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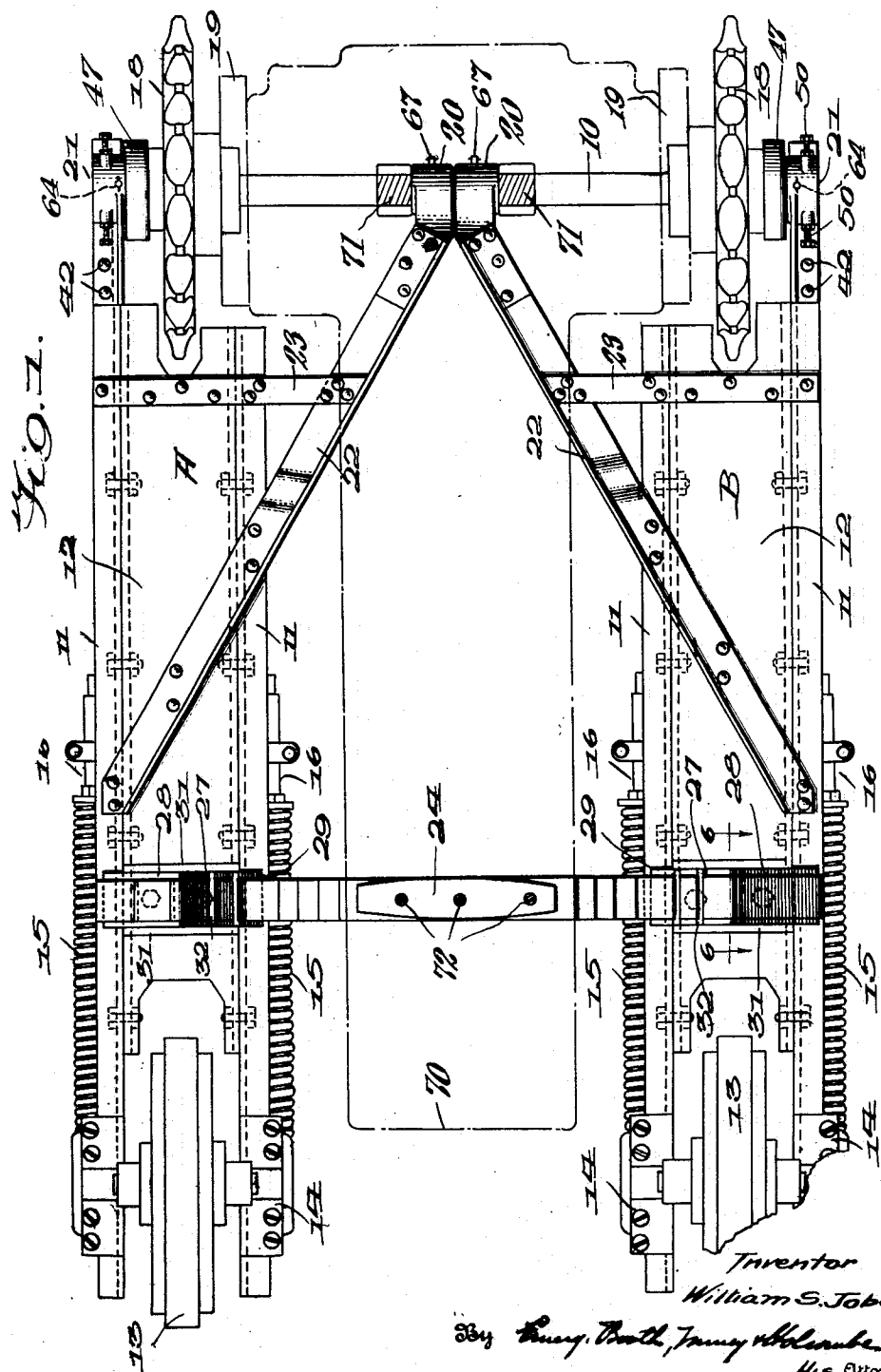
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1,933,018

