May 12, 1953 M. J. BEBECH 2,638,283

COLLAPSIBLE DRUM

Filed April 20, 1951 2 Sheets-Sheet 1

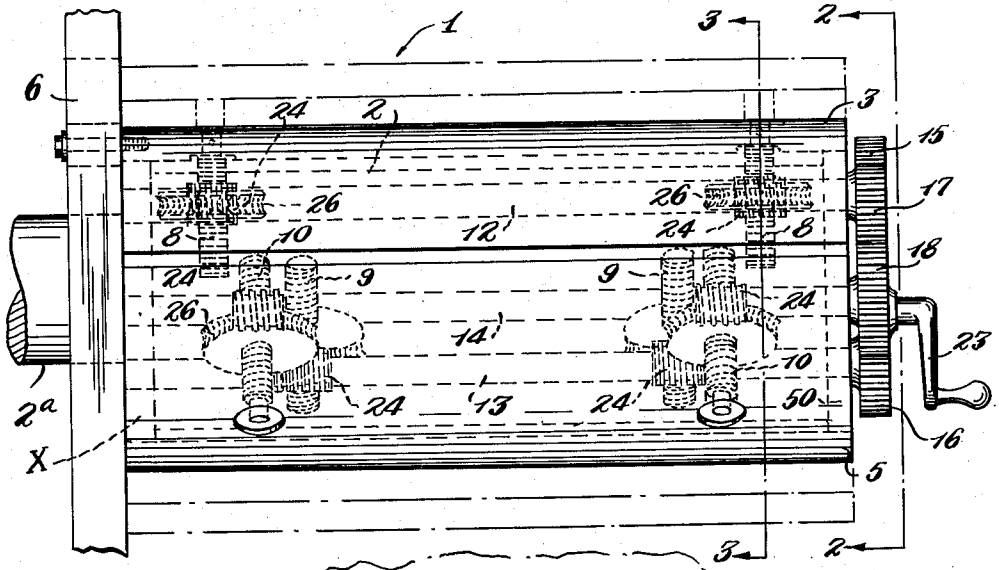


FIG. 1

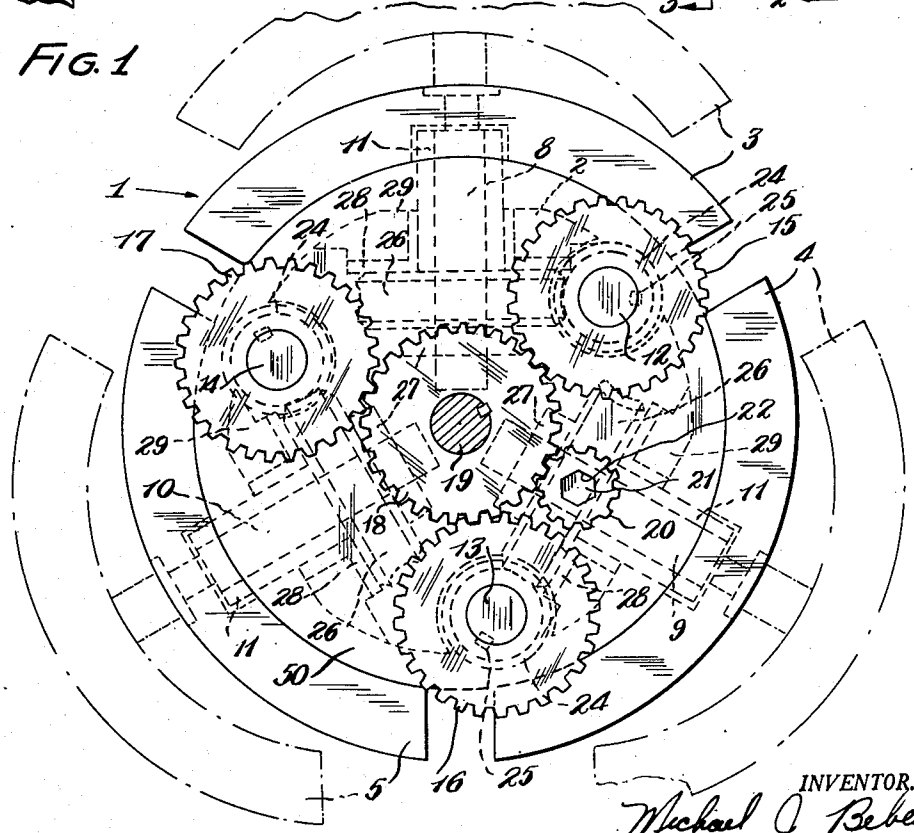


FIG. 2

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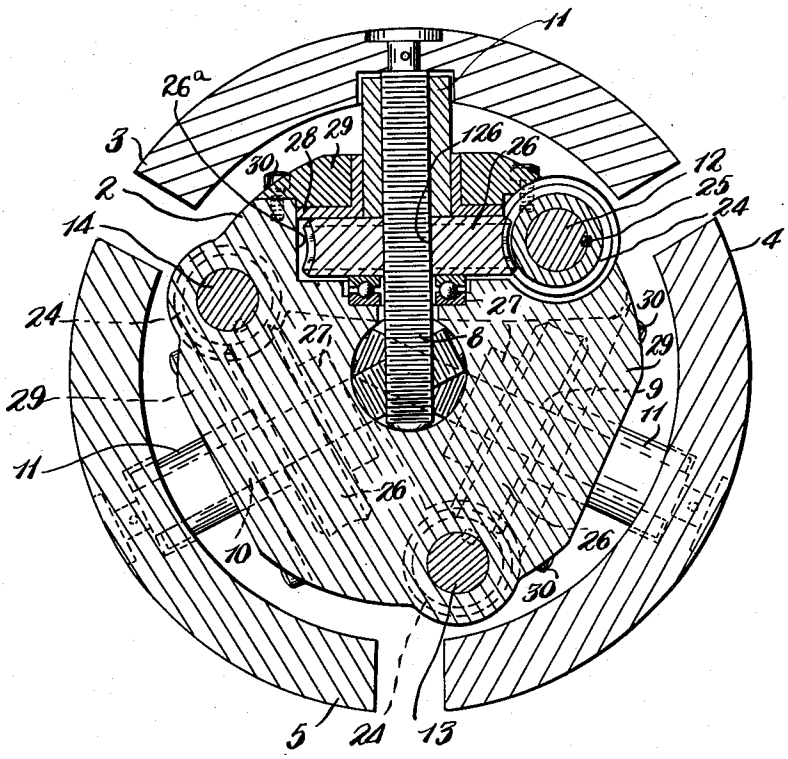


FIG. 3

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Patented May 12, 1953 2,638,283

UNITED STATES PATENT OFFICE

2,638,283

COLLAPSIBLE DRUM

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Application April 20, 1951, Serial No. 222,048

8 Claims. (Cl. 242—72)

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This invention relates to collapsible drums, especially to drums of the type for receiving coils of heavy material such as strip metal, thereon for uncoiling or holding the coiled strip metal while lengths of such metal or other material is being pulled or drawn therefrom.

Heretofore there have been various kinds of apparatus provided of the general type referred to above. Such apparatus normally is of very sturdy construction and has relatively expensive electrical or other controls provided therefor. One factor that is involved in apparatus of this type is the range of internal diameters of coils of material that can be secured to and supported by the collapsible drum used. Also, it is desirable that the drum has a rapid expansion or contraction action when engaging such coil of material with the drum or disengaging the drum from the coil of material. The apparatus of this type heretofore available has not had the range of expansion and contraction that is desirable in many instances.

Accordingly, the general object of the present invention is to provide a collapsible drum of the type indicated which is characterized by the wide variation in effective supporting diameter possessed by such collapsible drum.

A further object of the invention is to provide a collapsible drum including a plurality of drum sections the controls for which are axially staggered with relation to each other.

Another object of the invention is to provide a collapsible drum that can be manually or mechanically actuated.

Another object of the invention is to provide a drum of the type indicated that may have an unobstructed center axis, if desired.

Another object of the invention is to provide a sturdy drum of the type indicated wherein means are provided at one or more ends of the collapsible drum for controlling expansion or contraction of the drum.

Another object of the invention is to provide a relatively uncomplicated, easily controlled type of collapsible drum adapted for supporting heavy metal coils thereon.

