Sept. 12, 1961 L. M. KACZMARSKI 2,999,396

DRIVE FOR ROTARY DRUMS

Filed April 17, 1959 2 Sheets-Sheet 1

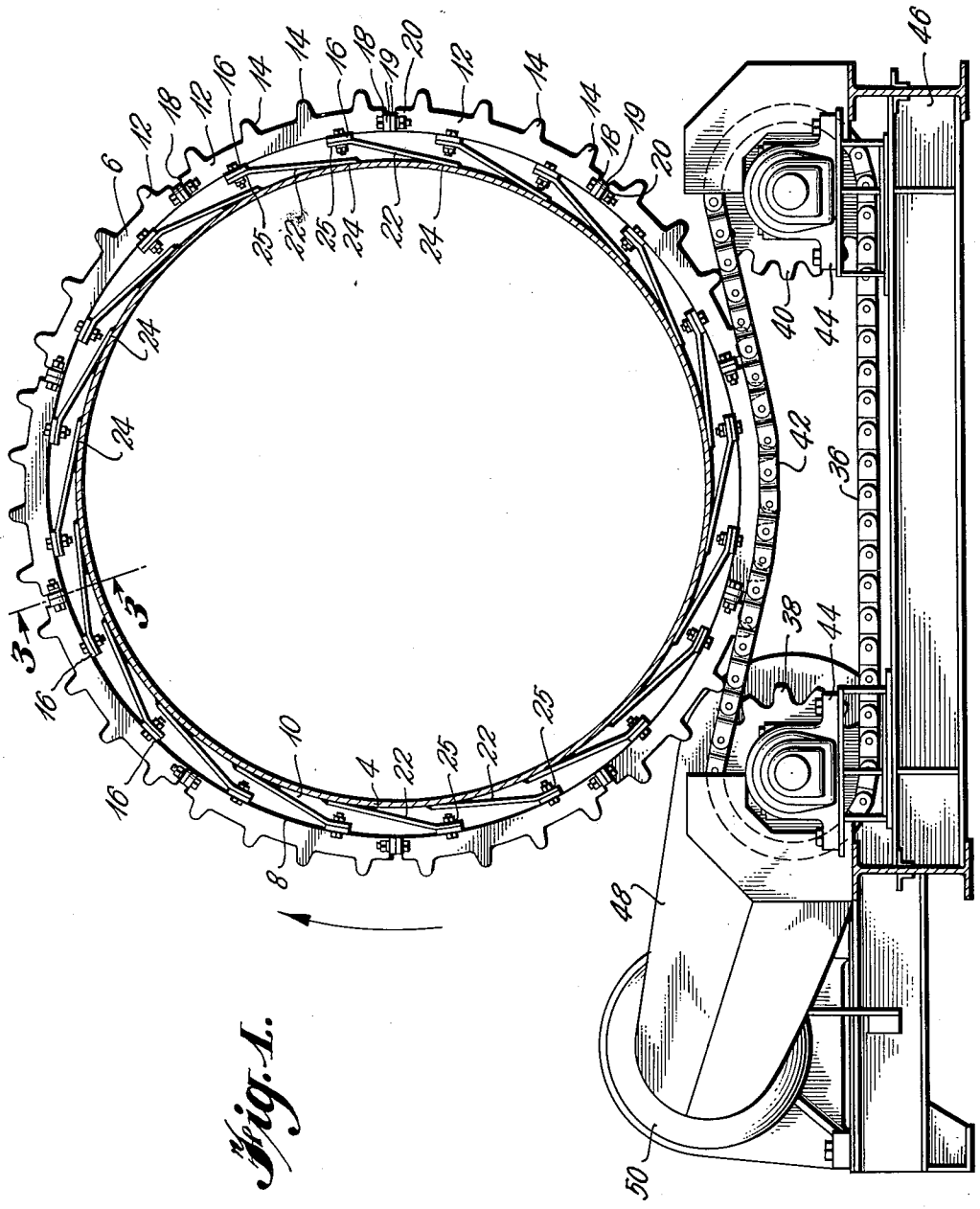


Fig. 1.

