April 15, 1930. L. F. SNYDER 1,754,699

LOADING MACHINE

Filed May 1, 1929 3 Sheets-Sheet 1

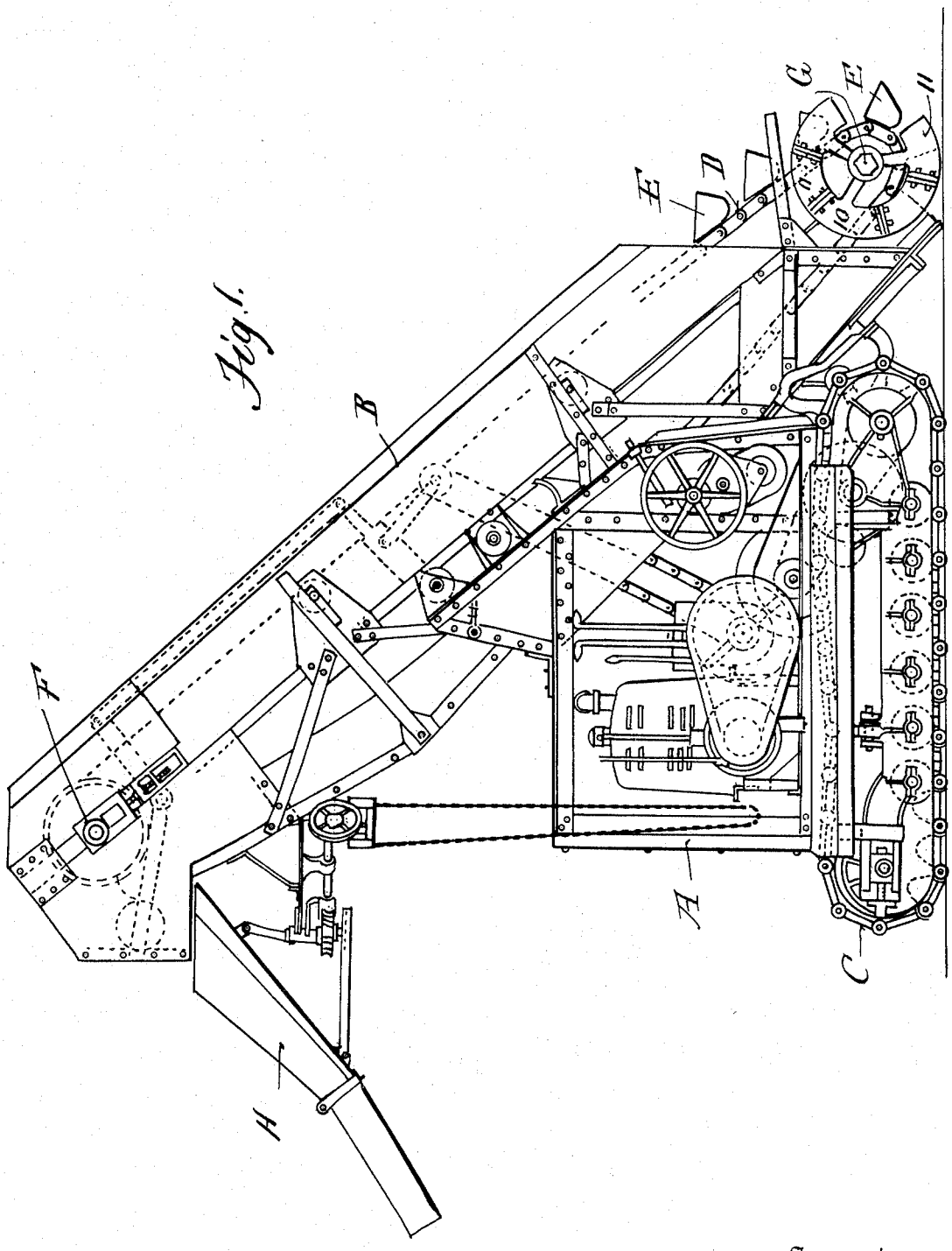


Fig. 1.

