

Dec. 31, 1946.

C. C. STOKES

2,413,661

MATERIAL HANDLING CONSTRUCTION

Filed Feb. 28, 1945

3 Sheets-Sheet 1

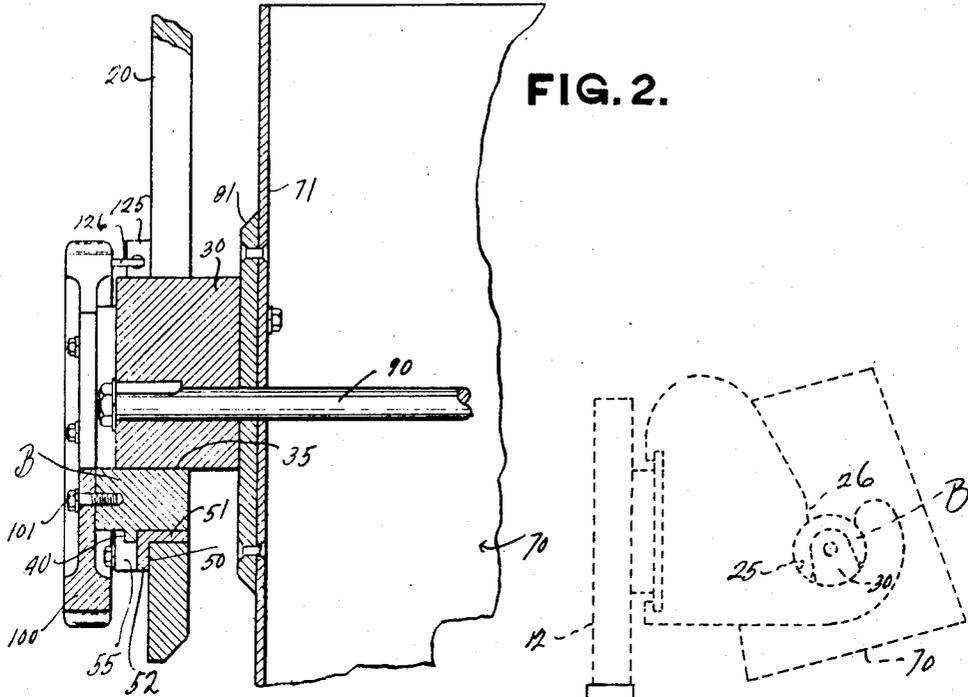


FIG. 1.

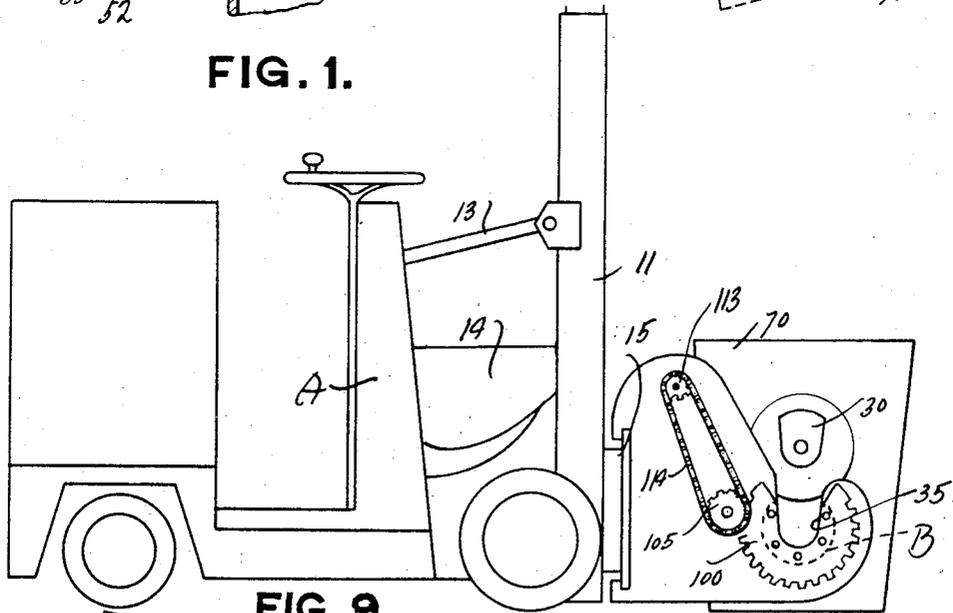
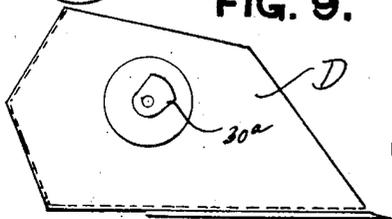


FIG. 9.