TRACTOR SWING FRAME ALIGNING MEANS

Filed Dec. 29, 1932

3 Sheets-Sheet 1



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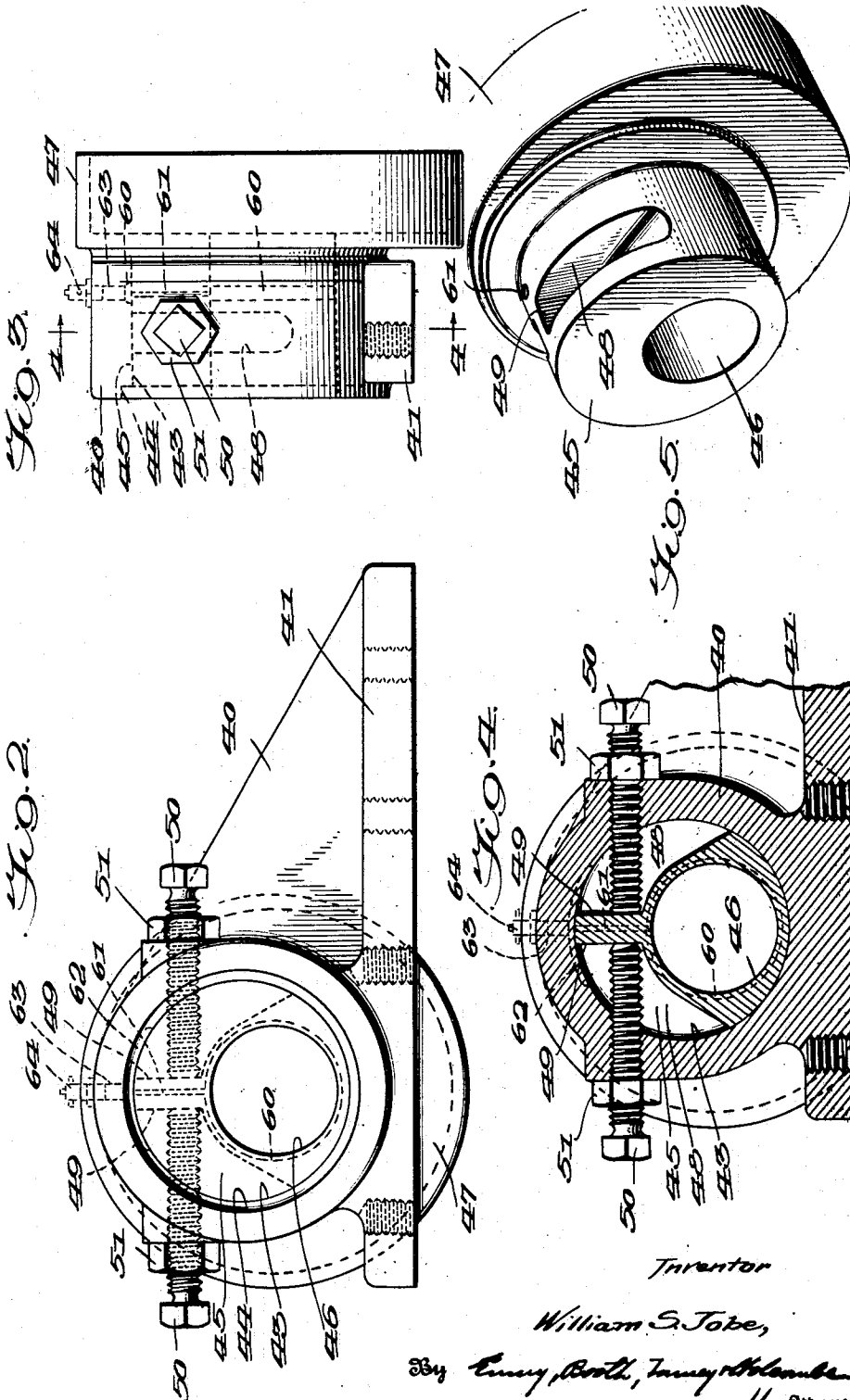
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3 Sheets-Sheet 2