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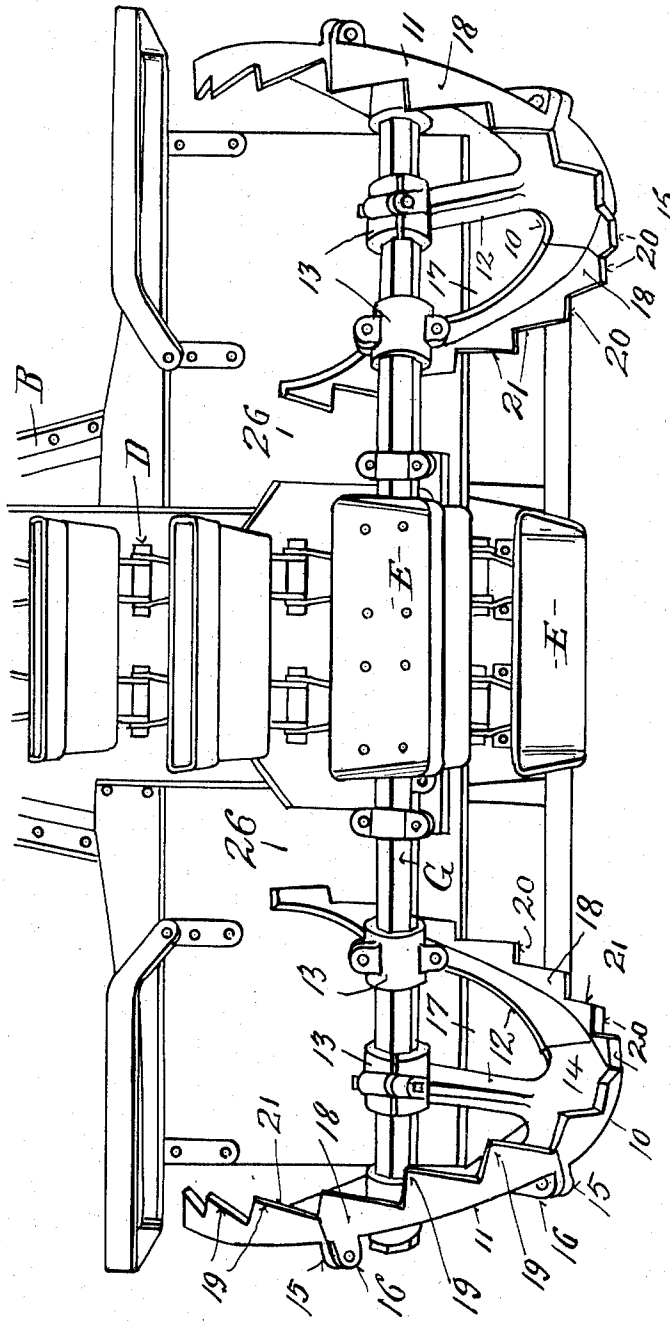


Fig. 2.

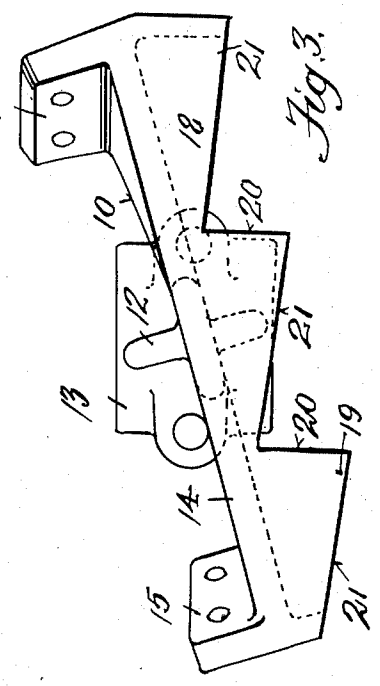


Fig. 3.

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Fig. 4.