Sept. 12, 1961 L. M. KACZMARSKI 2,999,396

DRIVE FOR ROTARY DRUMS

Filed April 17, 1959 2 Sheets-Sheet 2

Fig. 2.

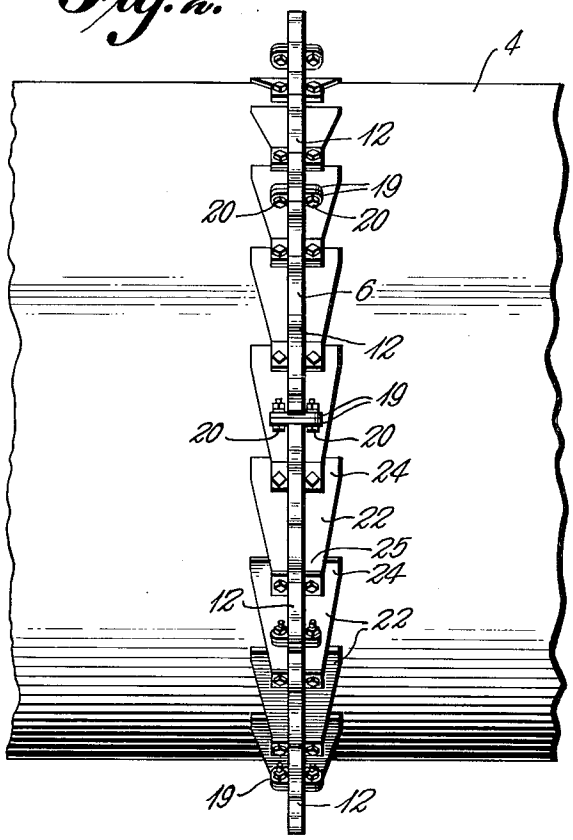
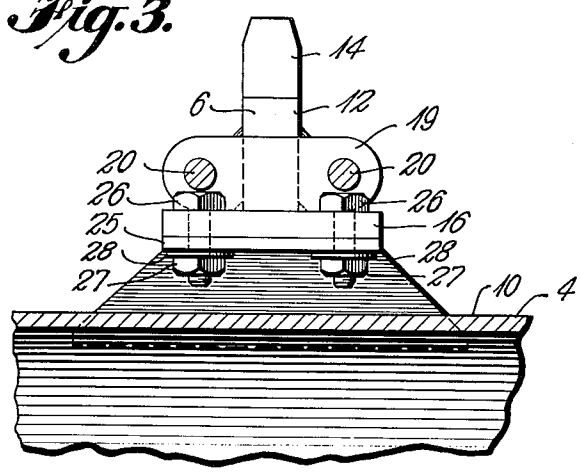


Fig. 3.



United States Patent Office 2,999,396 Patented Sept. 12, 1961

2,999,396

DRIVE FOR ROTARY DRUMS

Leonard M. Kaczmarski, Chicago, Ill., assignor to Link-Belt Company, a corporation of Illinois

Filed Apr. 17, 1959, Ser. No. 807,075
1 Claim. (Cl. 74—244)

This invention relates to rotary drums such as are used in treating various solid materials, and deals more particularly with a new and improved drive for such drums.

An object of this invention is to provide a rotary drum drive which is economical to manufacture, which requires little supervision and maintenance, and which is durable and unaffected by such conditions as out-of-roundness of the drum or changes in the drum temperature.

A more detailed object of this invention is to provide a rotary drum drive comprising a sprocket surrounding the drum and mounted thereon by a plurality of spacer elements interposed between the sprocket and the drum, the spacer elements providing for variations in expansion between the sprocket and the drum due to changes in the respective temperatures thereof, and permitting the sprocket to be positioned truly concentric with the axis of the drum despite an out-of-round condition in the exterior surface of the drum to which the sprocket is mounted.

A further object of this invention is to provide a rotary drum drive comprising a sprocket surrounding the drum and a drive chain arranged tangentially of the drum to engage a small sector of the sprocket.

