Aug. 20, 1935. W. W. SAYERS 2,012,089

SELF ALIGNING BELT CONVEYER IDLER

Filed July 27, 1931 2 Sheets-Sheet 1

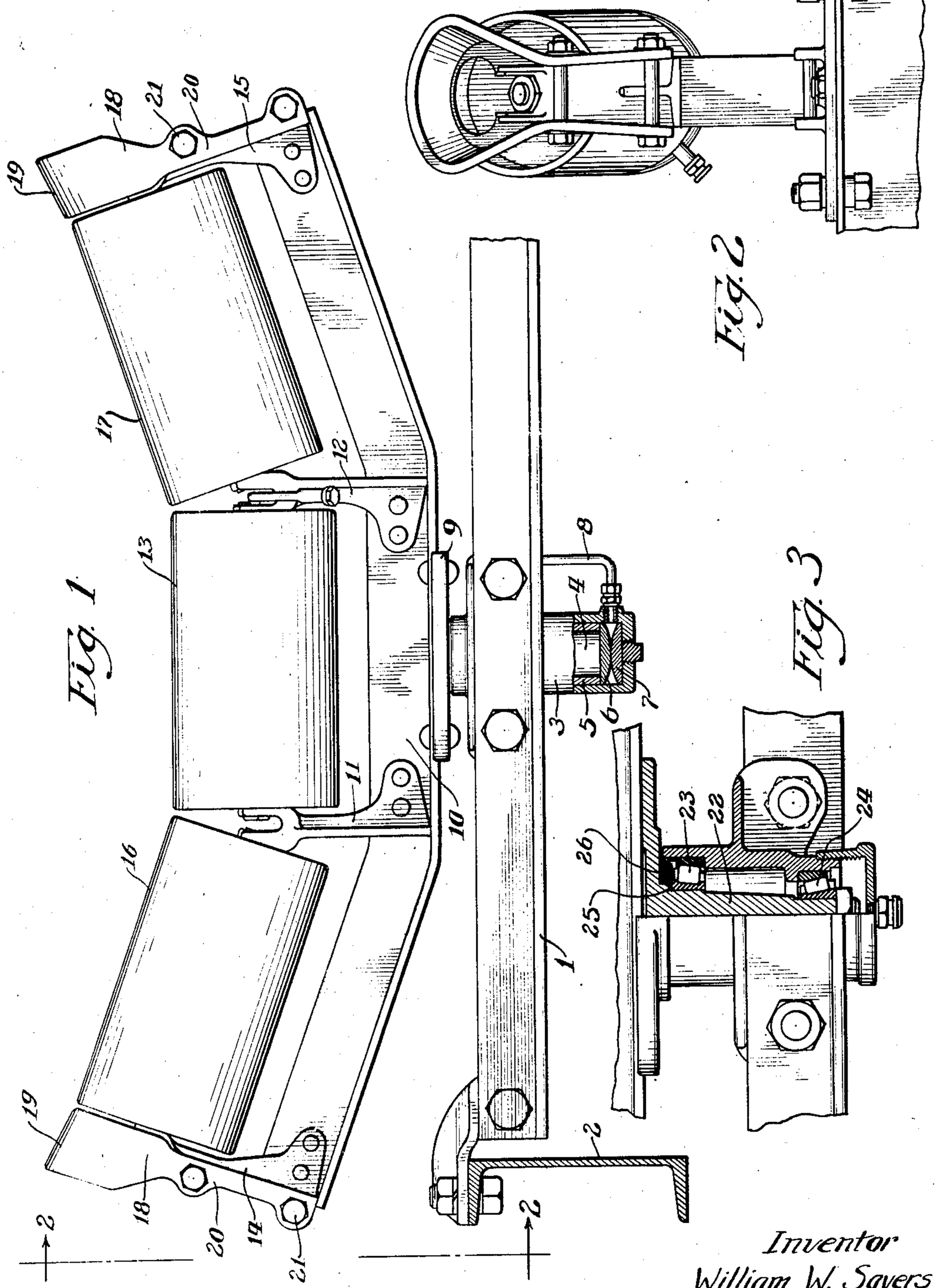

Fig. 1

Fig. 2

Fig. 3

Inventor
William W. Sayers
By Allyn Harris Atty.

