Dec. 19, 1967 R. SUKURS ET AL 3,358,809

BUCKET WHEEL LOADER

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FIG. 1

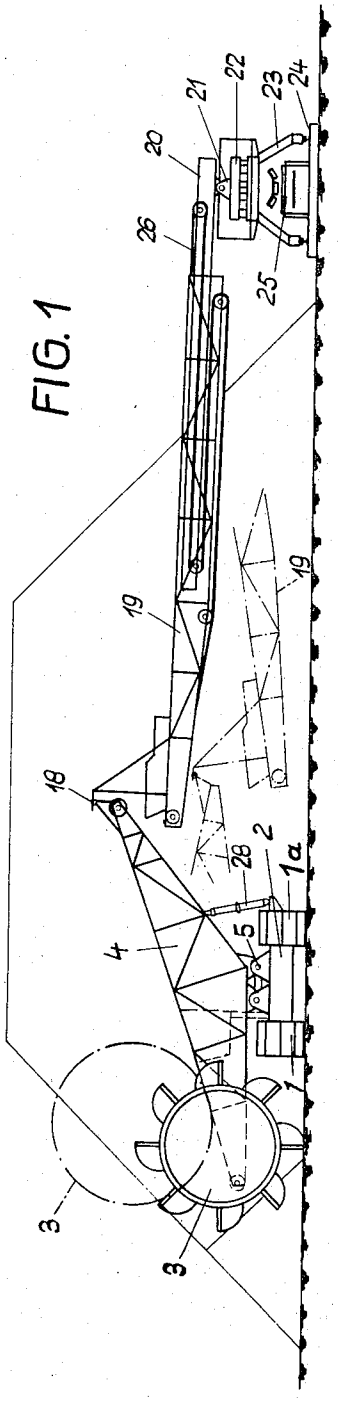

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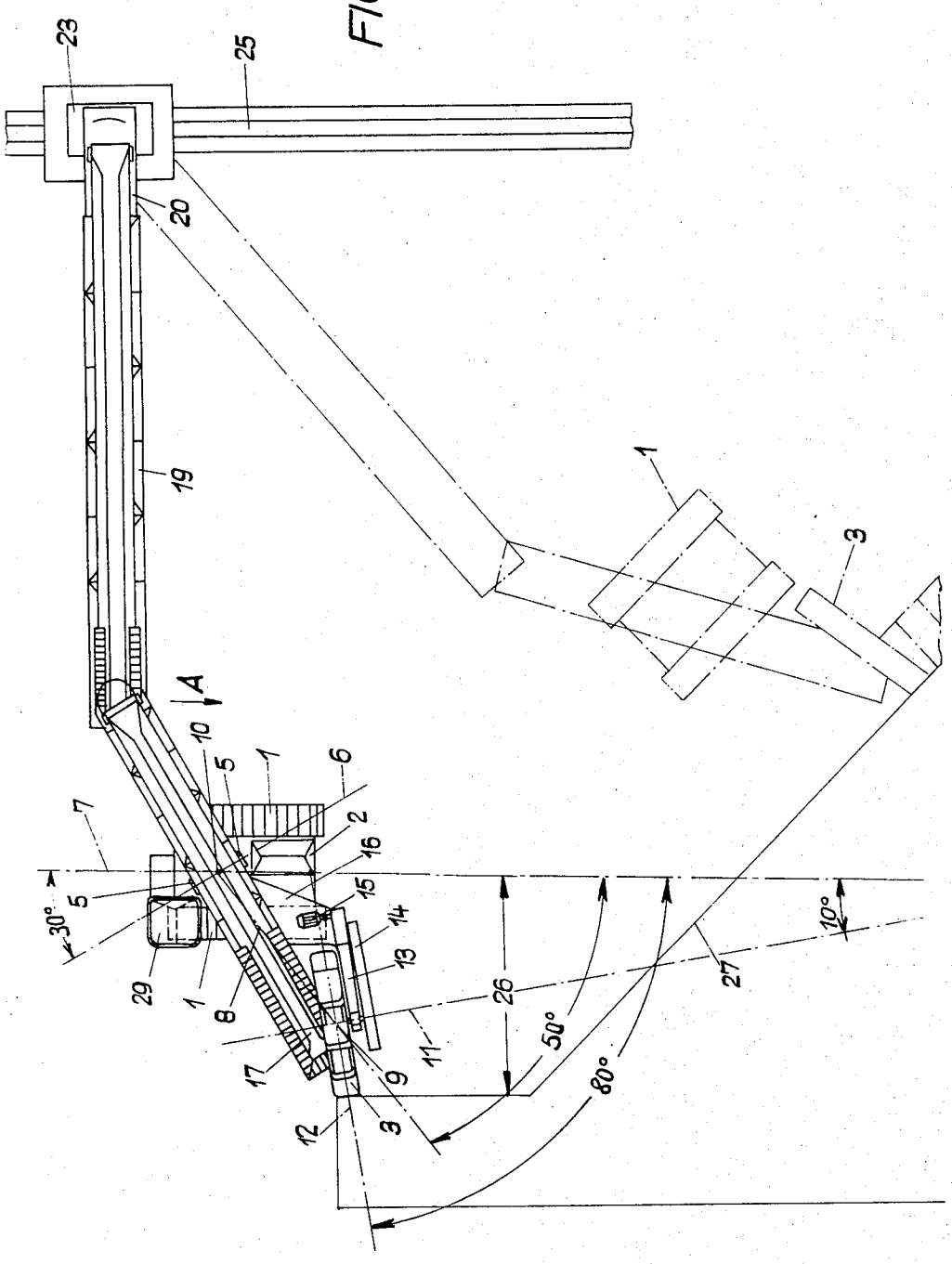
FIG. 2



