Sept. 6, 1955 C. L. COOK 2,717,071

ROLLER SUPPORT FOR POTATO DIGGERS

Filed July 19, 1952 2 Sheets-Sheet 1

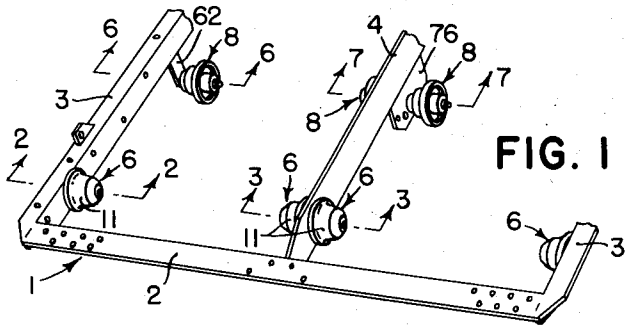


FIG. 1

FIG. 2

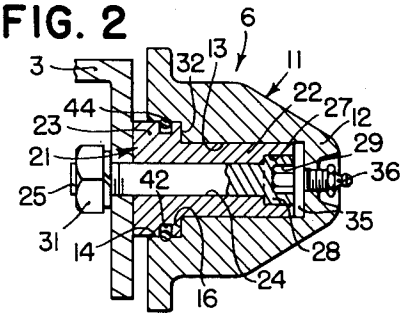


FIG. 3

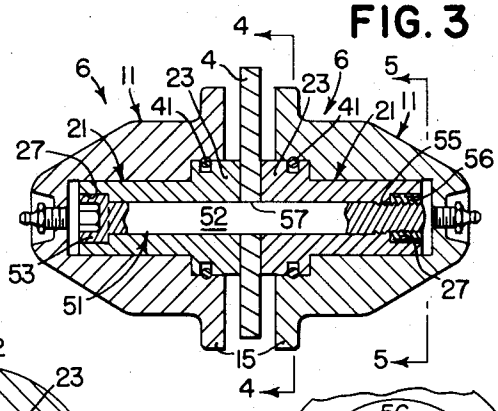


FIG. 4

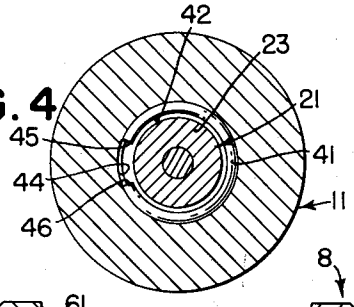


FIG. 5

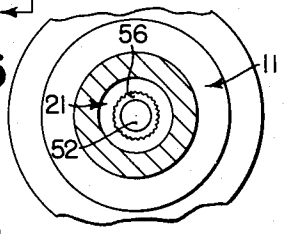


FIG. 6

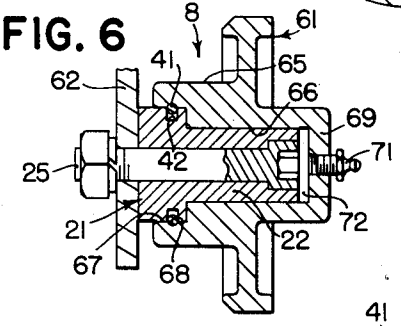


FIG. 7

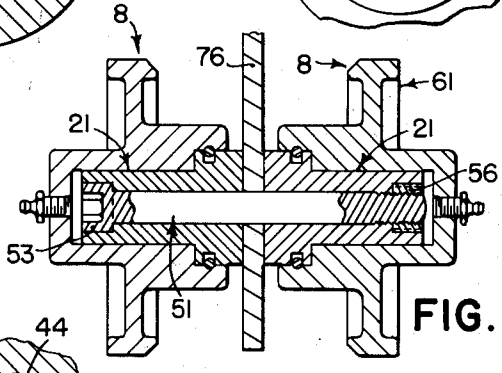
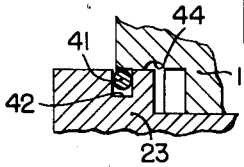