The foregoing and other objects and advantages of the invention will be made more apparent as the specification proceeds.

For a better understanding of the present invention, reference should be had to the accompanying drawings wherein a collapsible drum is shown embodying the principles of the invention, and wherein:

Fig. 1 is an elevation of a collapsible drum of the invention;

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1; and

Fig. 3 is a vertical section taken on line 3—3 of Fig. 1.

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The present invention resides in a collapsible drum which usually has a support member, two or more movable drum sections that are arcuate in external contour, a support rod or screw fixedly secured to and extending substantially radially inwardly from each of the drum sections with such support rods being movable to and from positions intersecting the axis of the drum, and with support rods for different drum sections being spaced axially of the drum, a control shaft for each drum section engaged with the support member and spaced from the axis of the drum, and means connecting the support rods individually to the control shaft provided therefor to move the drum sections connected to such support rods radially of the drum on rotation of the control shafts.

In referring to the drawings and following specification, corresponding numerals will be used to refer to corresponding parts to facilitate identification of and reference between such parts in the drawings and specification.

In order to understand the present invention more particularly, attention is directed to the details shown in the accompanying drawings, and a collapsible drum is shown therein and indicated as a whole by the numeral 1. This collapsible drum 1 includes a support member or shaft 2 that carries a plurality of drum sections 3, 4, and 5, all of which are arcuate in external contour and may be of the same shape in internal contour, in an adjustable manner thereon. Usually a face plate 6 is carried by the support shaft 2 which support shaft has a portion 2^a thereof that is of cylindrical shape and protrudes from the face plate 6 for engaging with suitable support and drive means for the collapsible drum. Usually end portions of the drum sections 3, 4 and 5 are engaged with the face plate 6 in slots provided therein whereby such drum sections can only be moved radially of the collapsible drum of the invention. Detailed connection means of this type are shown in a copending patent application Ser. No. 91,385 by Mr. Nathan L. Herman.

It should be noted that the support shaft 2 for the major portion of its length in the drum of the invention is of special shape in section and it positions therein suitable means for moving the drum sections radially inwardly or outwardly of the collapsible drum in a unitary manner for expanding or collapsing the drum of the invention. Thus each of the drum sections shown usually is provided with a pair of radially inwardly extending support rods or screws 8, 8; 9, 9; and 10, 10, respectively for the drum sections 3, 4, and 5. Usually these support rods are provided with threaded surfaces and are suitably fixedly secured to the drum sections and extend at least substantially radially inwardly

therefrom. The support rods 8, 9, and 10 may have telescoping sections (not shown) therein so that more expansion and contraction may be provided in the drum of the invention with a short screw or rod length. Figs. 2 and 3 of the drawings show that suitable bushings 11 are carried by the support shaft 2 and snugly engage the support rods, 8, 9 and 10 to position them on the support shaft for sliding movement in a direction radially of such support shaft 2.

In order to control the positions of the drum sections, a control shaft is provided for each of the drum sections of the collapsible drum of the invention for varying and regulating the radial positions of such drum sections. Thus the drawings clearly show that control shafts 12, 13 and 14 are provided, respectively, for the drum sections 3, 4 and 5. Such control shafts 12, 13 and 14 are suitably journaled in the support shaft 2 offset from the axis thereof and normally extending the length thereof to protrude from the exposed end of same. A bearing plate 50 is positioned at the open end of the drum 1 to aid in positioning the drum section control means accurately, and the control shafts 12, 13 and 14 extend therethrough. The plate 50 is suitably secured to the support shaft 2. Fig. 2 of the drawings clearly show that each of the control shafts 12, 13 and 14 carries suitable gears 15, 16 or 17, respectively, thereon at the end thereof protruding through the bearing plate 50. These gears are in turn engaged by a common drive gear 18 carried by a stub shaft 19 journaled in the bearing plate 50 whereby any driving forces applied to the gear 18 will be directly and simultaneously transferred to the different control shafts 12, 13 and 14 for moving the various drum sections radially inwardly or outwardly of the drum as a unit for varying the drum diameter, as desired. Suitable spacers (not shown) may be positioned intermediate the end of the support shaft 2 and the bearing plate 50 to permit freedom of movement of the gears 15, 16, 17 and 18. Fig. 2 shows that a pinion gear 20 is engaged with the drive gear 18 and is carried by a stub shaft 21 journaled in the bearing plate 50. The pinion gear 20 has a recess 22 provided therein for engagement with an end of a crank 23 so that the various drum sections can be expanded or collapsed in a unitary manner by manual rotation of the crank 23, if desired. Of course, suitable mechanical drive means can be connected to the pinion gear 20 for automatically moving the drum sections in a desired manner. While not completely shown on the attached drawings, similar gears to the gears 15, 16, 17 and 18 may be provided at the other end portion of the collapsible drum 1 usually adjacent the inner surface of the face plate 6 and are indicated at X in Fig. 1. A second bearing plate also may be provided at such end of the support shaft 2, when required. Suitable means may extend throgh the axis of the shaft section 2^a for engaging the center drive gear of such gears to drive same mechanically from a remote point for changing the effective diameter of the collapsible drum 1 of the invention, if desired.