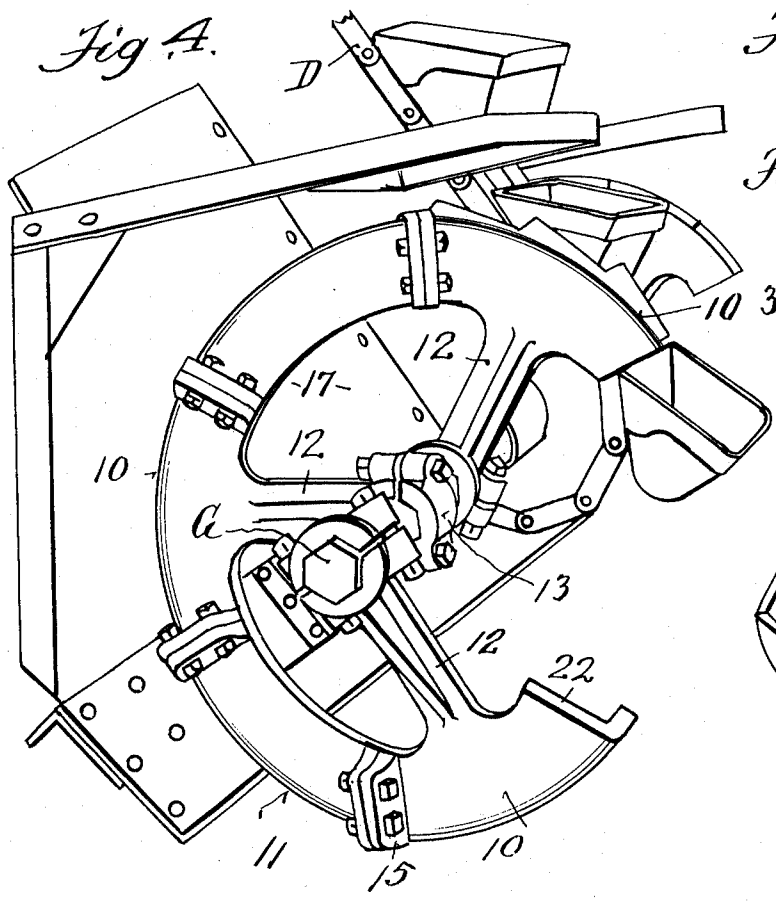


Fig. 6.

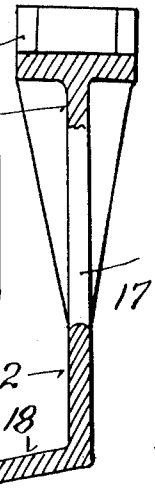
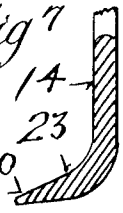


Fig. 7



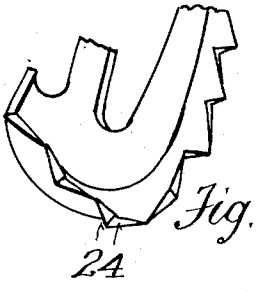


Fig. 8.

Fig. 5.

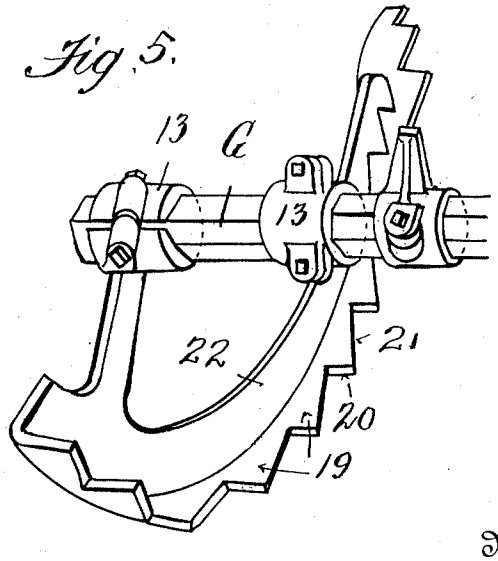
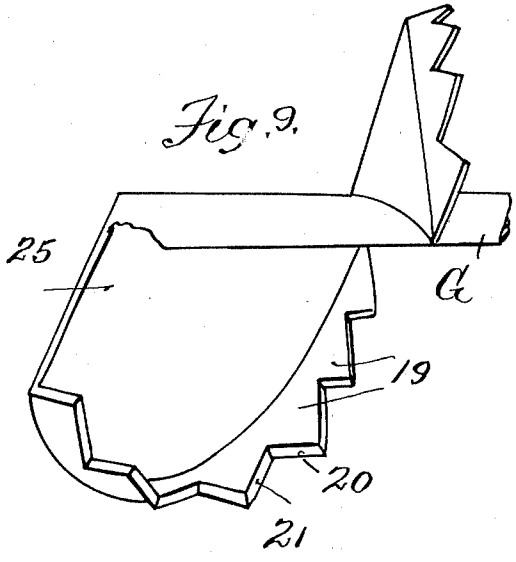


Fig. 9.