FIG. 8



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ROLLER SUPPORT FOR POTATO DIGGERS

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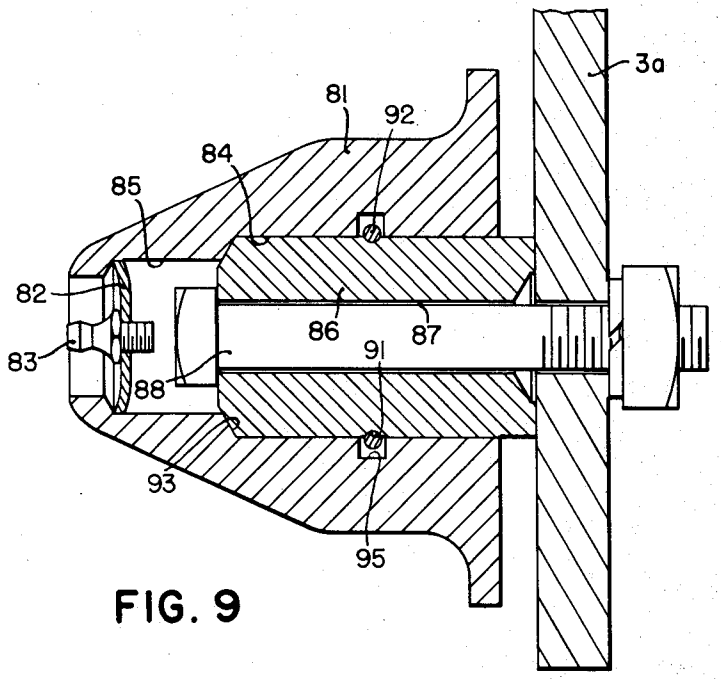


FIG. 9

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2,717,071

ROLLER SUPPORT FOR POTATO DIGGERS

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Application July 19, 1952, Serial No. 299,854

18 Claims. (Cl. 198—189)

This application is a continuation-in-part of my copending application Ser. No. 131,980, filed December 9, 1949 now abandoned, for Roller Support for Potato Diggers.

The present invention relates generally to farm machines and is more particularly concerned with potato diggers and like machines having a conveyor element and means on the implement frame for supporting the conveyor.

The object and general nature of the present invention is the provision of a new and improved type of supporting means for supporting the chain conveyor or elevator of a potato digger, which normally extends upwardly and rearwardly from the digger blade. More particularly, it is an important feature of this invention to provide a roller support construction for such conveyors or elevators and the like, in which the chain-receiving rollers are readily mounted in place. Still further, it is an important feature of this invention to provide a chain conveyor or elevator support which is so constructed and arranged that dust and dirt are prevented from entering the bearing surfaces. More particularly, it is a feature of this invention to provide a relatively fixed spindle member and a closed end roller member adapted to be mounted on the spindle after the latter is fixed to the implement frame, in connection with new and improved means for releasably holding the roller on its spindle. Further, another feature of this invention is the provision of a roller support of the type just mentioned, further characterized in that means is provided for directing lubricant into the closed end of the roller, any movement of lubricant from the other end of the roller past the retaining means cooperating with the latter to prevent entrance of dust, dirt and the like at this point. It is also a feature of this invention to provide new and improved retaining means for holding a rotatable part on a relatively fixed part, such means being constructed and arranged as to facilitate mounting and dismounting of one part on the other.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a fragmentary perspective view of the frame of a two-row potato digger equipped with a roller support construction in which the principles of the present invention have been incorporated;

Figures 2 and 3 are sectional views on an enlarged scale, taken generally along the lines 2—2 and 3—3, respectively, of Figure 1;

Figures 4 and 5 are sectional views taken along the lines 4—4 and 5—5, respectively, of Figure 3;

Figures 6 and 7 are sectional views taken at an enlarged scale along the lines 6—6 and 7—7 of Figure 1;

Figure 8 is an enlarged fragmentary sectional view showing how the chain-receiving roller may be pressed into position on its supporting spindle.

