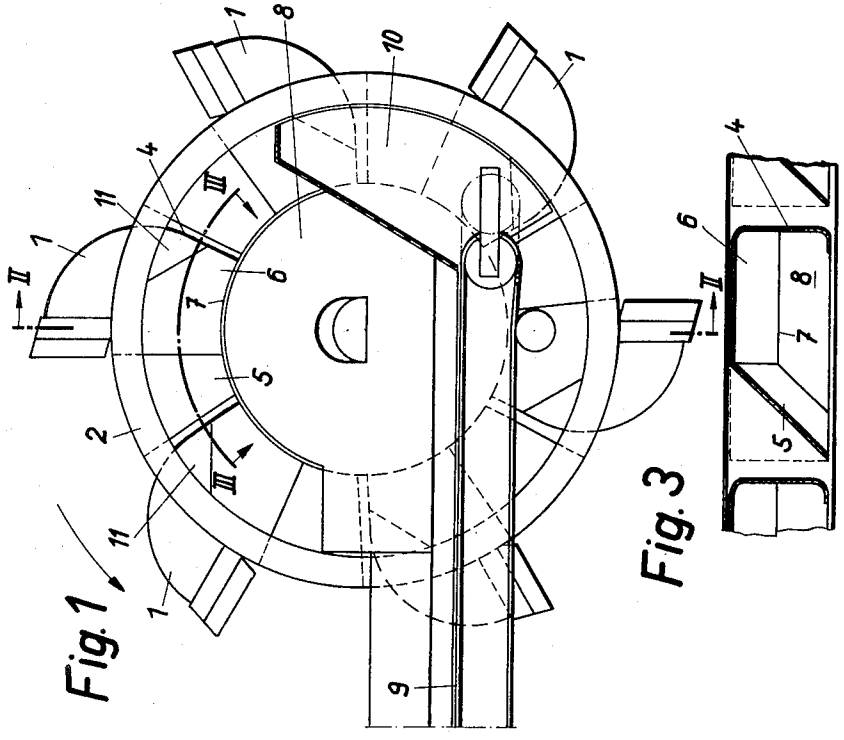


Fig. 1

Fig. 3

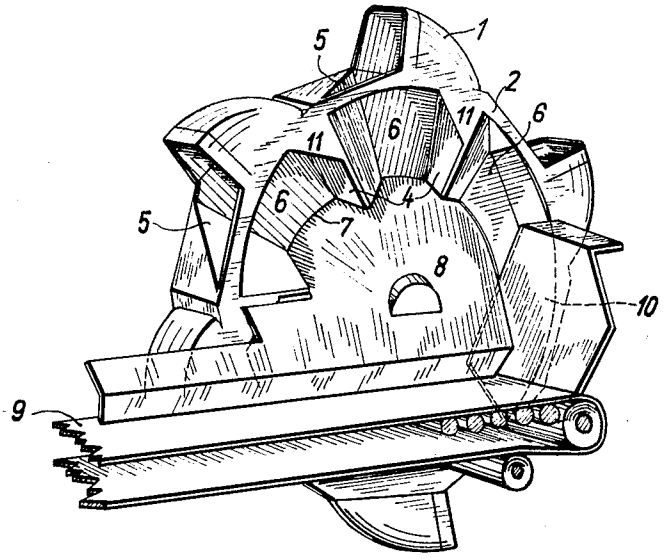
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Fig.4



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BUCKET WHEEL

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Bucket wheels for dredges or scoops are designed either as chamber bucket wheels or as bucket wheels without chambers. Chamber bucket wheels have rotating chambers which are sector-shaped and are respectively associated with one or two buckets, and between which there are provided partitions extending in radial direction with regard to the axis of rotation. The chambers are provided with sliding surfaces which together form a truncated cone and along which the excavated or dredged goods are discharged from the bucket wheel and conveyed to a conveyor belt through the intervention of a stationary chute or runway arranged outside said bucket wheel. In the filling section in which the upwardly moving buckets perform their digging work and receive dredged or excavated goods, the said excavated or dredged goods are prevented by means of lateral discs from falling out laterally from said chambers.

This design has the drawback that the excavated or dredged goods take part in the rotary movement of the bucket wheel until they are completely discharged. Consequently, in certain circumstances, that portion of the rotary movement of the bucket which is intended for the discharge will not be sufficient to completely empty the chambers so that with the next following downward movement of the buckets, the goods not discharged in due time from the latter and from the chambers will drop by said bucket wheel onto the ground. If this is to be prevented, it is necessary to operate the bucket wheel at such a low speed of rotation that sufficient time will be available for completely emptying the chambers in due time. If nevertheless a great output is to be obtained, it is necessary to increase the volume of the buckets and thus also to increase the diameter of the bucket wheel. This, however, means an undesired increase in the weight at the end of the bucket wheel overhang beam or boom and consequently, a considerable increase in the weight of the entire dredge which in turn means a considerable increase in the cost thereof.