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UNITED STATES PATENT OFFICE

LOUIS F. SNYDER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO LINK-BELT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

LOADING MACHINE

Application filed May 1, 1929. Serial No. 359,512.

The invention relates to loading machines, and particularly to machines of the type in which bulk material such as coal, sand, gravel, dirt, and the like, is elevated from the ground, or other places of deposit, and delivered to wagons, carts, or other carriers and places.

More particularly the present invention relates to devices for feeding the material to be handled to the elevator, or carrier of loading machines of the nature referred to, by which said material is elevated and delivered.

The object of the invention is to provide a loading apparatus, and more particularly feeding devices therefor, which are simple in structure, economical to manufacture, and efficient in operation.

A further object is to provide feeding devices for loading machines which secure a continuous smooth progression or feed of the material to the elevator without shock or vibration and with reduced expenditure of power for actuating the same.

A further object is to provide in a loading machine of the type in which the machine is continuously advanced towards or into a pile of material to be loaded or transferred, feeding devices which operate to loosen up the material to be handled, and to effect the continuous, uniform, smooth progression of the loosened up material from opposite sides of the elevator into the line of advancement of the elevator, and which is characterized by reduced resistance and the absence of successive impacts or blows, thereby eliminating vibration, and wherein excessive feed of the material by the feeding device is avoided.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as illustrated in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views appearing thereon,—

Figure 1 is a view in side elevation of a loading machine equipped with feeding device embodying the principles of my invention:

Fig. 2 is a view in front elevation of the feeding device employed in connection with the machine shown in Fig. 1:

Fig. 3 is a detached detailed view in plan of one section of feeding device embodying the principles of my invention:

Fig. 4 is a broken view in perspective showing a portion of a feeding device embodying my invention:

Fig. 5 is a broken detail view showing a portion of the feeder device at one side of the elevating conveyor illustrating the manner of mounting the same upon the foot shaft of the machine:

Fig. 6 is a view in transverse section of one form of serrated or toothed spiral feeder section:

Fig. 7 is a broken detail view in section showing a slightly modified form of flanged and toothed feeder section embodying my invention:

Fig. 8 is a broken detail view in perspective of a portion of flanged and toothed feeder section in another slightly modified form included within the scope of my invention:

Fig. 9 is a broken detail view showing still another modified form of spiral feeder section included within my invention.

The same part is designated by the same reference character wherever it occurs throughout the several views.

In the handling of various kinds of material, such as coal, sand, gravel, dirt, and the like, it is a common practice to employ a delivering conveyor mounted in inclined position upon a suitable framework which is capable of being rocked or tilted vertically to various angles of inclination, and also to be swung into various horizontal positions, and to be advanced towards and from the material to be handled. In connection with such machines it is common to employ feeding devices at the lower front end of the elevating conveyor, and disposed at opposite sides thereof to loosen up and feed the material to be handled into the path of advancing movement of the conveyor, so as to be scooped up by the conveyor and elevated and loaded into

wagons, carts, or the like, or deposited in some other carrier or place.

The present invention relates to apparatus of this same general type and resides more particularly in the structure of feeding devices for loosening up and feeding the material from opposite sides of the conveyor into the path of advancement of the conveyor.

Heretofore it has been a common practice to employ feeders consisting of spirals carried by a foot shaft of the elevating structure, either the lower shaft over which operates the elevating conveyor, or an auxiliary shaft driven therefrom, or otherwise, as desired, the foot shaft being extended beyond one, or both, sides of the elevating conveyor. Spiral feeders of this nature are open to the objection of feeding excessive volumes of the material from opposite sides of the elevator towards the latter, and also to the further objection of encountering an increased resistance due to the large area of contact of the surface of the spiral with the material to be fed, thereby requiring the expenditure of excessive power to effect the rotation of the shaft carrying the spiral feeder. It has also been proposed to employ a series of paddles mounted upon the extended ends of the foot shaft in a spiral line therearound, and having their faces disposed in angular relation thereby forming, in effect, an interrupted spiral type of feeder. Devices of this nature, however, are open to the rather serious objection that the paddles exert successive blows or impacts on the material to be handled, and this not only subjects the structure to an objectionable vibration and jerky action but, also, it results in increased resistance to the rotative action of the feeder, and in the requirement for increased power to effect such rotation, with resultant increase in the strains imposed on the structure.