Figure 9 is a view similar to Figure 2, showing a modified form of construction.

Referring now to the drawings, the frame of the potato digger in which the principles of the present invention have been incorporated is indicated in its entirety by the reference numeral 1 and comprises a front frame section which is made up of a forward shovel-receiving transverse bar 2, a pair of side angles 3 which are fixed, as by welding, at their forward ends to the ends of the transverse bar 2, and a central frame bar 4 suitably secured at its forward end to the central portion of the front transverse bar 2. A pair of potato chain elevators or conveyors are carried by the frame 1 between the central bar 4 and each of the side bars 3. Each elevator or conveyor is substantially the same as the elevator chain construction shown in my prior Patent 2,172,435, issued September 12, 1939, to which reference may be had if necessary. The lower portions of each of the potato chain elevators or conveyors are supported by a pair of cone roller units 6 and the more rearward portions of each elevator are supported by roller units 8 which do not have the conical configuration of certain portions of the units 6.

Figure 2 is a sectional view showing the details of construction of one of the laterally outer chain-supporting roller units 6, and referring now to this figure, each unit 6 includes a cone roller member 11 which is generally of sleeve-like construction having a conical configuration which terminates in a closed end portion 12. The roller 11 is provided with a bore 13 which extends axially from the closed end 12 toward a bore 14 of larger diameter at the other end of the roller 11, the bores 13 and 14 being concentric and spaced apart axially. The rotatable roller element 11 has a flange 15 at the open end of the roller and disposed between the bores 13 and 14 of different diameter is a shouldered portion 16.

Each roller 11 is mounted on a spindle indicated in its entirety by the reference numeral 21, and each spindle includes a bearing section 22 of generally cylindrical configuration and a base section 23 concentric with but larger in diameter than the bearing portion 22. The spindle 21 is provided with a central through aperture 24 which is adapted to receive an attaching bolt 25 by which the base portion 23 of the spindle is adapted to be fixed against the adjacent side of the frame bar 3. The central bore 24 of the spindle 21 is enlarged at its outer end, as at 27, to form a socket to receive the head 28 of the bolt 25. Preferably, the bolt head 28 is of the socket type, having a socket 29 to receive a wrench or the like for tightening the bolts. The other end of the bolt 25 is threaded and receives a nut 31, in the form of the invention shown in Figure 2. Disposed between the two portions 22 and 23 of the spindle member 21 is an axially facing shouldered portion 32 which cooperates with the shouldered section 16 on the roller 11 to prevent axial displacement of the latter in one direction. The parts are so dimensioned and proportioned that when the shoulder 16 is up against the shoulder 32, there is a space 35 between the outer end of the spindle 21 and the bottom or closed end of the bore 13. This space provides a lubricant chamber into which lubricant may be fed through the closed end 12 by means of a lubricant fitting 36 of conventional construction.

As best shown in Figures 2 and 4, the means for releasably holding the roller 11 on the supporting spindle 21 comprises a spring ring member 41 disposed loosely in an annular groove 42 formed in the cylindrical outer surface of the base portion 23 of the spindle 21. The open end of the roller 11 is provided with an inwardly facing annular groove 44 which is adapted to be disposed opposite and in registry with the groove 42 when the shoulder 16 is disposed up against the shoulder 32. The spring