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BUCKET WHEEL LOADER

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5 Claims. (Cl. 198—36)

The present invention relates to a bucket wheel loader. For picking up piled up bulk goods from storage places. Frequently bucket wheel loaders are employed which are movable on caterpillar tracks which are designed similar to bucket wheel dredges employed in strip mining.

With a bucket wheel loader of this type, a boom carrying a bucket wheel is tiltable upwardly and downwardly and is journalled preferably on a C-shaped upper structure which rests on a track-laying carriage by means of a turntable which is rotatable about a vertical axis. Usually, a boom provided with a discharging conveyor is connected to the upper structure and is laterally turnable independently of said upper structure.

It is an object of the present invention to provide a bucket wheel loader for picking up piled up bulk material from storage places, which will be considerably simpler and therefore more economical than heretofore known bucket wheel loaders of the type involved.

It is another object of this invention to provide a bucket wheel loader as set forth in the preceding paragraph which will have a considerably smaller understructure than is required with heretofore known bucket wheel loaders.

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

FIG. 1 diagrammatically illustrates a side view of a bucket wheel loader according to the invention.

FIG. 2 is a top view of FIG. 1.

The bucket wheel loader according to the present invention is characterized primarily in that the bucket wheel supporting member is without being laterally turnable mounted on the track laying carriage by means of a supporting structure in such a way that the plane passing through the center of said supporting structure and through the center of the bucket wheel will be located at an angle with regard to the driving direction of said carriage while that end of the bucket wheel supporting member which with regard to the supporting structure is located opposite the bucket wheel, supports a bridge member which in a manner known per se establishes the connection of the loader with a storage place conveyor means.

Referring more specifically to the drawing, the bucket wheel loader shown therein comprises an understructure or carriage **2** movable on two caterpillar tracks **1**, **1***a*. The two tracks may, in a manner well known in connection with track laying vehicles, individually be driven at different speeds for permitting a steering of the carriage and for that purpose may also be driven in a direction opposite to each other.

The loader furthermore comprises a bucket wheel **3** which is supported by a rocker **4** resting upon understructure **2** by means of two rocking bearings **5**. The horizontal axis **6** (FIG. 2) of said bearings **5** forms an acute angle with the vertical central plane **7** of the understructure **2**. For instance, axis **6** may form an angle of 30° with the vertical projection of plane **7**. However, the said angle is not limited to 30° but may vary within the range of from 15 to 45°. The arrangement is such that

the vertical projection **8** of the vertical plane defined on one hand by center point **9** of bucket wheel **3** and on the other hand by the point **10** of intersection of axis **6** and vertical projection **7** of the vertical central plane of understructure **2** forms an acute angle with the driving direction of the loader. For instance, line **8** forms with line **7** an angle of 50°, but the angle may also vary within the range of from 35 to 65°.

As will be seen from the drawings, when considering FIG. 2, bucket wheel **3** forms an acute angle with line **8** so that the axis of rotation **11** of the bucket wheel for instance forms an angle of 10° with line **8**.

As will also be seen from the drawing, the vertical projection of the vertical central plane **12** of the bucket wheel forms with line **7**, i.e. with the driving direction of the carriage **2**, an angle of approximately 80°. Bucket wheel **3** is thus so arranged that when considering FIG. 1, the bucket wheel is located in the direct vicinity of the caterpillar track **1**, and when considering FIG. 2, is located adjacent the front deviating wheel of said caterpillar track **1**. In order to maintain said bucket wheel **3** in this position, the rocker is provided with a crank while that arm **13** of the crank which carries the bucket wheel supports a transmission **14**, and the bucket wheel driving motor **15** is arranged in a portion **16** located above the respective caterpillar track and pertaining to rocker **4**.

When looking in the driving direction of the vehicle as indicated by the arrow A, a conveyor belt **17** is provided at the rear side of bucket wheel **3**. Conveyor belt **17** carries the material picked up by the bucket wheel and conveys said material along a straight line beyond point **10** to the rear end of rocker **4**. Suspended on said rear end in the manner of a universal joint at a point **18** is a conveyor belt bridge which is composed of two parts **19** and **20** longitudinally movable relative to each other. These displaceable parts may be of a design as it is described in U.S. patent application Ser. No. 447,128 filed Apr. 12, 1965, now abandoned.