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3 Sheets-Sheet 2

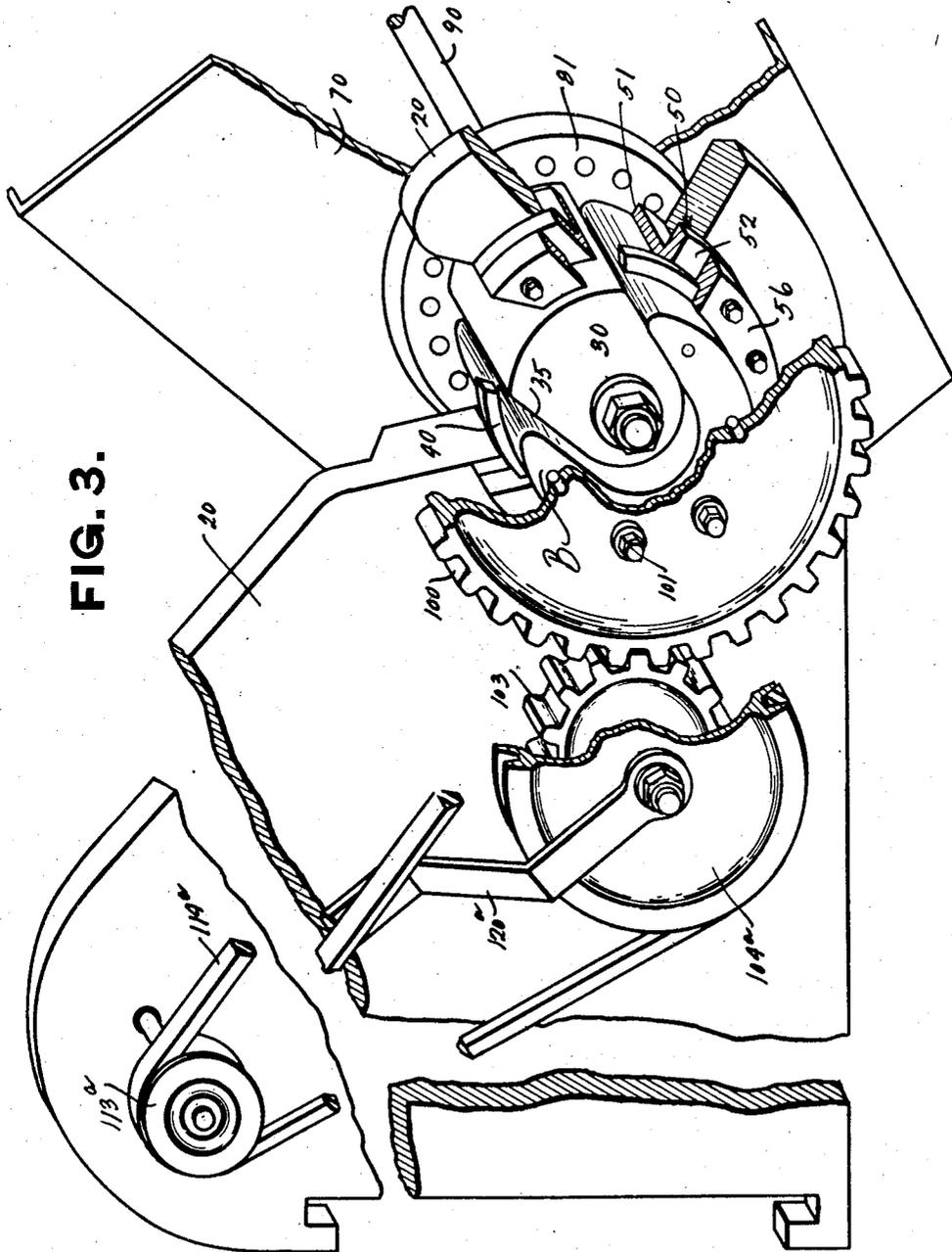


FIG. 3.

