Jan. 15, 1935. A. G. ROSE 1,987,871

CONVEYER APPARATUS

Filed Sept. 14, 1934 4 Sheets-Sheet 1

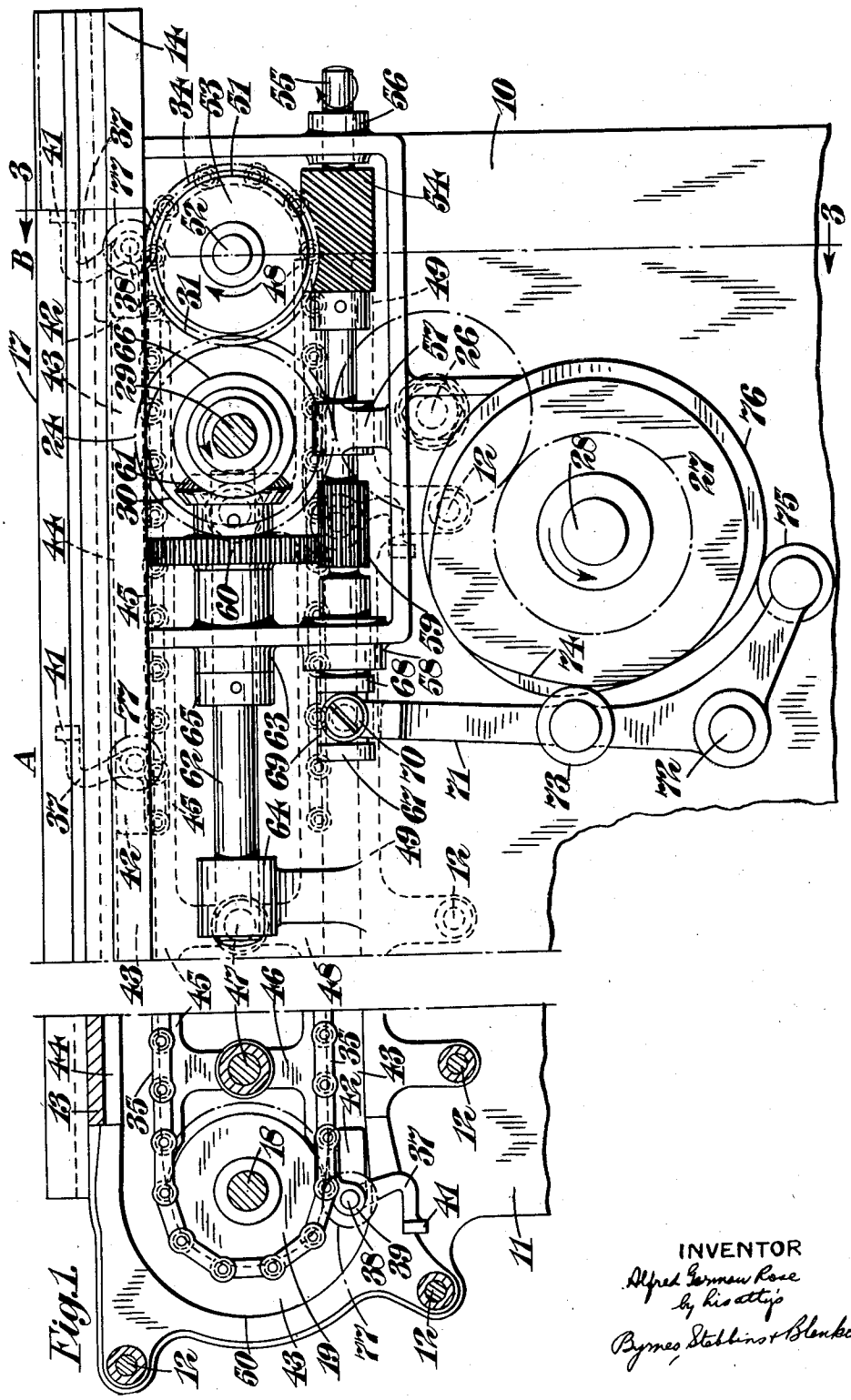


Fig. 1.