The bridge member **20** rests on two joints **21** and through the intervention of a turntable **22** rests on a gate-shaped carriage **23** which is movable on two rails **24** on both sides of conveyor belt means **25**. The two bearings **21** on carriage **23** and the suspension at point **18** represent a three-point support of the conveyor bridge **19**, **20**. Conveyor belt **26** is within the conveyor belt bridge **19**, **20** guided along a loop in such a way that it can adapt itself to an extension and reduction in the total length of bridge **19**, **20**.

For the design according to the present invention it is important that the rocker **4** is journalled on the understructure without being able to turn laterally so that the expensive turntable provided with heretofore known bucket wheel loaders will become superfluous, and also the structural difficulties will be avoided which are encountered with heretofore known bucket wheel loaders with regard to the transfer of the material within the range of the vertical axis of rotation.

When picking up bulk material from a storage place, the loader according to the present invention moves along the bank to be picked up while the bucket wheel in bank operation picks up the material from the pile. It is of advantage that due to the arrangement of the bucket wheel as described above with regard to the carriage, the distance **26** between the outermost point of the bucket wheel engagement with the bulk goods, and the vertical longitudinal plane **7** of the driving carriage is only relatively small. Since the resistance offered to the movement of the carriage by the engagement of the bucket wheel with the pourable goods acts upon carriage **2** or tracks **1**, **1***a* with a relatively short lever arm, a relatively short spacing between the two caterpillar tracks **1**, **1***a* will suf-

fice. Due to this fact and also due to the absence of a turntable, the understructure can be considerably smaller dimensioned than is the case with heretofore known customary bucket wheel loaders. In this way a relatively light and inexpensive device is obtained which is furthermore characterized in that it can be steered very easily. Such a device can easily adapt itself to the different slopes of bulk goods on the storage place. The dot-dash lines in FIG. 2 indicate how the device will work for instance on a slope **27** which forms an acute angle with the storage conveyor **25**. Bridge **18**, **19** can adapt itself to the varying distances between the device and the discharge carriage **23**.

Due to the fact that bridge **19**, **20** rests on that end of rocker **4** which is remote from bucket wheel **3**, the overweight of bucket wheel **3** is compensated for without the necessity of carrying dead ballast.

Bucket wheel **3** can be lifted upwardly by means of rocker **4**. To this end, the rear rocker portion is for instance equipped with a hydraulic hoist **28**. In FIG. 1, the dot-dash lines indicate the position of the rear end of rocker **4** and of the bridge member **19** which rests thereon. These parts are illustrated in a position according to which the bucket wheel is lifted into the position illustrated in dot-dash lines.

According to the embodiment of the invention as illustrated in the drawing, an operator's cab **29** is arranged on the lower structure **2** behind rocker **4** on the same side as the bucket wheel **3**.

It is, of course, to be understood that the present invention is, by no means, limited to the particular arrangement shown in the drawings but also comprises any modifications within the scope of the appended claims. Thus, while the device described above has the bucket wheel adjustable in a vertical plane, it is also possible to rigidly connect the bucket wheel support on the driving structure or carriage. This last mentioned arrangement may be used when the bucket wheel has such a large diameter that it can reach the pourable goods up close to the upper edge of the pile or when the pourable goods are so loose in the pile that they will automatically slide downwardly when digging off the pile at the foot of the slope.

What we claim is:

1. A bucket wheel loader which includes: a freely movable carriage, a rotatable bucket wheel, longitudinally extending supporting means supported by said carriage and rotatably supporting said bucket wheel at one end portion of said supporting means, mounting means for preventing rotation of said supporting means about a vertical axis while permitting rotation of said supporting means about a horizontal axis, said bucket wheel being so located with regard to said carriage that the vertical plane passing through the center of said carriage and through the center of said bucket wheel forms an acute angle with the advancing direction of said carriage, bridge means having one end thereof supported by the other end portion of said supporting means, additional supporting means supporting the other end portion of said bridge means for pivotal movement about a substantially horizontal axis, and conveyor means leading from said bucket wheel to said other end portion of said bridge means.

2. A loader according to claim **1**, in which said first mentioned supporting means forms a two-arm rocker pivotable in a vertical plane only which forms an acute angle with the advancing direction of said carriage, one of said arms supporting said bucket wheel and the other one of said arms supporting said one end portion of said bridge means.

3. A bucket wheel loader according to claim **2**, in which said other arm of said rocker support said one end portion of said bridge means by a universal joint.

4. A bucket wheel loader according to claim **1**, in which the central substantially vertical plane of the bucket wheel which is perpendicular to the axis of rotation of said bucket wheel forms an angle of approximately 80° with the advancing direction of said carriage.

5. A bucket wheel loader according to claim **1**, in which said first mentioned supporting means comprises a cranked portion rotatably supporting said bucket wheel and offset with regard to the longitudinal axis of said first mentioned supporting means in the advancing direction of said carriage.

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