Aug. 20, 1935. W. W. SAYERS 2,012,089

SELF ALIGNING BELT CONVEYER IDLER

Filed July 27, 1931 2 Sheets-Sheet 2

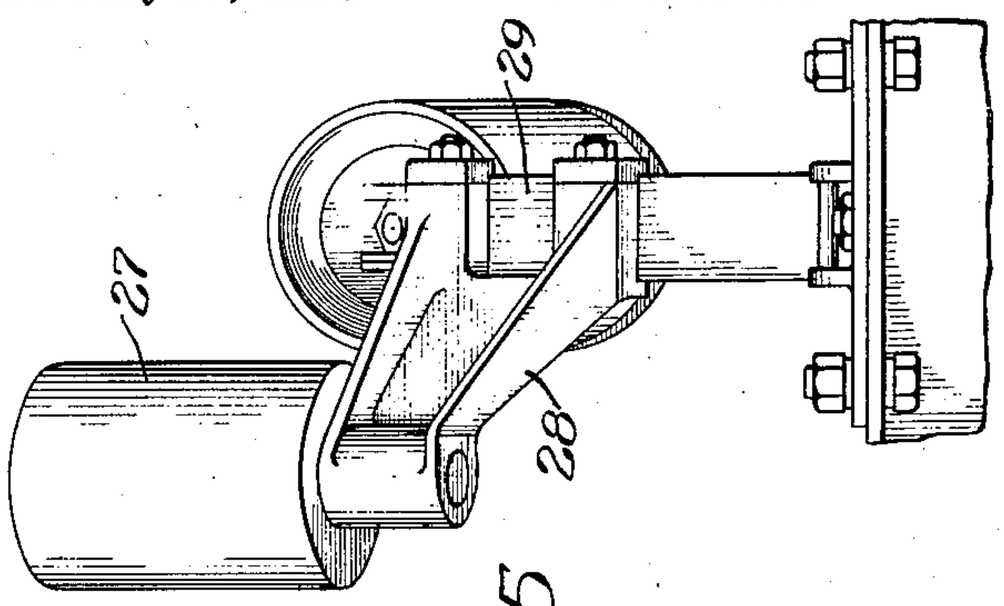

Fig. 5

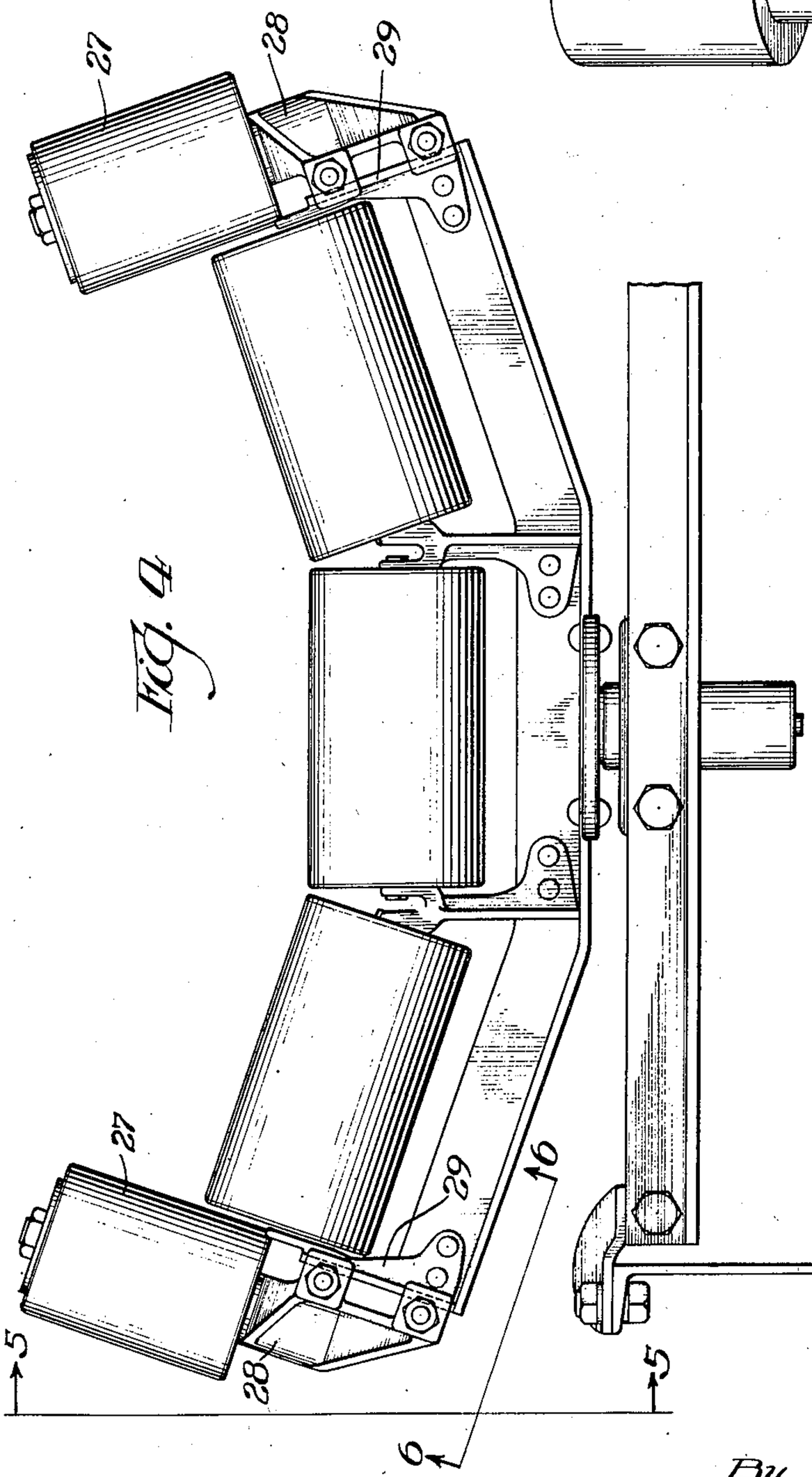

Fig. 4

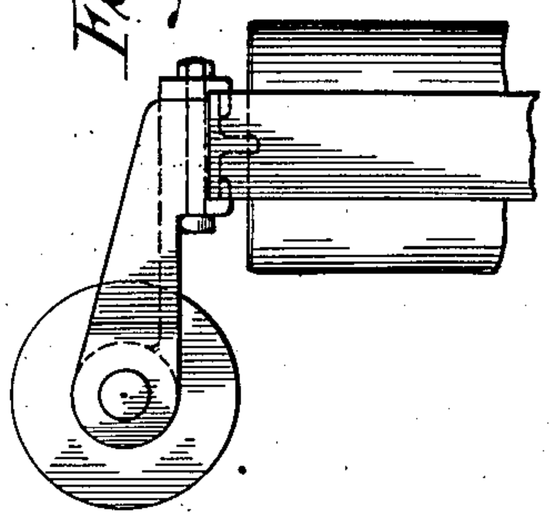

Fig. 6

Inventor
William W. Sayers
By Allyn Harris Atty.

Patented Aug. 20, 1935 2,012,089

UNITED STATES PATENT OFFICE

2,012,089

SELF-ALIGNING BELT CONVEYER IDLER

William W. Sayers, Chicago, Ill., assignor to Link-Belt Company, a corporation of Illinois

Application July 27, 1931, Serial No. 553,304

15 Claims. (Cl. 198—202)

This invention relates to belt conveyers and particularly to the transversely arranged idlers which support the belts of such conveyers.

The object of the invention is to provide an improved idler embodying means for automatically correcting misalignment of the belt.