ring member 41 is formed of wire-like stock that is circular in section and the ends 45 and 46 (Figure 4) of the spring ring 41 are normally in spaced-apart relation, both when the ring 41 lies in the groove 44, as shown in Figure 4, and when the cone roller 11 is detached and the ring 41 lies loosely in a free or unloaded state. The ring 41 is so constructed that when it is radially compressed, as occurs when the roller 11 is being forced into position onto the spindle 21, as shown in Figure 8, all portions of the ring member 41 lie wholly within the deeper groove 42 in the base part 23 of the spindle 21. Also, the shallow groove 44 in the open end portion of the roller 11 is so dimensioned that when the groove 44 comes into registry with the groove 42 and the spring ring 41 permitted to expand into the groove 44, the radially inner portions of the ring 41 still lie between the side walls of the groove 42, whereby the ring 41 serves to hold the roller 11 in position on the spindle 21. The free or unloaded condition of the spring means 41 is such, as mentioned above, that the spring ring 41 remains in the groove 42, even when the roller 11 is removed, yet when the roller is mounted in place on the spindle and the spring ring 41 permitted to expand into the groove 44, there is still sufficient resilience in the ring 41 to cause it to engage in the groove 44 and rotate with the roller 11. The groove 44 in the roller 11 is formed so as to have a cross section slightly less than half of a cross section of the material of the ring 41. As a result of this arrangement, the roller 11 may be forced off the spindle 21, yet the ring 41 normally holds the roller 11 in place on the spindle, particularly since by virtue of the flange 15 and/or the conical inner end of the roller 11, the bearing of the potato chain or elevator against each roller 11 is such as to tend to hold the same on the spindle 21. For forcing the roller 11 off its spindle 21, any suitable tool may be used, or, if desired, an excess of lubricant may be forced through the fitting 36 into the space 35 which, acting against the closed end 12 of the roller, will create sufficient hydraulic pressure within the space 35 so as to force the roller 11 axially outwardly along the bearing portion 22.

For two-row potato diggers, such as one of the type for which the frame 1 mentioned above is provided, the two elevators or conveyors are disposed fairly close together, usually with sufficient room only to receive a relatively narrow central frame bar 4. In such potato diggers, it is convenient if not essential to mount the laterally inner roller supports on the same frame-attaching bolt. The present invention admirably adapts itself for this use and, referring now to Figure 3, it will be seen that the center conveyor or elevator support comprises two rollers 11 arranged with their supporting spindles 21 mounted on a single through bolt 51 which includes an elongated shank section 52, a socket-type head 53 disposed in the socket 27 at the outer end of one of the spindles 21, and a threaded portion 55 at the other end of the bolt threaded into a nut member 56 of the serrated type that is adapted to be pressed into the socket 27 of the companion spindle 21. In the construction shown in Figure 3, the two spindles 21 are mounted on the frame bar in coaxial relation by inserting the bolt 51 through one spindle 21 and the opening 57 in the frame bar 4, and then into the other spindle 21, in whose socket 27 the serrated nut 56 has been pressed. Then by tightening the bolt 51, as by any suitable wrench insertable into the socket in the head 53 of the bolt 51, the two spindles 21 are firmly and rigidly mounted in position. The relatively wide bearing of the base portions 23 of the two spindles against the frame bar 4 materially facilitates the rigid attachment of the spindles to the potato digger frame. This is also true of the construction shown in Figure 2. After the two spindles 21 (Figure 3) are mounted in position, the rollers 11 are then mounted into position on the spindles 21 by forcing the rollers over the spring-retainer rings 41 in the manner described above in connection with Figures 2, 4 and 8.

The construction shown in Figures 6 and 7 is substantially the same as described above, except that Figures 6 and 7 show the roller units 8 which include plain rollers 61, rather than conical rollers 11, as described above.