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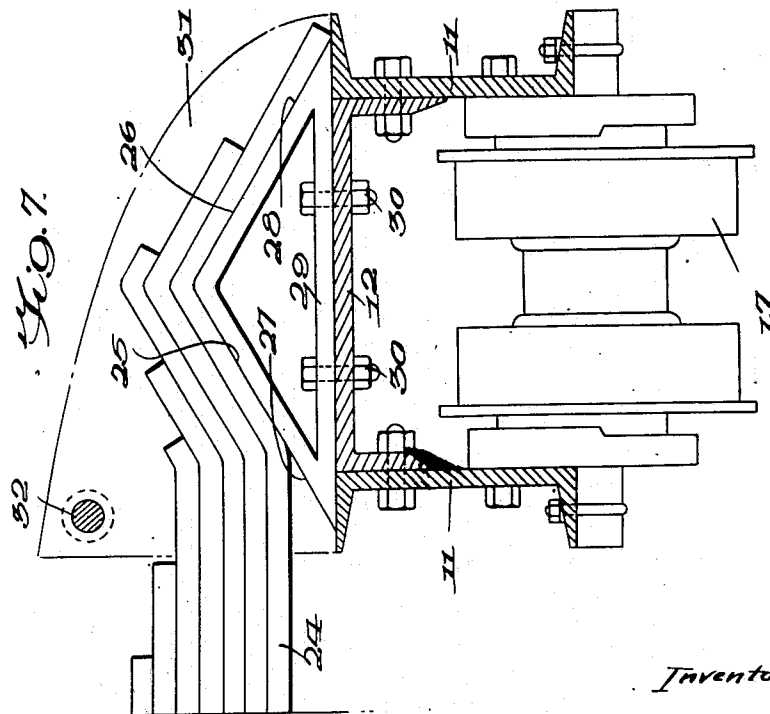
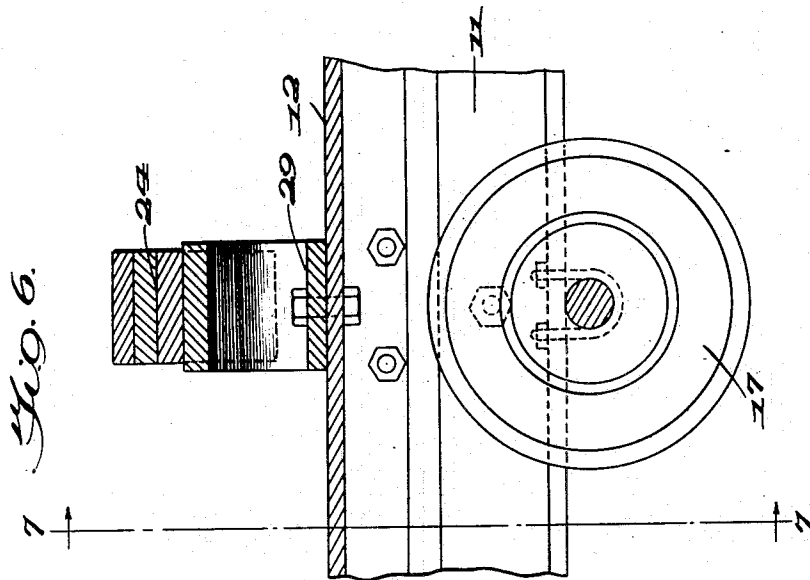
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TRACTOR SWING FRAME ALIGNING MEANS

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3 Sheets-Sheet 3



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1,933,018

TRACTOR SWING FRAME ALIGNING
MEANS

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8 Claims. (Cl. 305—9)

This invention relates to aligning means for tractor swing frames and aims to provide means which severally and in combination assist in setting, maintaining, and/or resetting, the alignment of tractor swing frames relative to each other and relative to the longitudinal axis of the tractor.