Chamber bucket wheels are known the axes of which are arranged above the conveyor belt and which are equipped with a coaxially arranged braker drum. With this type of chamber bucket wheels, the exit edge of the chambers is elevated in order to prevent excavated or dredged goods accumulated above said braker drum from impeding the discharge of the goods from the rotating chambers. Furthermore, outside said bucket wheel there is arranged a stationary chute or runway between the said discharge edge and said braker drum. This design has a two-fold drawback, namely first, it results in a rather great bucket wheel diameter, and secondly, the discharge of the dredged or excavated goods from the bucket wheel is effected exclusively by the rotating chambers so that the speed of rotation of the bucket wheel is rather limited.

The above situation is by no means changed if, in conformity with another heretofore made suggestion, in a bucket wheel the partitions between the rotating chambers are not extended downwardly to the exit edge of the chambers. It will be appreciated that with such an arrangement the discharge of the excavated or dredged goods from the chambers is effected over the entire width of the bucket wheel—when measured in axial direction—by means of the rotating sliding surfaces of the chambers.

The above outlined drawbacks of chamber bucket wheels are avoided by bucket wheels without chambers. With said last mentioned bucket wheels, the buckets are closed off within the filling range on that side which faces the axis of rotation. This is done by a cylindrically curved stationary metal sheet. When the buckets have reached the uppermost edge of such a closing metal sheet, the dredged or excavated goods in said buckets drop upon a discharge chute or runway extending into the bucket wheel so that said goods slide downwardly on said chute or runway upon the conveyor belt arranged adjacent the bucket wheel. Since, consequently, the excavated or dredged goods after leaving the buckets are not confined any longer to the movement of rotation of the bucket wheel, the discharge of goods will not be affected by high speeds of rotation of the bucket wheel. Consequently, for a certain desired delivery or output, a relatively fast rotating bucket wheel with not too great a diameter will be obtained.

These bucket wheels without chambers have, however, the drawback that the above mentioned cylindrically curved metal sheet closure is subjected to a considerable wear because the dredged or excavated goods in the buckets slide under a certain pressure over the entire filling section along said metal sheet closure. Consequently, such metal sheet closure has to be provided with wear-resistant parts the exchange of which can be effected under unfavorable conditions only inasmuch as such metal sheet closure is accessible only under difficulties.

While with chamber bucket wheels likewise a certain wear occurs along the above mentioned lateral closure disc, the wear in this instance is rather irrelevant because the goods in said chambers laterally rest against such closure disc under an immaterial pressure only, and because it is prevented from a lateral discharge from the chambers by primarily wedge-shaped or gusset-shaped metal sheets which likewise rotate and cover a corner of the chambers. Furthermore, the lateral discs of the chamber bucket wheels are easily accessible so that they can be easily exchanged.

It is, therefore, an object of the present invention to provide a bucket wheel which will overcome the drawbacks listed above of the heretofore known type of bucket wheels while containing the advantages thereof.

It is also an object of this invention to provide a bucket wheel of the type set forth in the preceding paragraph which will be relatively simple in construction and low in cost of production and will have a considerably increased output at relatively small dimensions.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 is a diagrammatic side view of a bucket wheel according to the invention.

FIG. 2 represents a section along the line II—II of FIG. 1.

FIG. 3 illustrates a development of a section taken along the line III—III of FIG. 1.

FIG. 4 is a perspective view of the bucket wheel according to the invention.

A bucket wheel according to the present invention is characterized primarily in that there are provided stationary discharging means extending far into the bucket wheel and arranged adjacent rotating receiving chambers of the bucket wheel. According to an advantageous embodiment of the invention, the discharging means has the shape of a conical chute which extends below the sliding surfaces of the said receiving chambers.

Referring now to the drawing in detail, each of the buckets **1** of the bucket wheel, which are connected to circumferential rings **2**, has associated therewith a rotating chamber which at the discharge end of the bucket is confined by a radial partition **4** arranged perpendicular to supporting means in the form of a rear disk **3** connected to and supported by a rotatable shaft **12**. The other side of each chamber is closed by a wall **5** which is inclined in rotational direction with regard to supporting wall or disc **3**. Wall **5** will in a manner known per se allow the discharge of the remaining excavated or dredged goods when the buckets move downwardly. The sliding surfaces or slideways **6** of the chambers are inclined with regard to the axis of rotation by an angle of approximately 60° and together form the outline of a truncated cone.

In conformity with the invention, the sliding surfaces extend only a relatively short distance from disc **3** in the direction toward the axis of rotation so that the discharge edges **7** of the chambers are located approximately in the center portion of the axial section profile of the bucket wheel. These edges **7** protrude or extend over a stationary discharging means in the form of a cone-shaped discharge chute or runway **8** which extends correspondingly far into the bucket wheel and is arranged at approximately the same inclination as the sliding surfaces **6**. The goods slide from chute **8** upon a conveyor belt **9** which is arranged adjacent the bucket wheel and below the axle thereof, said conveyor belt being in a manner known per se seamed by chutes.