Referring to the drawings,

Figure 1 is a view in side elevation of a complete idler embodying the invention,

Figure 2 is a view in end elevation of the idler shown in Figure 1,

Figure 3 is a sectional detail view illustrating a modified form of bearing for the idler.

Figure 4 is a view in side elevation of an idler embodying a modification of the invention,

Figure 5 is an end elevation of the form shown in Figure 4, and

Figure 6 is a fragmentary bottom plan view of the form shown in Figures 4 and 5.

In the operation of belt conveyers it often occurs that the load will not be uniformly distributed transversely of the belt. This condition results in lateral shifting of the belt and gives rise to excessive and uneven wear and spillage. In ordinary idler constructions this condition is taken care of by providing guide rolls positioned to engage the edges of the belt, but this is unsatisfactory due to the fact that such guide rolls cause considerable wear of the belt edges and after a time leave them exposed to the action of grit and moisture. The present invention aims to avoid the use of guide rolls and to provide for automatically correcting any condition of misalignment which might occur due to uneven loading of the belt, to improperly placed stationary idlers, or otherwise.

Self aligning idlers are applicable to either troughing or flat load carrying idlers, although the necessity is greater in the use of troughing idlers due to the fact that the more heavily loaded side of the belt will seek the low point on the idler and in so doing will throw the belt out of alignment and cause it to be delivered off center to the tripper or head pulleys. It will be understood, of course, that a complete conveyer may comprise a large number of fixed or stationary idlers, with just a sufficient number of self aligning idlers to maintain correct alignment of the belt. For example, every fifth idler might be of the self aligning type, though of course, this can best be determined in view of the conditions of each particular case.

Self aligning idlers are not primarily intended for use to correct the effect of improperly aligned fixed troughing idlers, although they will accomplish this purpose within reasonable limits if used in sufficient numbers.

The improved idler comprises a deck or supporting frame consisting of suitably designed transverse beam 1 and longitudinal beams 2. The beam 1 is provided centrally with a well or pocket 3 designed to receive a long gudgeon 4, a bearing sleeve 5 being interposed between the gudgeon and the wall of the pocket. Opposed parti-spherical bearing discs 6 and 7 are positioned between the bottom of the well and the lower end of the gudgeon. Lubricant may be introduced into this bearing through the fitting 8.

The upper end of the gudgeon terminates in a flange 9 which is riveted or otherwise secured to the beam 10. It will be noted that the central portion of the beam is substantially horizontal and the extremities thereof incline upwardly. Upstanding arms 11 and 12 secured to the horizontal portion of the beam support a central idler roll 13, and arms 14 and 15 secured to the extremities of the beam cooperate with the said arms 11 and 12 to support inclined idler rolls 16 and 17. Thus, a conveyer belt supported upon rolls 13, 16 and 17 will have a trough-like cross section. From the foregoing it will be noted that the entire belt supporting idler is free for pivotal movement to correct any condition of misalignment.

It has been found in practice that mere freedom of the idler for pivotal movement cannot be relied upon to correct misalignment of the belt. Some means is required to positively and quickly bring about this movement. In the present instance this means is in the form of fixed shoes so arranged adjacent the outer extremities of the end idler rolls as to be engaged by the conveyer belt when it moves a certain distance out of central or aligned position. As shown in Figures 1 and 2, each shoe 18 consists of a casting having a curved belt contacting surface 19 and depending legs 20. The legs 20 are designed to engage opposed edges of upstanding arms 14 and 15 and may be clamped to the latter by means of bolts 21.

In operation, the idler assembly will maintain a substantially transverse position so long as the conveyer belt supported thereby operates in approximately normal alignment. If, however, the belt should shift laterally to an abnormal extent due to uneven loading or other cause, its under side will come into frictional engagement with one of the fixed shoes 18. This friction or drag between the belt and the fixed shoe serves to move the idler about its pivotal axis, thus causing the belt to return promptly to its normal aligned position. It will be noted that this cor-

recting force occurs at a point substantially removed from the pivotal axis and is therefore quite effective.