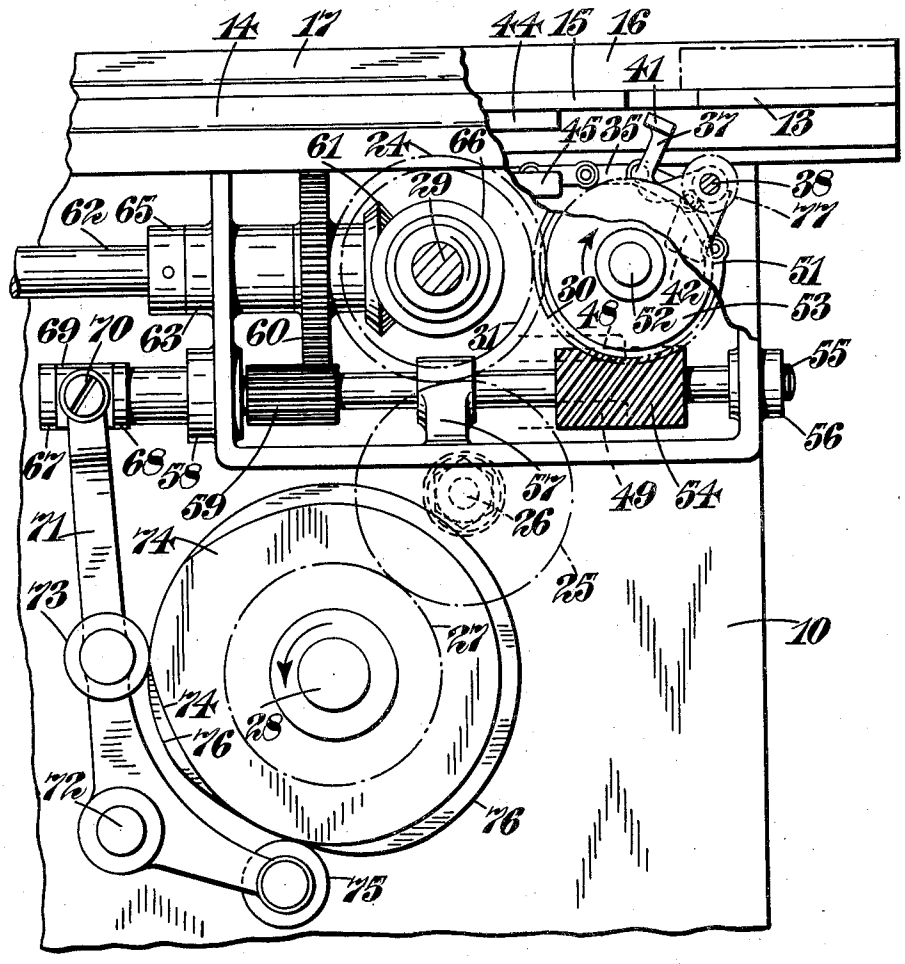
INVENTOR
Alfred Germain Rose
by his attys
Byrnes, Stebbins & Blenko

Jan. 15, 1935. A. G. ROSE 1,987,871

CONVEYER APPARATUS

Filed Sept. 14, 1934 4 Sheets-Sheet 2

Fig. 2.