As at present constructed the track assembly of track-laying tractors, as distinguished from the power creating unit, or engine, and the power conveying unit, or transmission, comprises a sprocket shaft, or dead axle, usually at the rear end of the tractor, upon the ends of which are journaled outside swing frame-bearings carried by the swing frames or track-roller frames, upon which are mounted the several track rollers, the idle-sprockets for the tracks, track-tightening means, and various guards, shields and other parts, the track being trained over the idle sprockets, track rollers, and drive sprockets journaled on bearings adjacent the outside swing frame bearings. This construction is adopted in order that the track-carrying swing frames may oscillate or pivot vertically about the dead axle to prevent strain or twist on uneven ground.

Due to the heavy side thrusts to which the track-carrying units are subjected in travel over such uneven ground, and particularly during turning operations when one of the tracks may stand still while the other travels, it is necessary that these cantilever-mounted units be strongly braced to hold them in alignment. It has accordingly become standard practice to employ for this purpose arms or extensions rigidly connected to the swing frames and extending towards intermediate portions of the dead axle, where these arms are pivoted to the axle by so-called inside swing frame bearings. In practice these arms or extensions are usually made of angle stock which is bent down to clear the power plant and transmission, and heat treated to obtain maximum rigidity without brittleness.

With this construction, however, it is not unusual for the track-frames to be forced out of alignment in use, due to bending of the inside swing-frame bearing arms by the extremely heavy side thrusts frequently experienced, and in view of the heat treated character of the arms it is impractical to attempt to straighten them.

The resulting misalignment of the track assemblies greatly shortens the life of their parts as the enforced lateral sliding of the track on the ground in its travel under the swing frame not only wears out the ground-contacting faces

of the track shoes, but also puts severe side thrusts on the track links, bushings and pins and produces lateral thrust between the track links and the track rollers and sprockets causing rapid wear of these parts, and of the bearings supporting the sprockets and the track rollers.

For these and other reasons it is very desirable to maintain the alignment of the track assemblies, and my invention as above noted, aims to provide means which severally and in combination will assist in maintaining and/or setting or resetting the alignment to reduce power consumption and wear to a minimum.

With this end in view, my invention contemplates, severally and interdependently, the provision of means incorporated in a tractor or particularly devised for application thereto, to enable adjustment of the alignment of the track frames, to reactively resist lateral displacement of the track frames from normal aligned position, to indicate misalignment of the track frames, to indicate when realignment thereof has been reached, and to provide particular constructions of such means and particular coordinations therebetween and between such means and various other tractor parts such as the resilient idle-sprocket turning means, as may be conducive of cheapness of manufacture, economy, strength and simplicity of construction and operation, and convenience of application and adjustment.

In the accompanying drawings illustrative of a preferred embodiment of my invention:

Fig. 1 is a more or less diagrammatic plan view of a swing frame assembly of a tractor showing an embodiment of the several features of the invention in relatively heavy lines, and parts cooperating with or affected thereby, in relatively light lines;

Fig. 2 is a detail view of a swing-frame realigning means combined with an outside swing frame bearing;

Fig. 3 is a front end view thereof;

Fig. 4 is a section therethrough on the line 4—4 of Fig. 3, looking in the direction of the arrows;

Fig. 5 is a perspective view of the aligning bearing proper of Figs. 2, 3 and 4, removed from the bearing support;

Fig. 6 is a more or less diagrammatic sectional view of one of the means of Fig. 1 for reactively resisting displacement of a swing frame, taken at line 6—6 of Fig. 1 looking in the direction indicated by the arrows, and drawn to an enlarged scale; and

Fig. 7 is a more or less diagrammatic sectional view thereof taken on a plane indicated by the line 7—7 of Fig. 6, looking in the direction of the arrows.

Referring to Fig. 1 of the drawings, the track-frame assembly therein shown comprises a sprocket shaft or dead axle 10 of any usual or desired construction, and track roller frames or swing frames A and B each of the single unit oscillating type, made up in any desired or usual manner as by fabrication from structural steel channels 11, 12 (see also Fig. 7). The front idler sprockets 13 may be of the usual or any desired construction, mounted on spiral roller or other bearings with dirt seals and carried by sliding boxes 14 positioned in any suitable way. Any desired form of track tightener may be used, and any desired form of safety release may be employed to allow the idler sprockets to move back in the event of clogging of the track, to thus prevent undue strain on the track roller frame and track until the foreign material becomes dislodged, but in conjunction with my swing frame aligning means I prefer to employ for reasons hereinafter set forth, sliding boxes 14 resiliently positioned as by helical springs 15 and adjusting devices 16, which may be similar for example, to those shown in U. S. Patent No. 1,674,817, granted June 26, 1928 to C. L. Best.