It should be understood that the self aligning idler is not entirely dependent upon the friction shoes for its automatic correcting action. Slight deviations of the belt will be automatically corrected before contact is made with the friction shoes. If however the deviation is of substantial degree, the belt will engage one of the friction shoes and positively and quickly bring about corrective movement.

Figure 3 discloses a modified form of pivotal support for the idler. In this form the gudgeon **22** is provided with a pair of oppositely arranged tapered roller bearings **23** and **24** designed to take both the radial and thrust loads. A lubricant labyrinth consisting of members **25** and **26** is provided in the upper end of the bearing and the grease forced between the members **26** and **25** provides an additional seal for preventing dust and grit reaching the roller bearings.

In a further modification of the invention, shown in Figures 4, 5 and 6, the friction shoes are replaced by rolls **27** carried by brackets **28** which in turn are detachably clamped to the upstanding end arms **29**. It will be noted that rolls **27** are so positioned that their lower extremities lie slightly above the axes of the adjacent belt supporting rolls and that they are substantially at right angles and laterally offset with respect to said supporting rolls. While this particular position of rolls **27** is preferable, it is not in all respects essential and may be varied to some extent, so long as a laterally offset relation between rolls **27** and the belt supporting rolls is maintained.

The action of the form last described is somewhat different from that of the form first described, though the results are substantially the same. In the form of Figures 4, 5 and 6, corrective movement of the idler is brought about by the edges of the belt engaging and exerting force against rolls **27** which, due to the offset relation of rolls **27**, produces a leverage action resulting in swinging of the idler about its axis. In this form, corrective movement of the idler is quite rapid and entirely positive.

It is quite apparent that the principles of this invention, as represented in the various forms, may be effectively carried out in several ways and that the structural details of the particular forms chosen for purposes of illustration may be varied quite widely. For these reasons, the invention as defined in the appended claims should be construed as broadly as the prior art will permit.

I claim:

1. The combination with a pivotally mounted idler adapted to support a conveyer belt, of a permanently fixed shoe associated with each end of said idler and positioned to be frictionally engaged by the under side of the conveyer belt when the latter moves out of normal alignment to a predetermined extent.

2. In a device of the character described, a support, a beam mounted upon said support for pivotal movement about a vertical axis, a plurality of upstanding arms secured to said beam, idler rolls carried by the upper ends of said arms, and a fixed shoe directly carried by each of the outermost arms and positioned to be engaged by the under side of the belt when the latter moves to a predetermined extent out of normal alignment.

3. In a device of the character described, a support, a beam mounted upon said support for pivotal movement about a vertical axis, a plurality of upstanding arms secured to said beam, idler rolls carried by the upper ends of said arms, and a shoe having clamping engagement with each of the outermost arms and positioned to be engaged by the conveyer belt when the latter moves sufficiently out of normal alignment.

4. The combination with a pivotally mounted idler adapted to support a conveyer belt and including an idler roll and shafting for supporting the roll, of permanently immovable means secured to said idler independently of said shafting for engaging the conveyer belt when the latter moves out of normal alignment to a predetermined extent.

5. As an article of manufacture, a device to be detachably mounted upon a pivoted conveyer belt idler for accomplishing self-alignment of the idler, said article comprising an immovable belt engaging shoe, a body for supporting the shoe including relatively adjustable clamping parts, and means associated with said parts for forcibly adjusting the same relative to each other.

6. In a device of the character described, a stationary support, a beam mounted upon said support for pivotal movement, upstanding arms carried by the extremities of said beam, belt supporting rolls carried by said arms and additional rolls angularly related and laterally offset with respect to said belt supporting rolls and also carried by said arms.

7. In a device of the character described, a stationary support, a beam mounted upon said support for pivotal movement, upstanding arms carried by the extremities of said beam, belt supporting rolls carried by said arms, brackets detachably clamped to said arms and extending laterally with respect thereto, rolls carried by said brackets in offset relation to said belt supporting rolls and arranged with their axes in angular relation thereto.