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3 Sheets-Sheet 3

FIG. 4.

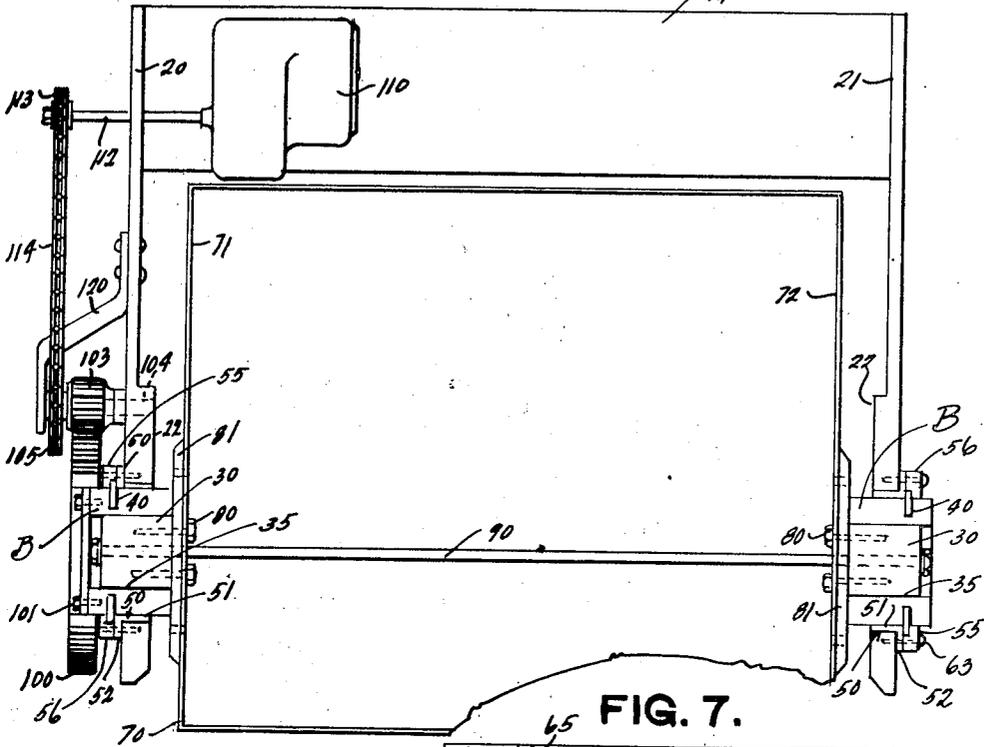


FIG. 5.

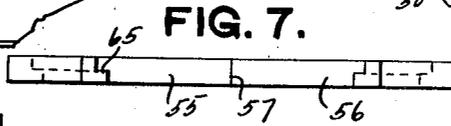


FIG. 7.

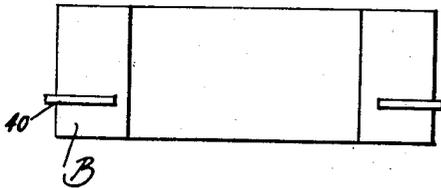


FIG. 6.

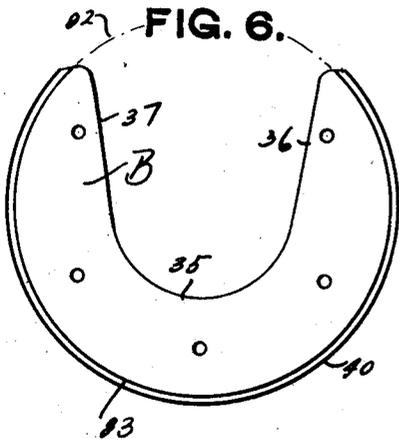
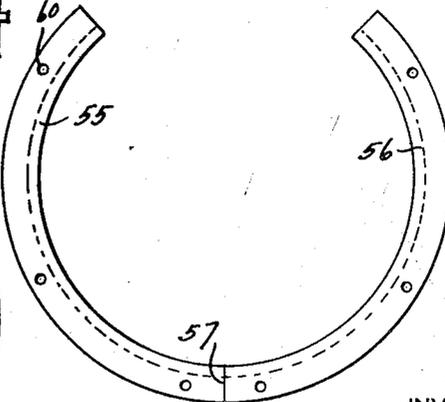


FIG. 8.