It is among the special purposes of my present invention to provide feeding devices for use in connection with loading machines of the nature and type referred to which obviate the foregoing and other serious objections and defects in machines of this character.

In carrying out my invention I propose to eliminate entirely the feature of spirally arranged paddles or blades and to employ a continuous form of spiral feeder which is so mounted, constructed and arranged as to accomplish the function of loosening up the material to be fed thereby, and of feeding the loosened material smoothly towards the elevating conveyor, without shock or jar incident to successive impacts or blows, without causing an excessive feed of material, and without requiring excessive power to rotatively actuate the feeders. I also propose, in one form of embodiment of my invention, to employ feeding devices made in separable sections whereby when one section is injured or broken it may be removed and replaced by a new section without necessitating the removal and replacement of the entire feeder. I also propose to employ a feeder of the ribbon type of spiral, that is, a spiral the inner continuous edge of the feeding surface of which is offset radially away from the axis of the shaft upon which it is supported, thereby leaving an open space between the inner radial edge of the spiral and its supporting shaft which will permit a portion of the material to be handled to spill through such space without being engaged and fed toward the elevating conveyor. This avoids an excessive volume of feed of the material and, also, it results reducing the resistance to the operation of the feeder, and in avoiding the shocks, strains and stresses incident to successive blows or impacts. I also propose to provide the continuous spiral material-feeding surface of the feeder at its outer peripheral edges with a laterally turned edge flange, and to form said lateral flange into serrations or teeth which serve the purpose of digging into the material to be handled, and of loosening up the same, so that the continuous surface of the web portion of the spiral may exert an efficient, smooth and constant feeding action upon the material to progress the same continuously towards the path of travel of the elevating conveyor.

In the accompanying drawings, I have shown a main framework A carrying the usual power equipment, and upon which is supported an auxiliary frame B constituting the elevator frame. This elevator frame, in the particular form shown, to which, however, my invention is not to be limited or restricted, is supported upon the main frame A for vertical tilting movement. The main frame is provided with suitable feeding mechanism by which the entire frame may be advanced towards or retracted from the material to be handled. In the particular embodiment shown as illustrative of my invention the main framework is of the crawler type, employing the usual travelling treads C. My invention is not, however, to be limited or restricted in this respect.

The elevator includes endless carriers D, shown in the present instance as having buckets E. The elevator operates over an upper shaft F and a lower or foot shaft G. As the endless carriers D are driven the buckets E carried thereby scoop into the material to be handled which lies in front of them, as they pass around the foot shaft G, thereby picking up and elevating such material to the upper end and over the upper shaft F of the elevating structure, at which point the material is dumped by the buckets into a delivery chute H and thence into a conveniently located wagon, cart, or other carrier.

The features so far described are well known in the art, and in and of themselves form no part of my present invention, except

as the same may form elements of combinations with the features of structure hereinafter to be described. And while I have shown a structure of loading machine of a well known general type, it will be understood, of course, that the feeder devices of my invention are not limited in respect to the use thereof in connection with the particular type of loading machine I have selected for illustrative purposes, as said feeders are equally well applicable to machines of various other general types.

The foot shaft G, as clearly shown in Fig. 2, has its ends extended transversely and beyond the sides of the elevator. Upon the extended ends of this shaft are mounted the feeder devices to which my invention is more particularly directed. In the form shown these feeder devices are made up of sections 10, 11. Each section 10 includes a radial spoke portion 12 having a clamping member 13 at its inner end adapted to be detachably clamped upon the shaft G. Also each section 10 includes a radially disposed web portion 14 which extends transversely with respect to the spoke portion 12 and in generally spiral form. The sections 10 terminate at their ends in flanges 15 for securement to the proximate ends of the adjacent sections 11 of the feeder. Each intermediate section 11, in the particular embodiment shown, consists simply of a spiral radially disposed web portion terminating in end flanges 16 against which the flanges 15 of the sections abut for detachably securing said sections together endwise.

The web portions of the sections 10, 11 are formed into general spiral shape so that when the various sections constituting a feeder at one side of the elevator are assembled on the shaft F said web portions form a continuous ribbon spiral, that is, a spiral surface which is radial with respect to the axis of shaft G but is offset laterally away from said shaft so as to form spaces 17 between the shaft and the inner edge of the spiral assembly. The spiral web portion of each section 10, 11, at its outer peripheral edge is flanged laterally, as indicated at 18, and the free edge of this laterally extending flange is serrated or toothed as indicated at 19. The forward end surface 20 of each tooth lies substantially in a plane parallel to the axis of shaft G and constitutes the surface which impacts against the mass of material to be handled as the shaft G is rotated and the machine is advanced into the pile of material. The side edges 21 of each tooth are in a plane substantially at right angles to the axis of shaft G.