The track roller assemblies, one of which is shown at 17 in Figs. 6 and 7, may also be of any desired type, as may the drive sprockets 18, their bearings, and the means for driving the sprockets indicated at 19; and if different forms of incidental parts require changes of design of the parts with which my invention is more especially concerned, such changes are of course contemplated by my invention.

Swing frame mounting

Referring more particularly to the structure shown in heavy lines in Fig. 1, and embodying my invention, it will be seen that the swing frames A and B are pivotally mounted to the axle 10 by inside and outside swing frame bearings 20 and 21; the inside swing frame bearings 20 being journaled on intermediate portions of the axle 10 and being attached to arms or extensions 22 which may be of angle form rigidly secured to the swing frames A and B at points substantially spaced from the axle 10 and braced by supplemental arms or extensions 23, while the outside swing frame bearings 21 are journaled at the outer ends of the axle 10. As a result the swing frames A and B are free to pivot or oscillate vertically about the axle 10, but are braced against lateral swinging, with a view to holding them in predetermined positions of alignment.

Special swing frame tie

To maintain and preserve the alignment as far as possible, my invention provides a special tie interconnecting the swing frames A and B at a substantial distance from the axle 10, and so associated with the swing frames as to reactively resist displacement thereof from the normal position of alignment, while allowing the lateral play necessary to avoid breakages and the vertical play incident to the oscillation of the swing frames. In its preferred forms, this swing frame tie, as hereinafter explained, is of particular utility in indicating when the swing frames become misaligned and when they lie in or have been restored to proper alignment by means of parts of my invention hereinafter described.

Referring to Figs. 1, 6 and 7 of the drawings it will be seen that this swing frame tie may be combined or incorporated with the substantially flat leaf spring or other element 24 which assists the dead axle 10 in supporting the tractor power plant, (indicated generally by the broken outline 70 on Fig. 1, and secured to these elements in any suitable way, as by the journaled frame members 71 at the axle 10, and the spring securing bolts 72 at the spring 24) and that while the tie may comprise any suitable means associating the ends of said element with the swing frames in a manner to reactively resist relative displacement therebetween, the means preferred consists in providing each of the ends of the tie with a pair of downwardly faced opposed inclined surfaces 25, 26, which, in the normal position of the parts, rest substantially symmetrically upon a pair of cooperating opposed inclined surfaces 27, 28, provided on the swing frames. In the form shown, the opposed surfaces 25, 26 are provided simply by appropriately forming the ends of the leaves of the leaf spring 24, and the inclined surfaces 27, 28 are provided by a generally triangular member 29, preferably of heat treated hardened steel, suitably secured to the swing frame as by bolts 30 passing through the channel 12.

It will be appreciated that with this construction, lateral displacement of either of the swing frames A and B away from the other will be reactively resisted by the surfaces 26 bearing against the surfaces 28, and that upon the occurrence of the limited displacement necessarily allowed, the surfaces 26 will be wedged upwardly by the surface 28 against their tendency to slide downwardly thereon, which tendency reacts to force the swing-frames back into alignment as soon as the displacing force is removed.

It will also be appreciated that the cooperating faces 25 and 27 act in substantially the same way to reactively resist lateral displacement of either swing frame toward the other and to again urge the swing frames toward normal alignment when the displacing force is removed.