As shown in Figure 1, the upper laterally outer roller units 8 are fixed to or carried by a bracket 62 that is fixed in any suitable manner to the frame bar 3 above the roller unit 6. The roller units 8 include the same spindle and attaching bolt construction as described above in connection with Figure 2, and hence the same reference numerals are used where applicable. The plain roller 61 includes a hub section 65 which has a bearing portion 66 and a portion 67 of larger diameter. The latter portion is provided with a screw 68 located in the same relative position as the groove 44 in the roller 11. The bore 66 is of smaller diameter, corresponding to the bore 13 in the roller 11, and has bearing support on the bearing portion 22 of the associated spindle 21. The inner end of the bore 66 is closed, as indicated at 69, and carried a lubricant fitting 71, the parts being so dimensioned that a lubricant space 72 lies between the end of the spindle 21 and the closed end 69 of the roller 61.

As shown in Figure 7, two roller units 8 for supporting the laterally inner portions of the associated elevator chains are carried on a bracket 76 that is fixed to the central frame bar 4 above the double roller unit 6—6 shown in Figure 1. The construction of Figure 7 includes the same spindle members 21 as described above, and these spindles are fixed to the bracket by the elongated bolt 51 in the same way as described above in connection with Figure 3.

A modified form of spindle and roller construction is shown in Figure 9. In this form of the invention, the cone roller is indicated by the reference numeral 81 and is of substantially the same construction as the roller 11 described above, except that the small or outer end of the roller is closed by an expansion plug 82 which is tapped to receive a grease fitting 83, the outer end of the latter lying in or inwardly of the plane of the outer end of the roller. The expansion plug is firmly fixed to the roller 81 to form a permanent part thereof. The roller 11 is provided with a generally central bore that includes an enlarged bearing section 84 and a section 85 of smaller diameter, the outer portion of this section receiving the expansion plug 82.

The roller 81 is mounted on a spindle sleeve 86 which, unlike the spindle 21 described above, is of substantially uniform cross section, comprising a generally cylindrical member having a central opening 87 to receive an attaching bolt 88 by which the spindle 86 may firmly and fixedly be connected to the associated frame member 3*a*.

In this form of the invention, the roller 81 is held on the spindle 86 by substantially the same means as described above. Specifically, generally centrally of its length, the spindle sleeve 86 is provided with an axially outwardly facing annular groove 91 shaped to receive a snap ring 92 that is round in cross section, the depth of the groove 91 being slightly less than one half the diameter of the ring cross section. The ring 92 is biased so as to be resiliently held seated in the groove 91 in the spindle 86. A shoulder 93 is formed on the interior surface of the roller 81 and is shaped and dimensioned to engage the outer end of the spindle 86. When this engagement is established, an interior groove 95 formed in the roller 81 lies in registry with the groove 91 in the sleeve 86. The groove 95 in the roller 81 is, like the groove 42 described above, shaped so as to have a radial depth at least equal to the diameter of the cross section of the spring ring 92. By virtue of this arrangement, when the roller 81 is forced axially of the spindle 86, the snap ring 92 is expanded radially and lies wholly within the groove 95, whereby the mounting and dismounting of the roller

81 may be effected simply by axial shifting of the roller 81 on the spindle 86. However, normally the spring ring 92 lies in the groove 91 and, in this position, prevents any axial displacement of the roller 81 relative to the spindle 86.

By providing an elongated bolt, longer than the bolt 88, two of the units shown in Figure 9 may be mounted back to back, in substantially the same arrangement as indicated in Figure 7.

While I have described above and shown in the accompanying drawings the preferred structure in which the principles of the present invention have been embodied, it is to be understood that my invention is not to be limited to the particular details, shown and described above, but that, in fact, widely different means may be employed in the practice of the broader aspects of my invention.