Rotary movement of the control shafts 12, 13 and 14 is suitably translated into radial movement of the support rods 8, 9, and 10 and drum sections secured thereto. These means are shown as including one or more worms 24 that are individually secured to each of the control shafts provided and are suitably secured thereto as by keys 25. These worms 24 in turn engage with worm gears 26 that are suitably received in recesses 26^a in the support shaft 2 for rotation therein but which are held against any other movement in such support shaft. Fig. 3 of the drawings best shows that the sides of the worm gears 26 are carried by thrust bearings 27 and suitable individual plate bearings 28 are secured against the radially outer side surfaces of each of the worm gears 26 which are positioned with their support axes substantially radially directed in the collapsible drum. These bearings 28 may be removably secured to the support shaft by removable end or cap plates 29 fixed to the support shaft 2 by cap screws 30. These gears 26, or other means unitarily secured thereto, have tapped bores 126 engaging the threaded rods 8, 9, and 10 to move the rods and associated drum sections radially of the apparatus upon rotation of such gears.

An important feature of the invention is brought out in Fig. 3, which shows that the support rods 8 protrude through the center axis of the support shaft 2 when the drum sections 3, 4 and 5 are moved to or adjacent their radially inner positions. The different support rods 8, 9, and 10 are all spaced axially of the collapsible drum of the invention with relation to each other so that the associated driving and control means provided therefor, as indicated best in Fig. 1, also are staggered axially of the collapsible drum. Thus the support rods provided for the drum sections will not contact each other upon collapsing movement of the different drum sections and accordingly a small effective support diameter is provided for the drum of the invention, but which drum has an exceptional adjustment provided therein for relatively great expanding movement of same from its entirely collapsed position. Also, the support shaft 2 is stronger due to the staggered positions of the drum section controls.

It will be noted that usually the support shaft 2 normally has a bore extending therethrough but it only is necessary that suitable recesses or chambers be provided in such support shaft 2 for receiving the support rods or screws 8, 9 and 10 and permitting the radial movement of same required for changing the positions of the drum sections, if no axially positioned control or drive shaft is used. In some instances, it may be possible that the support rods 8, 9 and 10 would not be positioned to extend radially of the collapsible drum, as such members might be positioned to move past an axially extending control shaft in the bore of the support shaft. Of course, the support rods provided for the different drum sections will be connected thereto in an axially and radially balanced manner to facilitate support and movement of the drum sections. It also would be possible in some instances that possibly only two drum sections would be movable with relation to the remainder of the drum for varying the diameter thereof. Likewise, it is possible to use any number of drum sections in forming the collapsible drum of the invention dependent upon practical considerations in making and using the collapsible drum.

Normally the drum sections of the collapsible drum of the invention can be moved inwardly or outwardly of the apparatus rapidly even with large weights thereon whereby the desired change in diameter of the collapsible drum can be provided.

It will be appreciated that the drum sections provided may be of any desired arcuate length. Likewise, the support rods or screws 8, 9 and 10 may be of such length as to extend over and

contact an opposed drum section when the different drum sections of the device of the invention are moved to their radially innermost positions to provide maximum contraction thereof.

With varying axial lengths of the drum of the invention, possibly more than the six support rods 8, 9 and 10, as shown, may be required.