In addition the substantial vertical oscillation of the swing frames relative to one another, during travel over rough ground, for example, will increase the spacing between the relatively movable members 29, this increase in spacing being accommodated by upward wedging of the surfaces 26 by the surfaces 28, bringing the reactive effect into play to aid in limiting the extent of oscillation to which either swing-frame will be subjected thus to aid in snubbing the rise or fall of the respective swing frames and aid in returning them to normal horizontal position. Moreover, it will be apparent that as either surface 27 or 28 wedges upwardly the cooperating surface 25 or 26, there will be a horizontal component of force, as well as the vertical component tending to raise the spring end, and that this horizontal component will be transmitted through the element 24, to the connection thereof to the power-plant, or to the opposed cooperating surfaces of the connection to the other swing frame, where the horizontal component of the force will be taken up and resisted, tending to snub or minimize the displacement.

Indication of condition of alignment

As above noted, it is not unusual for tractor swing frames to be subjected to such severe lateral stresses as to permanently strain them out of alignment, for example, by slightly deforming the extension or arm 22 of the swing frame con-

nection to the inside or center swing frame bearing 20. Even so slight a misalignment of the swing frames as may not be noticeable in a casual inspection of present tractors will produce greatly increased wear on the parts, so it is evident that any means which will readily indicate the condition of alignment by mere inspection will greatly facilitate the maintenance of proper alignment and thus enable the operator to obtain maximum service from the tractor. My invention contemplates the provision of such indicating means, which, after running of the tractor a length or two on a level surface to allow the parts of the track assembly to take up an unstrained position, will indicate by mere inspection the condition of alignment of the swing frames. In the preferred embodiment disclosed this means is provided by constructing the tie ends and tie end supports to lie in symmetrical relation when the parts are properly aligned, and to show a persisting abnormal relative position when the swing frames are not properly aligned. Thus when the swing frames are properly aligned the surfaces 25 and 26 at the ends of the substantially flat transverse spring 24 will rest symmetrically on the swing frame surfaces 27 and 28, but any appreciable misalignment of a swing frame will cause one of said surfaces 25 or 26 to pull away from the cooperating surface 27 or 28, thus indicating by mere inspection, after level running, the fact of misalignment; and by mere inspection, upon adjustment of the means hereinafter described and further level running, the completion of the required adjustment.

In this connection it will be noted that the pairs of cooperating surfaces 25, 27 and 26, 28, are so proportioned that a sufficient bearing will be obtained in all contemplated positions of adjustment of the realigning means (hereinafter described) as by making one of each of the pairs of cooperating surfaces sufficiently wide to provide a full bearing for the other cooperating surface in any contemplated position of adjustment. In the particular form shown, this is accomplished by making the faces 27 and 28 wider than the faces 25 and 26 so that the latter may have a full bearing throughout the contemplated range of relative forward or rearward movement of the former.

If desired side guards 31 may be provided adjacent the tie end supports 29, as shown in Figs. 1 and 7, and limit pins 32 may be employed in connection therewith, such parts being of any desired form, as, for example, the forms shown in U. S. Patent No. 1,715,055, granted May 28, 1929 to C. L. Best.

Realigning means

It has been noted above that misalignment is usually caused by bending of the arms or extensions 22 and that these members are usually made of heat treated stock. It will accordingly be appreciated that it is not practical to try to straighten them in the field if they become bent, and it will also be obvious that frequently the tractor cannot be spared long enough to obtain a replacement arm, take down the swing frame and put in the new arm, even if the operator knows the alignment to be out, which he frequently does not with present tractors. In accordance with my invention, means is provided so that the operator, whenever he ascertains that a condition of misalignment exists, may quickly correct this condition, without taking down the swing frame, by the mere making of a simple

adjustment, thus saving unnecessary wear and tear on the tractor and the time and expense now required to realign the swing frames by replacement of parts such as an inner swing frame bearing arm 22. This means is preferably associated with one of the swing frame bearings, in the disclosed embodiment the bearing 21, so that the relative position of the swing frame A or B and the axle 10 may be altered to return the swing frame to true alignment if it has become misaligned.

In the embodiment disclosed in Figs. 1 through 5 of the drawings I have incorporated this means as a modified outside swing-frame bearing, particularly because of the accessibility thereof, and it is the application of the particular means described at the outside swing frame bearing that makes it desirable to employ the resilient adjusting means 15, 16 with the sliding boxes 14, above mentioned.