What I claim, therefore, and desire to secure by Letters Patent is:

1. A roller support for the conveyor chain of a potato digger or the like having a frame, comprising a fixed spindle having a cylindrical bearing portion and an adjacent base portion concentric with the bearing portion, there being an annular groove in the peripheral portion of said base portion, a conveyor-supporting roller journaled on said bearing portion and having an inner bore dimensioned to receive at least a portion of said base portion, said bore having an annular groove positioned to overlie the groove in said spindle base portion, a spring ring member disposed loosely in said base groove, the latter being at least as deep in a radial direction as the diameter of the stock of which said spring ring member is formed and the circumferential length of said spring ring member being such that when one end of said roller is forced over onto the base portion of said spindle the spring ring member is contracted into the bottom portions of said base groove so as to permit the open end of said roller to be moved axially of said spindle until the annular groove in said roller comes into registry with said base groove, whereby the spring ring member expands into the groove in said roller, said latter groove and said spring ring member being dimensioned so that said spring member, when seated in said annular groove, has sufficient residual resilience to be held in said roller groove but has portions lying radially inwardly of the groove in said roller whereby said spring member serves to hold said roller on said spindle, and means for fixing said spindle to said frame.

2. A support for the conveyor chain of a potato digger or the like having an apertured frame bar, said support comprising a spindle having a cylindrical bearing section at one end and a larger base section at the other end, there being a central bolt-receiving hole extending axially through said spindle and said hole being enlarged at said one end of the spindle to form a bolt-head-receiving socket, a roller closed at one end and open at the other end, the latter end being formed to fit over said base section and the closed end fitting over and having bearing support on the bearing section of said spindle, and means for fixing the base section of said spindle to one side of said frame bar including a bolt having a socket head at one end fitting non-rotatably in the socket in said one end of said spindle, a threaded end extending through the aperture in said frame bar to the other side of the latter, and means engaging the threaded end of the bolt and acting against said other side of the frame bar for tightening the bolt to cause it to fix said spindle to said frame bar.

3. The invention defined in claim 2, further characterized by spring retaining means acting between said base section of the spindle and the open end of said roller for releasably holding the latter on the spindle, said spring retaining means being constructed and arranged to be releasable by axial movement of the roller relative to the spindle.

4. The invention defined in claim 3, further characterized by spring retaining means acting between said base section of the spindle and the open end of said roller for releasably holding the latter on the spindle, said spindle and roller being dimensioned so that when excess lubricant is forced into said chamber said spring retaining means yields and the roller is forced off said roller.

5. The invention defined in claim 2, further characterized by the means engaging the threaded end of said bolt comprising a second spindle like that set forth in claim 2 having a bolt-receiving nut member disposed at the other side of said frame bar and carried non-rotatably in the socket in the second spindle and receiving the threaded end of said bolt, whereby turning of the latter in said first spindle serves to clamp both spindles to said frame bar, and a second roller mounted on said second spindle at said other side of the frame bar.

6. The invention defined in claim 5, further characterized by spring means acting between the base section of each spindle and the open end of the associated roller for holding said rollers in place on said spindles, said spring means being releasable from the roller by axial movement of the latter relative to the associated spindle.

7. In a two-row potato digger having frame means including an apertured frame bar, a double cone roller support adapted to be fixed to said frame bar, comprising a pair of spindles each having an aperture extending axially therethrough and a base section adapted to be clamped against opposite sides of said frame bar with the spindle apertures in alignment with the aperture in said frame bar, bolt means extending through the axial apertures of both spindles and through the aperture in said frame bar for clamping said spindles to said frame bar, a pair of chain-receiving rollers, each being closed at one end and open at the other end to form a blind bearing socket adapted to receive the associated spindle after said spindles are fixed to the frame bar, and means acting between the portion of each spindle adjacent the frame bar and the associated open end of each roller for holding the rollers on said spindles in chain-supporting relation.

8. The invention defined in claim 7, further characterized by said last mentioned means including a spring member carried by each spindle and a recess formed in the associated roller, said spring members and recesses being formed whereby each roller may be forcibly moved into position onto each spindle by axially inward movement of each roller relative to the associated spindle.