From the foregoing it should be observed that a novel collapsible drum has been provided and that it has desirable properties of the character indicated so that the objects of the invention have been achieved.

While one complete embodiment has been disclosed herein, it will be appreciated that modification of this particular embodiment of the invention may be resorted to without departing from the scope of the invention as defined by the appended claims.

Having thus described my invention, what I claim is:

1. In a collapsible drum, a support shaft having an axially positioned bore therein, a plurality of arcuate drum sections, a control shaft for each said drum section journaled in said support shaft spaced from the center thereof, a support screw fixedly secured to each of said drum sections and extending radially inwardly therefrom, said support screws for different ones of said drum sections being spaced axially of the drum and being movable to and through the bore thereof, a worm gear in threaded engagement with each of said support screws, means for positioning said worm gears for rotary movement only, worm means connecting said control shafts individually to said worm gears for rotating same, gear means carried by each of said control shafts, and a drive gear engaged with all of said gear means to couple same together for driving them as a unit.

2. In a collapsible drum, a support shaft, a plurality of arcuate drum sections, a control shaft for each said drum section journaled in said support shaft spaced from the center thereof, a support screw fixedly secured to each of said drum sections and extending radially inwardly therefrom, said support screws for different ones of said drum sections being spaced axially of the drum, a member in threaded engagement with each of said support screws, means for positioning said members for rotary movement only, gear means connecting said control shafts individually to said members for rotating same, and means at one end of said drum connecting said control shafts together for driving same as a unit.

3. In a collapsible drum, a support shaft, a plurality of arcuate drum sections, a control shaft for each said drum section journaled in said support shaft spaced from the center thereof, a support screw fixedly secured to each of said drum sections and extending radially inwardly therefrom, said support screws for different ones of said drum sections being spaced axially of the drum, a member in threaded engagement with each of said support screws, means for positioning said members for rotary movement only, and gear means connecting said control shafts individually to said members for rotating same to move said drum sections radially of the drum.

4. A collapsible drum comprising a support member, a plurality of drum sections, a threaded support rod rigidly extending radially inwardly of the drum from each said drum section and being movable to a position intersecting the axis of the drum, said support rods for different drum sections being spaced axially of said drum, a control shaft for each said drum section spaced from the axis of the drum, and means connecting said support rods to the said control shaft therefor to move same radially of the drum on rotation of said control shafts, said support rods securing said drum sections to said support member.

5. In a collapsible drum, a plurality of movable drum sections, a support rod fixedly secured to and extending inwardly of the drum from each of said drum section and being movable to and from a position with parts thereof intersecting the axis of the drum, said support rods for different said drum sections being spaced axially of said drum, a control shaft for each said drum section spaced from the axis of the drum, and means connecting said support rods to the said control shaft therefor to move same at least substantially radially of the drum on rotation of said control shafts.

6. A collapsible drum comprising a support member, a plurality of drum sections carried by said support member, a threaded support rod rigidly extending inwardly of the drum from each drum section and being movable to a position intersecting the axis of the drum, said support rods for different drum sections being spaced axially of said drum, a control shaft for each said drum section spaced from the axis of the drum and journaled in said support member, said control shafts extending from an end of said support member, means connecting said support rods to the said control shaft therefor to move same at least substantially radially of the drum on rotation of said control shafts, and means at one end of the drum engaging said control shafts for driving same and moving said drum sections as a unit inwardly or outwardly of the drum.

7. A collapsible drum as in claim 3 wherein said gear means includes worms carried by said control shaft, and worm gears carried in said support shaft and engaging said worms, and said members are formed as a unit with said worm gears.

8. A collapsible drum comprising a support member, a plurality of drum sections carried by said support member, a threaded support rod rigidly extending radially inwardly of the drum from each drum section and being movable to a position intersecting the axis of the drum, said support rods for different drum sections being spaced axially of said drum, a control shaft for each drum section spaced from the axis of the drum and journaled in said support member, means connecting said support rods to the said control shaft therefor to move same at least substantially radially of the drum on rotation of said control shafts, and means spaced axially outwardly of said support rods and engaging said control shafts for driving same and moving said drum sections as a unit inwardly or outwardly of the drum.

MICHAEL J. BEBECH.

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