In operation when shaft G is rotated these serrations or teeth, or the forward edges 20, thereof, dig into and serve to loosen up the material without exerting any feeding action tending to feed the material towards the elevator, the material feeding action being accomplished by the radial surfaces of the spiral web portions 22 of the sections 10, 11. As the shaft G rotates and the machine is advanced into the pile of material to be handled the material is loosened up by the teeth 19 and the continuous spiral surfaces of the web portions 22 of the sections engage and continuously progress material towards the line of travel of the elevating conveyor.

If desired the teeth 19 may be sharpened at their forward edges, and the lateral peripheral flange 18 in which the teeth are formed may be slightly curved outwardly from the web portion 14, as indicated at 23, see Fig. 7. This forms a more or less sharpened front edge 30, rather than the blunt edge 20 (see Figs. 2 and 6). By slightly inclining the flange with reference to the web portion 14, a self-sharpening action is secured by the operation of the feeder through the material to be handled. Such incline also facilitates the detachment of any roots, wires, or like obstructions which might become caught or engaged upon the teeth of the feeder device sections while in operation, thereby preventing the clogging of the feeders. For a like purpose both the forward and the side edges of the teeth may be sharpened as indicated at 24, see Fig. 8.

Instead of employing a ribbon spiral, that is, a spiral feeder the inner edge of the continuous radial feeding web of which is offset laterally away from the shaft G, a continuous spiral may be employed, as indicated at 25, see Fig. 9, wherein the web portion extends radially all the way to the shaft G. In this instance, as shown, the feature of the lateral peripheral edge flange with its serrations or teeth, above described, may remain the same. A sectional structure of spiral feeder device of the nature described and having the lateral outer peripheral edge flange with serrations or teeth formed therein, is exceedingly smooth in its operation, and effects a smooth, steady, continuous feed of the material to be handled from opposite sides towards the line of travel of the elevating conveyor.

The provision of the open spaces 17 between the inner edges of the radial web portions or surfaces of the spiral feeder and the supporting shaft G permits the material, if supplied thereto, by avalanching or otherwise, in excessive quantities, to spill through the feeder without being progressed or fed towards the elevator. This prevents a too rapid feed of material towards the elevator, and hence avoids choking up or retarding the continuous operation of the apparatus. The saw teeth, formed on the outer peripheral flange of the spiral web when the apparatus is in operation, serve to cut into and loosen up the pile of material, thereby permitting the material to reach and to be acted upon by the continuous side feeding surfaces of the spiral web portions, and to be

thereby fed or progressed smoothly and continuously towards the path of travel of the elevator buckets. By making the feeders in separable sections, detachably bolted together at their ends, their repair and replacement in case of breakage is very greatly facilitated. The saw teeth may present either a blunt, squared off cutting surface, or, as above explained, it may be tapered to provide a self-sharpening cutting edge; and, if desired, and as also above explained, it may be slightly inclined to the plane of the web. This permits the teeth to shear or cut any wires or roots that might be encountered, and it serves to prevent such obstructions from catching and twining around the feeder parts or its carrying shaft. With the sectional form of feeding devices the section thereof closest to the path of the traveling buckets may terminate farther away from the path of the buckets than has been the case heretofore. This prevents the jamming of any large lumps of material in the space between the side surfaces of the feeder elements and of the traveling elevator. This is shown clearly in Fig. 2 where the wide spaces 26 are provided between the side edges of the elevator and the inner terminals of the spiral feeders.

It will be observed that no tossing or throwing action more than that of the ordinary spiral conveyor is exerted upon the material tending to throw the same forwardly and towards the line of travel of the elevator. On the contrary, the feeding action exerted on the material is accomplished solely by the continuous radial spiral web surfaces of the feeder sections and is smooth and continuous.

It will be understood, of course, that the radial web portions of the feeder sections may have any desired degree of spiral, that is, the pitch of the spiral thereof may be of any desired degree. The pitch of the spiral ordinarily depends on the nature of the material to be handled. By employing sectional feeders less area of surface of hubs and spokes is presented to churn up the material or to retard rotation, and, hence, less power is required to drive the feeders.