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UNITED STATES PATENT OFFICE

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MATERIAL HANDLING CONSTRUCTION

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5 Claims. (Cl. 214-113)

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This invention relates to improvements in loading and dumping equipment.

The primary object of this invention is the provision of an improved mechanism to facilitate the economical loading, transportation and dumping or stacking of such comminuted materials as coal, sand, stones, gravel, etc.

A further object of this invention is the provision of improved loading and dumping equipment adapted to be attached to a mobile unit, such as an industrial truck, consisting of a loading shovel, hopper or bin and associated means thru which the same may be lifted and moved to loading or dumping positions with facility.

A further object of this invention is the provision of an industrial mobile unit and a detachable carrier having complementary parts associated therewith by means of which thru a power control from the industrial unit the carrier may be lifted and moved with facility into loading or dumping positions.

A further object of this invention is the provision of an improved revolving saddle and mating part associated therewith particularly well adapted to be used in connection with loading equipment.

Other objects and advantages of the invention will appear from the following description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts thruout the several views—

Figure 1 is a side elevation, partly diagrammatic, showing the association of the improved loading, carrying and dumping equipment associated with an industrial truck and a carrier detachably connected therewith.

Figure 2 is an enlarged cross sectional view taken vertically thru a revolving saddle and mating part structure of the invention.

Figure 3 is a fragmentary perspective view, partly in section, showing associated details of the improved means by which a hopper or like construction may be manipulated thru a power unit into loading, transporting or dumping positions.

Figure 4 is a plan view of the improved means by which a hopper or like carrier may be associated with a mobile unit, such as an industrial truck, so that the carrier may, with facility, be power controlled into loading, transporting or dumping positions.

Figure 5 is a plan view of an improved revolving saddle associated as a part of this invention.

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Figure 6 is a side elevation of the revolving saddle.

Figure 7 is a plan view of an attaching flange by means of which the revolving saddle may be secured in place in a frame structure.

Figure 8 is a side elevation of the attaching flange or member shown in Figure 7.

Figure 9 shows a modified form of shovel which may be used as the carrier, in place of the bin or conventional hopper (the latter being shown in Figure 1).

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the letter A may generally designate any improved type of mobile unit, such as a conventional industrial truck. One type of such truck is known as the "Yale Ram truck." The general features of such truck are set forth in U. S. Patents 2,216,697; 2,126,289; 2,327,848 and 2,339,120. In the main, the truck consists of a chassis 10 having suitable traction means (not shown). It includes the tilting upright frame structure 11 which may have an extensible or telescoping lift 12. The upright frame 11 is mounted on the chassis for tilting and has associated therewith a tilting unit 13 and a hoist unit 14 for a carriage 15 which is mounted upon the upright for vertical upward and downward movement upon the frame 11 and its extensible lift 12, as will be well understood by those skilled in the art to which this invention relates. The carriage structure 15 is of such nature as to permit of detachable connection therewith of a forked or platform structure upon which the element or material to be loaded and carried may be disposed. This type of truck is especially well adapted for use in confined space, and I have improved upon the same by associating therewith means so that the carrier may be moved thru power control into loading, transporting or dumping or stacking positions. To that end I provide a pair of elevating and lowering frame arms 20 and 21, best shown in Figure 4 of the drawings, which are of metal and suitably reinforced by thickening them at the outer ends thereof, as shown at 22, for receiving the improved revolving saddle B. These arms, as shown in the drawings, are suitably socketed at 25 for rotatably receiving the revolving saddle B. The socket 25 has a restricted opening 26 at the top thereof thru which the so-called mating or male part 30 of the bin, hopper or shovel may pass on its way to or from the revolving saddle B.