Referring to Figs. 2 through 5, it will be seen that the form of aligning and bearing means there shown in detail, comprises a bearing supporting member 40 constructed for rigid securement to the swing frame by being provided with a substantial foot 41 adapted to be secured to the swing frame in any suitable way as by bolts or rivets 42 (Fig. 1). This foot may be drilled and tapped for securement to a particular tractor either in the original manufacture thereof or in substitution for the ordinary fixed swing frame bearing of some particular tractor, or may be left undrilled so that it may be applied to various tractors by special drilling to fit the work in hand.

The bearing support 40 is provided in its body with a cylindrical bore or socket 43 to receive the aligning bearing proper, and this socket 43 may be shouldered at 44 to receive a press cap of ordinary form (not shown) to seal the structure against entry of dirt.

The aligning bearing proper, as best shown in Fig. 5, may comprise a cylindrical portion 45 rotatably fitting the bore 43, eccentrically bored to form a journal 46 which receives and pivots on the dead axle 10 (Fig. 1). Concentric with the journal 46 the aligning bearing proper preferably carries a skirt or flange 47 adapted to stand in protecting relation to a portion of the sprocket assembly carried on the axle 10, as indicated in Fig. 1. By forming this flange or skirt 47 on the aligning bearing proper, and concentric with the journal bore 46, it will be apparent that the skirt will stand in constant protecting relation to the assembly irrespective of adjustment of the bearing.

In the form disclosed this adjustment is effected by cutting out the cylindrical portion 45 of the bearing proper, as indicated at 48, to form clamping faces 49 thereon, and by providing the bearing support 40 with adjusting and locking screws 50 threaded through its walls in position to engage the faces 49, so that retraction of one and advance of the other will turn the bearing proper in its support to throw the support, and attached swing frame A or B, forwardly or rearwardly with reference to the axis of the axle-receiving journal bore 45. Turning of both screws 50 into engagement with the faces 49 will of course lock the aligning bearing in adjusted position, and to further insure against movement thereof, the screws 50 may each be provided with a lock-nut 51, as shown.

Lubrication of the journal 45 may be accomplished in numerous ways. One desirable way

of effecting this end is shown in Figures 2 through 5, in which the journal bore 45 is provided with an oil groove 60 fed through a passage 61 extending upwardly through the cylindrical portion 45, and which communicates with an arcuate channel 62, which receives lubricant from a passage 63 to which is connected a high pressure lubricator fitting 64. The arcuate channel 62 thus provides not only for supply of lubricant to the passage 61 in any position of the bearing proper within the contemplated range of adjustment, but also supplies lubricant to work downwardly between the cylindrical portion 45 and the socket wall 43 to keep these parts in adjustable condition, wherefore this construction is particularly desirable. In the form shown, the inside swing frame bearings 20 are lubricated in the usual way by means of lubricator fittings 67.

Realignment operation

With the illustrative construction described, when the operator is informed (as by persisting abnormal relation of the reactive displacement-resisting surfaces 25 and 27 or 26 and 28 when these are used) that a misalignment of a swing frame to one side or the other has occurred, he can correct this misalignment simply by adjusting the screws 50 to force the misaligned swing frame A or B backward or forward with reference to the journal of its outside swing frame bearing 21 on the axle 10, thus causing the swing frame as a whole to pivot about its inside swing frame bearing 20 until it again reaches a position of alignment. When the described reactive displacement-resisting means is used, the return of the surfaces 25 and 27 or 26 and 28 to normal relation will indicate clearly that the proper alignment has been reached. The width of the faces 27 and 28 will enable the swing frame to slide forwardly or rearwardly under the faces 25 and 26 during adjustment, maintaining a constant distance between the tie 24 and the axle 10. During the adjustment the preferred mounting 14, 15, 16 of the idle sprocket 13, will compensate for movement of the swing frame relative to the track and drive sprocket 18, when this mounting is employed.