A further object of this invention is to provide a rotary drum drive comprising a sprocket wheel formed from a plurality of arcuate segments, each one of which may be rough cut from a relatively small piece of material or cast in relatively small molds, and spacer means for mounting the arcuate sprocket segments on the drum in a novel manner permitting the segments to be aligned concentrically with the axis of the drum despite an out-of-round condition in the outer surface of the drum to which the spacer means are attached.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the several views:

FIGURE 1 is a transverse sectional view of a rotary drum illustrating the sprocket, drive chain, and other components of the drum drive embodying the present invention;

FIGURE 2 is a fragmentary side elevational view of the drum illustrated in FIG. 1 showing the manner in which the sprocket wheel is mounted on the drum; and

FIGURE 3 is an enlarged fragmentary sectional view of the sprocket wheel taken on line 3—3 of FIG. 1.

In the drawings, wherein for the purpose of illustration is shown the preferred embodiment of this invention, and first particularly referring to FIG. 1, there is shown a drum 4 having a substantially cylindrical shape and positioned with its longitudinal axis disposed substantially horizontally. Suitable means, not shown, are employed to mount the drum for rotary movement about its longitudinal axis to permit its use in performing one or more operations on flowable or particulate solid material, such as heating, cooling, tumbling, grinding, mixing or any other operation in which such rotary drums are conventionally used.

According to the invention, the drive for the drum 4 includes a sprocket 6 surrounding the drum and disposed in a transverse plane normal to the longitudinal axis of the drum. The inside diameter of the sprocket 6 is somewhat larger than the outside diameter of the drum 4, and the sprocket is located concentric with the drum axis

so that the inside surface 8 of the sprocket is spaced a substantially uniform distance from the outside surface 10 of the drum. The sprocket 6 is formed from a plurality of arcuate segments 12, each having a number of teeth 14 along the radially outer surface thereof. The segments are connected together end-to-end, by means hereinafter described, to form the completed sprocket. By so forming the sprocket 6, the arcuate segments 12 may be cut from relatively small pieces of material or cast in relatively small molds as compared to the size of material or molds required to form the sprocket as a unitary member.

As best seen in FIGS. 1 and 3, each of the arcuate segments 12 of the sprocket 6 is provided along the inner surface 8 thereof with two mounting plates 16 which are welded to the segment at spaced locations intermediate its ends 18. Each of the mounting plates 16 extends outwardly for some distance on both sides of the segment in directions normal to the plane thereof and parallel to the longitudinal axis of the drum.

Each of the segments 12 also includes a connecting plate 19 at each of its ends 18 for fastening together the various segments in end-to-end fashion to form the complete sprocket 6. As shown in FIGS. 2 and 3 each of the connecting plates 19 is welded to its corresponding end 18 of a sprocket segment and extends outwardly from either side of the segment, in directions parallel to the longitudinal axis of the drum. On either side of its sprocket segment each connecting plate is apertured to receive a connecting bolt 20. In the assembled sprocket 6 the connecting plates of adjacent segments are in face-to-face contact with each other, as shown in FIG. 2, and are held clamped in this position by two connecting bolts 20 which pass through the plates on opposite sides of the segments.

The sprocket 6 is supported on the drum 4 by a plurality of spacer elements 22 which are attached one to each of the mounting plates 16 and which extend between the sprocket and the drum. In the present instance, the spacer elements 22 are in the form of leaves which extend, as seen in FIG. 1, from the sprocket 6 forwardly in the direction of rotation thereof, as indicated by the arrow, into tangential engagement at their leading or inner ends 24 with the outer surface 10 of the drum. At its trailing end 25, which is adjacent the sprocket 6, each spacer element 22 is approximately as wide as its mounting plate 16 and is attached to the mounting plate, as seen in FIG. 3, by means of a bolt 26 on each side of the sprocket 6 passed through the mounting plate 16 and the trailing end 25 of the spacer element 22, a nut 27 and washer 28, with the nut being tightly threaded onto the free end of the bolt 26. As shown in FIG. 1, each element 22 is bent inwardly adjacent its trailing end 25 to bring the element at the latter end into flat engagement with its mounting plate 16. Otherwise, each element is straight and disposed in a plane tangent to the outer surface of the drum.