It is to be understood that my invention is not limited with respect to the use of the feeders on any particular shaft at the lower end of the elevator.

Having now set forth the objects and nature of my invention, and various structures embodying the principles thereof, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is:

1. A feeding device for loading machines including a rotatably mounted spirally disposed radial feeding web portion having a lateral flange at the outer periphery thereof, and said flange having teeth in its free edge.

2. A feeding device for loading machines including a rotatably mounted spirally disposed radial feeding web portion having a lateral flange at the outer periphery thereof, said flange having teeth in its free edge, the material engaging portions of the teeth lying in planes substantially parallel with the axis of rotation of the feeding device.

3. A feeding device for loading machines including a rotatably mounted spirally disposed radial feeding web portion having a lateral flange at the outer periphery thereof, said flange having teeth in its free edge, and said lateral flange being inclined to the web portion.

4. A feeding device for loading machines including a rotatably mounted spirally disposed radial feeding web portion having a lateral flange at the outer periphery thereof, said flange having teeth in its free edge, and said flanged web portions being composed of sections adapted to be detachably secured together in endwise abutting relation.

5. A feeding device for loading machines including a rotatable shaft, and a feeder section mounted upon to rotate with said shaft, said section having a radial spirally disposed material feeding web portion having a laterally extending peripheral toothed edge flange.

6. A feeding device for loading machines including a rotatable shaft, and a feeder section mounted upon to rotate with said shaft, said section having a radial spirally disposed material feeding web portion having a laterally extending peripheral toothed edge flange, the inner edge of said web portion being offset radially from the said shaft.

7. In a feeding device for loading machines, a rotatable shaft, in combination with a plurality of feeder sections detachably mounted upon and detachably connected together in spiral relation around said shaft, said sections having radially disposed web sections which form a spiral material-feeding surface, each of said web portions having a laterally extending serrated peripheral edge flange.

8. In a feeding device for loading machines, a rotatable shaft, in combination with a plurality of feeder sections detachably mounted upon and detachably connected together in spiral relation around said shaft, said sections having radially disposed web sections which form a spiral material-feeding surface, each of said web portions having a laterally extending serrated peripheral edge flange, the material engaging surfaces of the teeth of said flanges being substantially parallel with the axis of said shaft.

9. In a feeding device for loading machines, a rotatable shaft, in combination with a plurality of feeder sections detachably mounted upon and detachably connected together in spiral relation around said shaft, said sections having radially disposed web sections which form a spiral material-feeding surface, each of said web portions having a laterally extending serrated peripheral edge

flange, said toothed edge flange being inclined with reference to the continuous material-feeding surface of said web portions.

10. In combination with a loading machine having a framework, means to advance and retract the same towards and from the material to be loaded, an elevator carried by said framework and mounted for vertical adjustment, and means to actuate the same, and a shaft projecting beyond the sides of said elevator and transversely of the same, of material feeding elements carried by said shaft and having sectional and detachable material-feeding web portions disposed in continuous spiral relation to said shaft, the peripheral edges of said web portions having laterally extending toothed peripheral flanges, whereby the material is continuously and smoothly fed towards the path of travel of the elevator.

11. In a feeding device for loading machines, a rotatable shaft, in combination with a plurality of feeder sections detachably mounted upon and detachably connected together in spiral relation around said shaft, said sections having radially disposed web sections which form a spiral material-feeding surface, each of said web portions having a laterally extending toothed peripheral edge flange, and the inner edges of the web portions being offset radially away from said shaft.

12. In a loading machine having a framework, means to advance and retract the same towards and from the material to be loaded, an elevator carried by said framework and mounted for vertical adjustment, means to actuate the same, and a shaft projecting beyond the opposite sides of said elevator and extending transversely thereof, of material-feeding devices carried by said shaft extensions, each comprising a plurality of detachable sectional web portions spirally disposed around and in radial relation to said shaft extensions and operating to feed the material to be loaded from opposite sides of the elevator towards the line of operation of the latter, said web portions presenting a spiral material-feeding surface, the peripheral edges of said web portions having laterally extending toothed flanges.

In testimony whereof I have hereunto set my hand on this 24th day of April, A. D. 1929.

LOUIS F. SNYDER.