INVENTOR
Alfred German Rose
by his atty's
Byrnes, Stebbins & Blake

Jan. 15, 1935. A. G. ROSE 1,987,871

CONVEYER APPARATUS

Filed Sept. 14, 1934 4 Sheets-Sheet 3

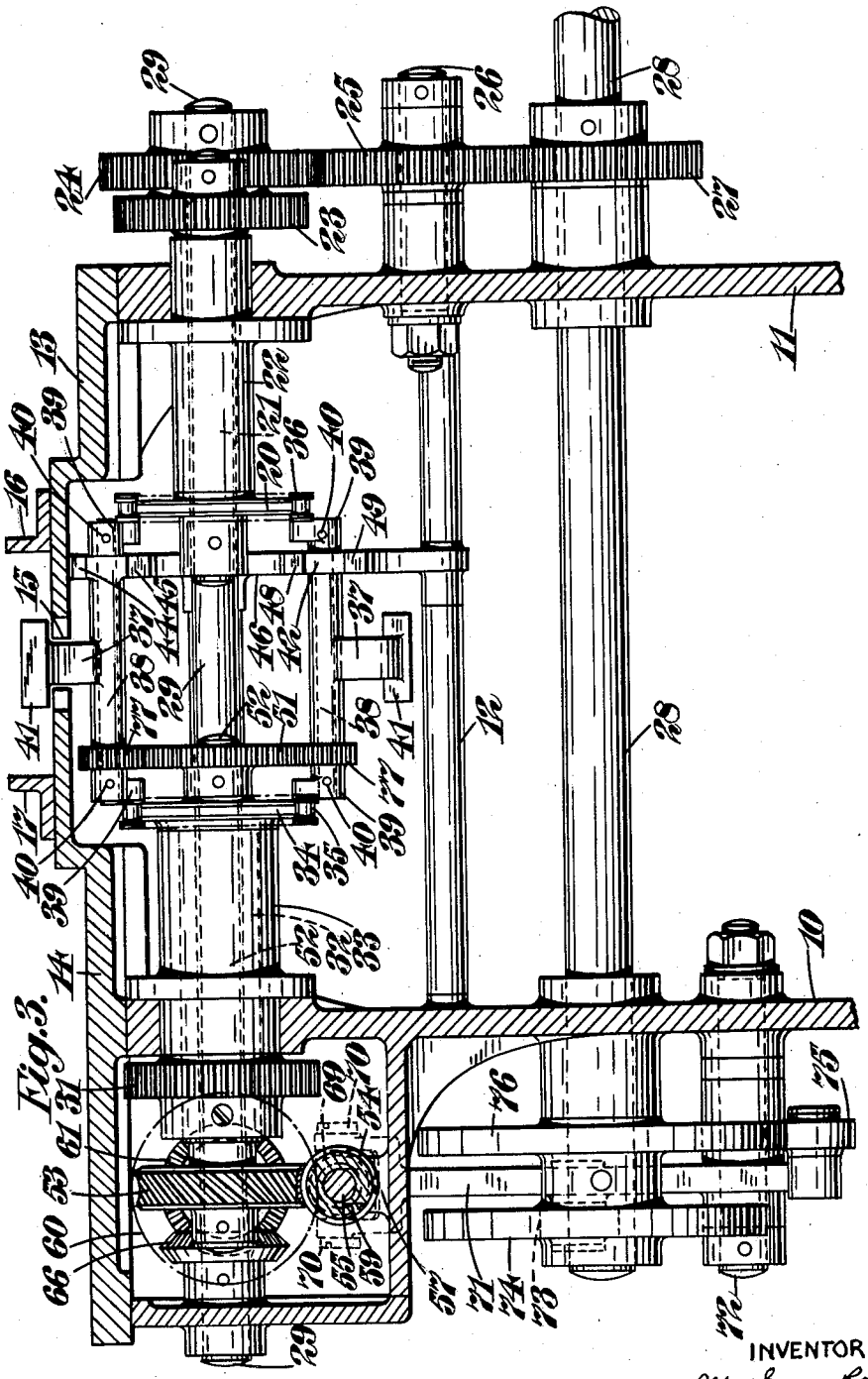


Fig. 3.