From the trailing end 25, the sides of each of the spacer elements 22 diverge laterally outwardly from the sprocket 6, as seen in FIG. 2, so that the leading end 24 thereof is substantially wider than the trailing end 25 to provide a relatively broad contact area between each spacer element 22 and the outer surface 10 of the drum 4. The leading ends 24 of the elements 22 are each rigidly secured to the drum by suitable means, such as welding.

At this point, it should be noted that the particular means, described above, for attaching the sprocket 6 to the drum permits the sprocket to be positively aligned concentric with the longitudinal axis of the drum, regardless of any irregularities or out-of-roundness in the outer surface 10, when the sprocket is mounted on the drum. To obtain this alignment the complete sprocket 6 with

all of the spacer elements 22 attached thereto is, during its assembly with the drum, first fitted over the drum to the desired position along the length thereof.

At this time the leading ends 24 of the spacer members frictionally engage the outer surface of the drum and hold the sprocket in spaced relation therewith; but, since the outer surface of a drum may not be truly circular in cross section, the sprocket will usually be held somewhat off-center in relation to the axis of the drum by the spacer elements. This off-center condition of the sprocket may be corrected, however, by working a number of temporary and suitable elements, such as wedges, between the sprocket and the drum to move the sprocket to a position of concentricity. During this movement of the sprocket from its off-center position to a position of concentricity, at least some of the leading edges 24 of the spacer elements will slide circumferentially of the drum from their former positions to new positions as required to shift the sprocket. Thereafter, the leading edges 24 of the spacer elements may be welded, or otherwise, secured to the drum while in the positions corresponding to a concentric condition of the sprocket, and the sprocket will then remain in alignment with the axis of the drum even after the temporary elements are removed.

Furthermore, the spacer elements 22 permit relative movement between the sprocket 6 and the drum 4 to allow for differences in the thermal expansion of the sprocket relative to the drum, particularly when the drum is used for cooling or drying purposes requiring a temperature within the drum considerably above or below the ambient temperature.

The drum is rotated by means of a driving force imparted to the sprocket 6, as shown in FIG. 1, through the upper run of a roller chain 36 which is trained between a drive sprocket 38 and an idler sprocket 40 located beneath and on opposite sides of the drum, the upper run of the chain 36 being arranged substantially tangential to the sprocket 6 and engaging a small segment thereof. Each of the sprockets 38 and 40 is journaled in suitable pillow block bearings 44 mounted on a base 46 which may also serve to support the drum. The drive sprocket 38 is driven through any conventional power transmission means 48 from a suitable electric motor 50.

It is to be understood that the form of this invention herewith shown and described is to be taken as the preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claim.

Having thus described the invention, I claim:

A drive for a rotary dum, comprising a sprocket surrounding said drum, said sprocket having an inside diameter substantially greater than the outside diameter of said drum and comprising a plurality of arcuate segments arranged end-to-end, each of said segments having a plurality of teeth formed on its outer surface and an arcuate inner surface, means for detachably connecting the adjacent ends of said segments to form the complete sprocket, a plurality of mounting plates fixed to the inner surface of each segment, each of said mounting plates extending laterally outwardly for some distance on both sides of its segment in directions normal to the plane of the sprocket and having flat inner faces arranged parallel to the inner surface of its segment, an elongated leaf element detachably connected at one of its ends to the said laterally outwardly extending portions of each mounting plate in engagement with the full length of the flat inner face thereof, all of said leaf elements being bent to extend tangentially inwardly of, and in the intended direction of rotation of the sprocket, the side edges of each leaf element diverging from each other to form the leading end of each element of substantially greater width than its trailing end, the leading ends of all of the leaf elements being flatly welded to the outer surface of the drum so that the greater width of said welded ends will provide substantial lateral stability for the sprocket, a drive chain engaging said sprocket, and means for driving said chain to impart rotary movement to said drum through said sprocket and said spacer elements.

References Cited in the file of this patent

UNITED STATES PATENTS

907,459	Childs	Dec. 22, 1908
1,142,661	Biela	June 8, 1915
1,312,252	Jeter	Aug. 5, 1919
1,423,028	Roth	July 28, 1922
2,399,122	Johnson	Apr. 23, 1946
2,761,485	Allen	Sept. 4, 1956