As the swing frame itself is several times as long as the distance between the inside and outside swing frame bearings 20 and 21, and as the inside swing frame bearing arm 22, 23 connects to an intermediate portion of the swing frame, it will be appreciated that a very small adjustment of the screws 50, with a correspondingly small advance or retraction of the swing frame as a whole, will produce a substantial lateral swing of its front end, so that a very small range of adjustment will enable one to compensate for substantial misalignment.

It is clear that the several features and combinations of features of my invention may be embodied in other specific forms without departing from the essential attributes thereof, and I therefore desire the present detailed description to be considered in all respects as illustrative and not restrictive.

I claim as my invention:

1. Swing frame aligning means for tractors having an axle and track-carrying swing-frames including outside swing-frame bearings by which said swing-frames are pivoted to said axle and also including inside swing-frame bearings attached to extensions of said swing frames and by which said swing frames are pivoted to said axle at secondary points and held in relative

alignment; said aligning means being constituted as follows: one of said swing-frame bearings including a bearing supporting means fixed relative to a swing-frame, bearing means pivoted on said axle, and means for adjusting the position of said bearing means with reference to said bearing supporting means to produce swinging of said swing-frame with reference to its other bearing and effect alignment of said swing-frame relative to the other swing-frame.

2. Swing frame aligning means for tractors having an axle and track-carrying swing-frames including outside swing-frame bearings by which said swing-frames are pivoted to said axle and also including inside swing-frame bearings attached to extensions of said swing frames and by which said swing frames are pivoted to said axle at secondary points and held in relative alignment; said aligning means being constituted as follows: one of the swing-frame bearings of each of said swing-frames including a bearing supporting means fixed relative to the swing-frame, bearing means pivoted on said axle, and means for adjusting the position of said bearing means with reference to said bearing supporting means to produce swinging of said swing frame with reference to its other bearing that the swing-frames may not only be aligned with one another but may both be maintained at substantially right angles to said axle.

3. A tractor of the type having an axle and swing-frames including outside swing frame bearings pivoted to the ends of said axle and inside swing frame bearings attached to inward extensions of said swing frames and pivoted to intermediate portions of said axle; said tractor comprising means associated with its outside swing frame bearings for adjusting said swing frames forwardly and rearwardly with reference to the ends of said axle to swing them about the inside swing frame bearings and into correct alignments.

4. A tractor having a dead axle, swing frames pivoted to the center and ends of said axle for vertical swinging movement thereabout, means for adjusting said swing frames horizontally each about one of its pivot points to effect alignment or realignment of the same, and means for locking the swing frames in adjusted position.

5. Tractor swing frame aligning and bearing means comprising a bearing support constructed for rigid securement to the swing frame, said support having a cylindrical socket therein, a swing frame bearing comprising a portion rotatable in said socket, said rotatable portion being bored eccentrically to receive and pivot on the dead axle of the tractor, and means for rotating said bearing in said bearing support and securing the same in various positions of adjustment to shift the center of the eccentric bore longitudinally with reference to said support.

6. A tractor of the type having an axle and swing frames including outside and inside swing frame bearings pivoted respectively near the ends and center of said axle to thus provide for oscillation of said swing frames thereabout, said tractor comprising means for turning said swing frames in a direction at right angles to the direction of oscillation thereof to adjust them to a position of alignment at right angles to said axle.

7. For a tractor of the type having an axle and track-carrying swing-frames each pivoted to said axle at two points and thus held in definite relation to said axle; swing frame aligning means comprising an aligning bearing for effecting the

pivoting of a swing frame at one of said points; said aligning bearing comprising a bearing means constructed to pivot on said axle at said point, a bearing supporting means constructed to be secured to the swing-frame in position to carry said bearing means at said point, and means for adjusting the position of said bearing means relative to said bearing supporting means, said aligning means being thus adapted to effect relative alignment of the tractor swing frames.

track-carrying swing-frames each pivoted to said axle at two points and thus held in definite relation to said axle; swing-frame aligning means comprising a pair of aligning bearings, each according to claim 7, and one for each swing frame, said aligning means being thus adapted to effect alignment of the tractor swing frames, not only relative to each other, but also at right angles to the tractor axle.

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3. For a tractor of the type having an axle and

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