The revolving saddle B is segmental in construction, as shown in Figure 6 of the drawings.

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having a socket 35 therein struck thru a radius extending 90° or less. From the ends of this curved lower part of the socket 35 the side walls 36 and 37 taper upwardly at an angle of 10° (more or less) to the vertical. The side walls 36 and 37 are divergent with respect to each other from the lower portion of the socket 35. The socket 35, of course, opens at the wider end of the segmental revolving saddle B. The revolving saddle B is of a depth sufficient to properly seat the mating part 30 of the carrier therein. Externally, the revolving saddle B is provided with a flange or collar 40, which may be integral therewith.

It is to be understood that these revolving saddles are provided upon each of the arms 20 and 21, as is likewise the associated structure upon which the revolving saddle is mounted.

Upon each of the elevating or lift arms I provide a segmental-shaped bushing 50, including the annular bushing segment 51 adapted to seat in the socket 25 provided therefor in the elevating arm. The bushing furthermore includes a segmental flange 52 overlying the exterior of the arm 20 or 21, as the case may be. This bushing receives the revolving saddle B therein so that the collar or flange 40 lies against the outer surface of the flange 52, in the relation shown in Figures 2 and 4 of the drawings. To retain the revolving saddle in place, I provide the retaining or attaching flange structure shown in Figures 7 and 8 consisting of complementary segmental portions 55 and 56, divided at 57. When they are assembled, these parts are short of a complete circle. They are suitably provided with openings 60 by means of which they may be attached by bolts, screws or other attaching expedients 63 with the flange 52 of the bushing. These attaching parts 55 and 56 are suitably recessed at 65 to receive the shoulder flange 40 therein. In this manner the revolving saddles are detachably locked in position upon the elevating arms. The revolving saddle projects beyond the locking flange.

Referring at this time to the carrier, which may be of the bin type shown at 70 in Figures 2 and 4 of the drawings, I prefer to provide a mating part 30 on each of the side walls 71 and 72. These parts are of a nature to snugly seat in the sockets 35 of the revolving saddles and will not rotate therein or move with free play in the plane of the supporting arms 20 and 21. They are detachably connected as by bolts 80 to reinforcing structures 81 upon the side walls 71 and 72. In shape they partake of the characteristic shape of the socket 35 and the side walls 36 and 37, but when in position each has a convex edge 82 contiguous with the outer circumference 83 of the revolving saddle B. Thus, when the trunnion extension or mating part is socketed in the revolving saddle they are complementary in providing at their outer peripheries a substantially continuous circle adapted to slide on the seat portion 51 of the bushing structure 50. The hopper or bin is preferably provided with a rod 90 extending thru the mating parts 30 as by being bolted thereto; this rod preferably extending transversely across the carrier, as shown in Figure 4, for the purpose of transmitting torque from one side of the carrier to the other. This eliminates any twist in the carrier and properly lines up the mating parts for efficient seating in the saddles.

As a preferred means of rotating the saddles for moving the carrier into loading, transport-

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ing or dumping positions, I prefer to provide a segmental gear 100, bolted as at 101, to the outer surface of one of the saddles B, as shown in Figures 2 and 4 of the drawings. A suitable pinion 103 is rotatably supported at 104 upon one of the arms 20 or 21. The shaft of this pinion 103 has a sprocket wheel 105, as shown in Figures 1 and 4 of the drawings, or a pulley wheel 104^a, as shown in Figure 3 of the drawings. A power unit 110 may be mounted upon the cross piece or frame 111 connecting the arms 20 and 21. It has a drive shaft 112 provided with a sprocket wheel 113. A link chain 114 connects the sprocket wheels 104 and 113 for drive of the pinion 103 and consequently the gear 100. There, of course, must be a proper reduction ratio in this gearing to insure that the motor will not throw the saddles around too fast. Also, there must be proper tolerances between the mating parts and the revolving saddles bearing upon the bushing 50, as can be well understood by those skilled in the art to which this invention relates.