9. A roller support for the conveyor chain of a potato digger or the like having a frame bar, comprising a spindle having a bearing portion and a base part, a conveyor-receiving roller having a bore therein extending inwardly from the outer end of said roller and adapted to receive said bearing portion, said outer end of the roller having an opening forming a spindle-receiving part adapted to partially enclose the base part of said spindle, attaching means acting against said spindle for fixing the base part thereof to said frame bar, each of said parts having an annular groove and said grooves being disposed in registry when the roller is mounted on said spindle, one of said grooves being deeper than the other, and a spring ring carried in the deeper groove and adapted to extend partially into the other groove for holding the roller on the spindle and the radially outer portion of said spring ring that extends partially into the other groove being rounded so that axial displacement of the roller will act to force the spring ring into said deeper groove, thereby releasing the roller from its connection with said spindle.

10. A roller support for the conveyor chain of a potato digger or the like having a frame bar, said support comprising a spindle having a bearing portion and a base part, a conveyor-receiving roller having a bore therein adapted to receive said bearing portion and to partially enclose said base part of the spindle, attaching means acting against said spindle for fixing the base part thereof to said frame bar, each of said parts having an

annular groove and said grooves being adapted to be disposed in registry when the roller is mounted on said spindle, one of said grooves being deeper than the other, and a spring ring carried in the deeper groove and adapted to extend partially into the other groove for holding the roller on the spindle, said spring ring comprising a generally circular member having ends disposed adjacent each other but spaced apart a distance such as to accommodate sufficient radial displacement to permit the ring to be forced completely into the deeper groove, thereby accommodating mounting and dismounting of the roller, said other groove being dimensioned so as to be frictionally engaged by the spring ring when the latter lies only partially therein, the remaining portions of the spring ring lying within the adjacent portions of the deeper groove, thereby serving to hold the roller on the spindle.

11. In a bearing support and retainer means, the improvement comprising a rotary element or the like having an interior spindle-receiving surface and an annular spring-receiving recess in said surface, a spindle having a bearing portion and a base section, the latter having a cylindrical section with an annular groove therein, and an expansible spring ring in said groove, the latter having a depth equal at least to the diameter of the stock of which the spring is formed, whereby the spring ring may be contracted so as to lie substantially wholly at or below the cylindrical surface of said section, thereby accommodating an axial movement of the rotary element thereover to a position where said spring ring can move outwardly into the recess in the associated roller, the annular spring-receiving recess in said rotary element having a depth less than the diameter of said spring stock, whereby when said spring ring expands into said annular recess, radially inner portions of said spring ring remain in said groove and yieldably restrain axial displacement of said rotary element.

12. In a bearing construction for a fixed spindle part and a sleeve-like part, one rotatable on the other: retaining means therefor comprising an annular groove in each of said parts disposed and spaced so as to lie in complemental juxtaposition when said parts are in operatively assembled relation, one of said grooves being deeper radially than the other, and a spring retainer disposed in the deeper groove and comprising a generally circular member having ends disposed adjacent each other but spaced apart a distance such as to accommodate sufficient radial displacement to permit the retainer to be forced completely into the deeper groove, thereby accommodating mounting and dismounting of one part on the other, said other groove being dimensioned so as to be frictionally engaged by the spring retainer when the latter lies only partially therein, the remaining portions of the spring retainer lying within the deeper groove, thereby holding said parts in assembled relation.

13. The invention defined in claim 12, further characterized by said spring retainer being formed of stock circular in cross section and said other groove having a cross section corresponding to slightly less than a half-section of said circular stock, thereby facilitating the axial movement of said one part out of assembled relation relative to the other part.