Within the filling section, on the discharge side of the chambers, the chambers are covered by a stationary retaining wall in the form of a metal sheet or closure disc **10**. Due to the small radial extension of the bucket wheel chambers **4**, **5** and **6**, metal sheet **10** may be dimensioned relatively small.

The excavated or dredged goods which are contained in buckets **1** within the filling section are retained in the chambers just until said chambers have been lifted to such an extent that the goods will slide down on the stationary discharging means such as chute **8**. Such sliding is effected very soon in view of the shortness of the sliding surfaces **6**. In this way, a fast discharge of the chambers will be assured while the discharge similarly to the bucket wheel without chambers will be effected independently of the speed of the bucket wheel by means of the stationary chute **8**.

On the other hand, the cylindrically curved closure sheet which is required with bucket wheels without chambers will not be required with the arrangement of the present invention, because the short chambers serving as receiving chambers, will without the employment of such closure sheet, retain the excavated or dredged goods until they slide downwardly on the discharge chute **8**.

Advantageously, the receiving chambers **4**, **5**, **6** are covered laterally by wedge-shaped parts **11** known per se at the corner which is adjacent the discharge end of the buckets.

A thin metal sheet which, for all practical purposes, is not subjected to any wear is arranged within the range of the filling section and concentrically to the axis of rotation in order to bring about a certain closure of the receiving chambers toward the inside.

Instead of a chute or runway **8**, also a rotating platform, a roller table, a discharge belt which may be tiltable about the axis of rotation of the bucket wheel, or similar devices may be employed as discharge devices.

Instead of having the partitions between the receiving chambers arranged precisely radially to the axis of rotation of the bucket wheel as it is done with the walls **4** shown in the drawing, it is also possible to arrange such walls in such a way that, depending on the particular dredged or excavated material, they will have their discharge ends either lag behind the radial direction or run ahead thereof. In this instance, the arrangement may be such that the imaginary extensions of said walls are arranged tangentially with regard to the axis or the hub of the blade wheels in a manner known per se.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. A bucket wheel having conveyor means arranged on one side thereof and adjacent thereto and comprising: a shaft, supporting means connected to said shaft for rotation and forming the rear side of said bucket wheel and being located remote from said conveyor means, first ring means connected to said supporting means, second ring means arranged in spaced relationship to said first ring means and arranged on the front side of said bucket wheel adjacent to said conveyor means, connecting wall means connecting said first and second ring means to each other, a plurality of bucket means spaced from each other and connected to circumferential portions of said first and second ring means, a plurality of chamber means respectively associated and communicating with the interior of said bucket means, each of said chamber means being formed by a slideway extending from the rear side toward the front side of said bucket wheel and at an acute angle with regard to said shaft, the front end of said slideway forming a discharging edge located in the interior of said bucket wheel and in spaced relationship to said shaft, each of said chamber means furthermore being formed by two successive ones of said connecting wall means and arranged relative to each other so as to diverge relative to each other in the direction toward said conveyor means, and stationary discharging means extending from said conveyor means into said bucket wheel above said shaft and close to at least some of said discharging edges for receiving excavated material therefrom and passing the same on to said conveyor means.

2. An arrangement according to claim 1, in which said stationary discharging means is in the form of conical chute means.

3. A bucket wheel having conveyor means arranged on one side thereof and adjacent thereto and comprising: a shaft, supporting means connected to said shaft for rotation and forming the rear side of said bucket wheel and being located remote from said conveyor means, first ring means connected to said supporting means, second ring means arranged in spaced relationship to said first ring means and arranged on the front side of said bucket wheel adjacent to said conveyor means, connecting wall means connecting said first and second ring means to each other, a plurality of bucket means spaced from each other and connected to circumferential portions of said first and second ring means, a plurality of chamber means respectively associated and communicating with the interior of said bucket means, each of said chamber means being formed by a slideway extending from the rear side toward the front side of said bucket wheel and at an acute angle with regard to said shaft, the front end of said slideway forming a discharging edge located in the interior of said bucket wheel in spaced relationship to said shaft, each of said chamber means furthermore being formed by two successive ones of said connecting wall means and arranged relative to each other so as to diverge relative to each other in the direction toward said conveyor means, stationary discharging means extending from said conveyor means into said bucket wheel above said shaft and

close to at least some of said discharging edges for receiving excavated material therefrom and passing the same on to said conveyor means, and stationary retaining wall means arranged at the front side of said bucket wheel along a portion of the rotative path of the open side of said chambers and extending from approximately the level of said conveyor means upwardly over a portion only of the path of rotation of said chambers to an extent sufficient to prevent excavated material just picked up by the respective buckets from leaving the respective bucket chambers outside the range of said discharging means.

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