The shaft 104 may be suitably supported as by a bracket arm 120 shown in Figures 3 and 4 of the drawings.

Referring to the operation of the invention, the carrier 70 has the mating parts 30 positioned thereon preferably above the vertical center of the carrier. At any rate, they are positioned so that when the carriage is at its lowermost position upon the truck, the arms 20 and 21 may be moved thru manipulation of the truck into position so that the sockets 35 will lie beneath the mating or male parts 30. Elevation of the carriage will then move the arms into position so that the sockets 35 receive the parts 30 and the bin may be lifted and transported to any desired location. The carriers 70 may be stacked one upon the other or in any desired position, or the materials therein may be dumped by rotating the saddle B thru the power unit 110. The latter is reversible and in operation for dumping, the gear 100 will be rotated and therewith the saddle B. This moves the male part 30 so that its arcuate edge 82 slides along the socket of the elevating arm bushing, as shown in dotted lines in Figure 2 of the drawings. In this position the mating parts are locked in the sockets and the power unit may swing the carrier into dumping position shown in dotted lines in Figure 2 of the drawings. After the materials are dumped the motor may be reversed and the carrier returned to normal position. It may then be moved to any desired location and set upon the platform or the ground thru a reverse cycle of movement. To control the motor so that the carrier will not be thrown too far in either of its extreme positions, I may provide control switches 125 operated by extension 126 upon the gear 100.

The carrier may, of course, take various shapes. It may be a scoop, hopper, bin or shovel. A shovel D is shown in Figure 9 of the drawings. Its forward part is entirely open so that it may be moved into shoveling position. When the shovel is standing in normal shoveling position the longitudinal axis of the mating part 30^a is placed at an angle of 45° from the vertical. Thus, when the power unit lifts the arms into position for receiving the mating parts 30^a in the sockets 35, they will drop therein and swing the shovel D in an angle of 45° for preventing the materials in the shovel from dropping out of the shovel.

It will be apparent from the foregoing that an improved means is provided for manipulating a material carrier so that it may be moved

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into loading, transporting or dumping positions within a confined space. The industrial truck and the application of the improved revolving saddle and mating structure will facilitate the handling of comminuted materials where there is a low ceiling space. The device is compact and is both economical and labor saving. It is obviously of rugged structure. One feature of importance is the fact that the socket receiving the mating part tapers upwardly so that the operator may make a rather careless approach and still achieve the purposes of the invention.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In material handling equipment the combination of a supporting frame structure, relatively spaced revolving saddles mounted upon said frame structure each defining a peripherally opening socket which tapers divergently from the bottom of the socket to the periphery of the respective saddle, a carrier having opposed extensions thereon adapted to seat in the sockets of said saddles, each of said extensions having opposite side surfaces divergently tapering from the bottom thereof to the top thereof in complementary relation to the taper of the socket of the saddle whereby the extensions will non-rotatably seat relative to the sockets of said saddles, and means for rotating said saddles whereby to move the carrier into different angular positions.

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2. A carrier member for material handling comprising a material receiving body portion having a chamber therein, the body portion having opposed side walls, and extensions on the opposed side walls of vertically elongated construction having the opposite side surfaces thereof tapered divergently upwards, and the bottom surface thereof arcuate and merging into said side surfaces.

3. In a material handling shovel construction the combination of a shovel body having opposed side walls, and an elongated carrier extension on each of the side walls projecting laterally therebeyond, said extensions being axially elongated at an angle between the horizontal and vertical, and the opposite side surfaces of each of said extensions being tapered divergently from the bottom of the extensions towards the top thereof.

4. In material handling equipment, a supporting frame structure, and relatively spaced revolving saddles mounted upon said frame structure, each defining a peripherally-opening socket having continuously diverging side wall surfaces each diverging upwardly at substantially the same angle from the vertical and an arcuate bottom wall surface, merging into said side wall surfaces.

5. In a material handling shovel construction, the combination of a shovel body having opposed side walls and a carrier extension, extending outwardly from each of the side walls, each extension having a bottom surface and opposed side surfaces which continuously extend upwardly and outwardly from said bottom surface.

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