INVENTOR

Alfred German Rose

by his attys

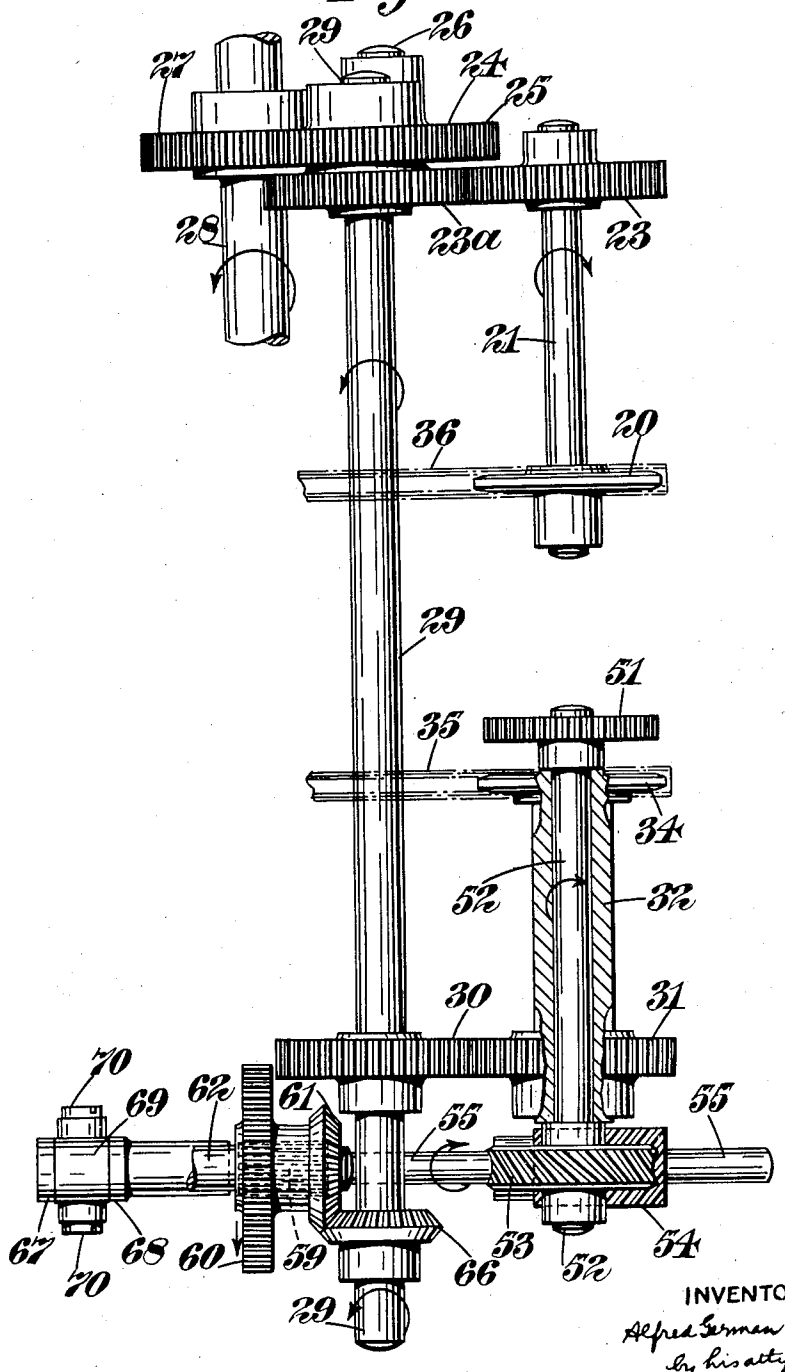
Byrnes, Stebbins & Blanke

Jan. 15, 1935. A. G. ROSE 1,987,871

CONVEYER APPARATUS

Filed Sept. 14, 1934 4 Sheets-Sheet 4

Fig. 4.



INVENTOR
Alfred German Rose
by his attys
Byrnes, Stebbins & Blenko

Patented Jan. 15, 1935 1,987,871

UNITED STATES PATENT OFFICE

1,987,871

CONVEYER APPARATUS

Alfred German Rose, Gainsborough, England, assignor to Rose Brothers (Gainsborough) Limited, Gainsborough, England, a British company

Application September 14, 1934, Serial No. 743,977
In Great Britain July 6, 1933

6 Claims. (Cl. 198—170)

This invention relates to conveyer apparatus of the kind comprising an endless chain mounted on a plurality of supporting wheels with a lap thereof extending alongside a track along which an article is to be fed to a delivery station at one end, means for driving the chain at a constant speed, a pusher (or more usually a plurality of such pushers) pivoted on the chain to move therewith, a rail or rails engaging the pusher to determine its position relatively to the chain and cause an operative part of the pusher to move along, and to feed an article along the track, and pusher-retiring means adjacent to delivery station for rocking the pusher relatively to the chain and thereby to move the operative part of the pusher backwardly relatively to the chain and transversely of the track from behind the article which is left on the track at the delivery station.

The object of this invention is to provide conveyer apparatus having a simple and reliable construction of pusher-retiring means. According to the present invention conveying apparatus of the above kind is provided with pusher-retiring means which comprises a pinion mounted to rotate with the pusher about the latter's pivot on the chain and a toothed member arranged to engage the pinion adjacent the delivery station and turn it and the pusher in such direction as to cause the operative part of the pusher to move backwardly relatively to the chain and transversely of the track. The delivery station is usually adjacent one of the supporting wheels around which the chain passes, and the toothed member is preferably a gear wheel concentric with the said supporting wheel.

In a preferred construction there is provided means for driving the toothed member, at the time when it engages the pinion, at a speed such that its teeth are moving at the same linear velocity as the cooperating teeth of the pinion and for thereafter varying the speed of movement of the toothed member so that it rotates the pinion relatively to the chain.