8. In a device of the character described, a support, a transverse beam pivotally mounted on said support for movement about a vertical axis, a plurality of upstanding brackets secured to said beam, idler rolls carried by said brackets, guide rolls carried by certain of said brackets adjacent the ends of said beam, said guide rolls being arranged with their axes in a vertical plane laterally offset with respect to the pivotal axis of said beam.

9. In a device of the character described, a support, a beam pivotally mounted on said support for movement about a vertical axis, upstanding brackets adjacent the ends of said beam, guide roll brackets carried by said upstanding brackets, and guide rolls carried by said brackets and arranged with their axes in a vertical plane laterally offset with respect to the pivotal axis of said beam.

10. In a device of the character described, a support, a beam pivotally mounted on said support for movement about a vertical axis, upstanding brackets adjacent the ends of said beam, and guide rolls carried by said brackets and arranged with their axes in a vertical plane laterally offset with respect to the pivotal axis of said beam.

11. In a device of the character described, a stationary support, a beam mounted for pivotal movement upon said support about a vertical axis, a plurality of upstanding arms secured to said beam, shafts carried by the upper ends of said arms, idler rolls carried by the shafts, and addi-

tional belt engaging rolls directly secured to the outermost arms independently of the shafts and positioned to be engaged by the conveyer belt when the latter moves out of normal alignment to a predetermined extent to bring about realignment of the belt.

12. In a device of the character described, a stationary base, a beam, a single device for mounting and entirely supporting said beam upon the base to permit the beam to pivot about a vertical axis, a plurality of upstanding arms carried by said beam, shafts carried by said arms, idler rolls carried by said shafts, means to be engaged by the conveyer belt when the latter moves out of normal alignment to a predetermined extent to bring about re-alignment of the belt by pivoting the beam, a mounting for said device including relatively adjustable parts, and means for drawing said parts toward each other for detachably clamping said mount to an outermost upstanding arm independently of said shafts.

13. In a device of the character described, a stationary base, a beam, a single device for mounting and entirely supporting said beam upon said base to permit the beam to pivot about a vertical axis, a plurality of upstanding arms carried by said beam, shafts carried by said arms, idler rolls carried by said shafts, means to be engaged by the conveyer belt when the latter moves out of normal alignment to a predetermined extent to bring about re-alignment of the belt by pivoting the beam, a mounting bracket for said means, and means carried by the bracket for detachably connecting the bracket to an outermost upstanding arm independently of said shafts.

14. In a device of the character described, a stationary support, a relatively narrow beam, an anti-friction swivel mounting carried by the support and centrally connected to the beam to completely support and permit pivotal movement of the latter about a vertical axis, transversely aligned upstanding arms secured to said beam, shafts carried by and extending between said aligned arms, rolls for supporting the full width of a conveyer belt mounted on said shafts, the axes of all of said rolls and said swivel mounting lying in a common vertical plane, means positioned to be engaged by the conveyer belt when the latter moves out of normal alignment to a predetermined extent to bring about re-alignment of the belt by pivoting the beam, a mounting bracket for said means, and means carried by the bracket for detachably connecting the bracket to an outermost upstanding arm independently of said shafts.

15. In a device of the character described, a stationary support, a relatively narrow idler beam, an anti-friction swivel mounting carried by the support and connected to the central portion of the idler beam to entirely support and permit pivotal movement of the latter about a vertical axis, transversely aligned upstanding arms secured to said idler beam, shafts carried by said arms, rolls for supporting the full width of a conveyer belt mounted on said shafts, the axes of all of said rolls and said swivel mounting lying in a common vertical plane, means positioned to be engaged by the conveyer belt when the latter moves out of normal alignment to a predetermined extent to bring about re-alignment of the belt, a mount for said means including relatively adjustable parts, and means for drawing said parts toward each other for detachably clamping said mount to an outermost upstanding arm independently of said shafts.

WILLIAM W. SAYERS.