14. A roller support for the conveyor chain of a potato digger or the like having a frame, said support comprising a spindle adapted to be fixed to said frame and having an annular groove in the peripheral portion thereof, a conveyor supporting roller journaled on said spindle and having an inner bore dimensioned to receive said spindle, said inner bore having an annular groove positioned to overlie the groove in the peripheral portion of said spindle, and a spring ring member formed of stock of circular cross section and disposed loosely in one of said grooves, said one groove having generally parallel side walls spaced apart axially a distance substantially equal to the diameter of said spring stock, said one groove being at least as deep in a radial direction as the diameter of said stock and the circumferential length of said spring ring member being such that when said roller is forced axially along said spindle the spring ring member is forced into the bottom portions of said one groove so as to permit said roller to be moved axially of said spindle until the other annular groove comes into registry with said one groove whereby the spring ring member moves into said other groove, said other groove having a depth slightly less than half the diameter of said spring stock and said spring ring member being dimensioned so that said spring member, when seated in said other groove, has sufficient residual resiliency to be held in said other groove, with portions of said spring ring member lying in said one groove, whereby said spring ring member serves to releasably hold said roller on said spindle.

15. A support for a roller or the like, said support comprising a spindle, said roller having bearing support on said spindle, and spring-retaining means acting between said spindle and said roller for releasably holding the latter on the spindle, said spring-retaining means comprising a pair of complementary registering grooves in said spindle and roller, one of said grooves being deeper than the other, and a generally annular spring member disposed in said registering grooves, said spring member being dimensioned so that, when force is applied generally radially thereto, the spring member lies wholly within the deeper groove, the portion of said spring member entering the other groove being rounded so that axial movement of said roller relative to said spindle will serve to force said spring member completely into the deeper groove, whereby said roller is releasable by axial movement of said roller relative to the spindle.

16. A support for the conveyor chain of a potato digger or the like having a frame bar, said support comprising a spindle part, a roller part having bearing support on said spindle part, means for fixing said spindle part to said frame bar including fastening means attachable to said frame bar, and spring-retaining means acting between said spindle part and said roller part, said spring-retaining means comprising an annular groove formed in each of said parts, said grooves being adapted to be disposed in registry one with the other when said roller part is mounted in position on said spindle part, one of said grooves being deeper than the other, and a spring ring member carried in the deeper groove and adapted normally to extend partially into the other groove, said spring ring member being formed of stock generally circular in cross section and said other groove having a depth equal to substantially slightly less than one half the diameter of the cross section of said spring ring stock, said spring ring member having sufficient resilience to frictionally engage the bottom portions of said other groove whereby said spring ring member normally remains with the part carrying said other groove, said deeper groove having a diameter at least equal to the diameter of said spring ring stock, whereby said spring ring member may be expanded by shifting one of said parts axially relative to the other, thereby forcing said spring ring member wholly within said deeper groove, whereby said spring ring member accommodates axial movement of one of said parts relative to the other.

17. In a two-row potato digger having frame means including an apertured frame bar, a double cone roller support adapted to be fixed to said frame bar, comprising a pair of spindles each having an aperture extending axially therethrough and a base section adapted to be clamped against opposite sides of said frame bar with the spindle apertures in alignment with the aperture in said frame bar, bolt means extending through the axial apertures of both spindles and through the aperture in said frame bar for clamping said spindles to said frame bar, a pair of chain-receiving rollers, each adapted to receive the associated spindle after said spindles are fixed to the frame bar, and means acting between the portion

of each spindle adjacent the frame bar and the associated end of each roller for holding the rollers on said spindles in chain-supporting relation.

18. A roller support for the conveyor chain of a potato digger or the like having a frame bar, comprising a shouldered spindle having a base portion adapted to engage said frame bar, a part in the form of a conveyor-receiving roller rotatably mounted on said spindle, attaching means acting against said spindle for fixing the base part thereof to said frame bar, each of said parts having an annular groove adapted to be disposed in registry when the roller is mounted on said spindle, a groove in the roller being deeper than the groove in the spindle, and a spring ring carried in the deeper groove and adapted to extend partially into the other groove for holding the roller on the spindle, the radial dimension of said ring being substantially equal to and no greater than the depth of said deeper groove, the portion of the ring member extending into the spindle groove being rounded, and the spring ring being formed so as to frictionally grip the spindle groove.

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