When the toothed member is a gear-wheel there may be provided a worm-wheel secured to it, a worm meshing with the worm-wheel and mounted for axial movement, and means for periodically reciprocating the worm. During the reciprocating movement of the worm the gear-wheel is first accelerated and is then decelerated in order to rock the pusher first in one direction and then in the other direction back to its original position.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:—

Figure 1 is an elevation of conveying apparatus with a cover removed and partly in section,

Figure 2 is an elevation showing a part of the apparatus with a pusher member in a different position to that shown in Figure 1,

Figure 3 is a section on the line 3—3 of Figure 1, and

Figure 4 is a plan of the gearing incorporated in the apparatus.

The apparatus comprises two side frames 10 and 11 (Figure 3) which support the various shafts of the mechanism and which are held together by suitable cross-members 12. The frames carry two table members 13 and 14 which have a slot 15 between them. Guide rails 16 and 17 are secured on the members 13 and 14 so as to provide a track along which a succession of articles are to be fed. The articles are conveyed along on this track from left to right, as seen in Figure 1.

A shaft 18 supported on the left-hand end (Figure 1) of the apparatus carries a pair of sprocket wheels 19. At the other end of the apparatus a sprocket wheel 20 is secured on a shaft 21 which is journalled in a sleeve 22. The sleeve 22 is secured to the frame 11 and extends therethrough. At its outer end the shaft 21 has a gear-wheel 23 secured on it. The gear-wheel meshes with a gear-wheel 23*a* (Figure 4) which is secured to a gear-wheel 24. The gear-wheel 24 meshes with a gear-wheel 25 free on a stud 26. The gear-wheel 25 in turn meshes with the gear-wheel 27 secured on a main drive shaft 28 which is driven continuously in any suitable manner. The gear-wheel 24 is secured on a shaft 29 which extends across the apparatus and carries a gear-wheel 30 (Figure 4) at its end adjacent the frame 10. The gear-wheel 30 meshes with a gear-wheel 31 (Figure 3) which is secured to a sleeve 32. The sleeve 32 is journalled in a sleeve 33 which is secured to and extends through, the frame 10. A sprocket wheel 34 is secured on the inner end of the sleeve 32.

The gearing just explained is so proportioned that the sprocket wheels 20 and 34 will rotate together in the same direction at the same angular velocity as the shaft 28. A chain 35 is stretched around the sprocket wheel 34 (Figure 3) and one of the sprocket wheels 19 (Figure 1) while a chain 36 is stretched around the sprocket wheel 20 (Figure 3) and the other of the sprocket wheels 19 (Figure 1). The sprocket chains thus extend in two substantially parallel straight laps joined by semi-circular lengths where they pass round the sprocket wheels. Intermediate sprocket

wheels may be provided for supporting the chains along their straight laps.

The chains support between them a plurality of pushers 37 which are spaced apart so that one complete rotation of the shaft 28 and the sprocket wheels moves each pusher into the position previously occupied by the preceding pusher.

Referring to the left-hand part of Figure 1 and to Figure 3, each pusher 37 is pivoted on a rod 38 which is carried by a pair of bearing members 39. Each bearing member 39 is secured to one of the links of a corresponding chain. The pushers 37 are thus pivotally supported by the chains. The spindles 38 are pinned on to the bearing members 39 by pins 40. The pushers 37 have operating portions 41 which, when the respective pusher is moving along the upper lap of the chain, travel along the track. The pushers are held in the required position relatively to the chain by a rearwardly extending block 42 which moves along a track 43. The track comprises an upper and lower straight portion joined at their left-hand end (Figure 1) by a semi-circular portion. The upper straight portion of the track 43 is defined by a downward projection 44 from the table member 13 and an upper bar 45 of a frame 46. The frame 46 is supported on suitable cross-bars 47 extending between the main frames 10 and 11. The lower straight portion of the track is defined by a lower bar 48 of the frame 46 and a bar 49 which is supported on the cross-bars 12. The arcuate portion of the track is defined by a curved member 50 (left Figure 1). The track 45 causes the pushers to extend transversely of the chain as they move round therewith. From Figure 1 it will be noticed that the upper length of the track 43 terminates just short of the sprocket wheels 20 and 34, while the lower length of the track commences immediately below these wheels.

A gear-wheel 51 (Figure 3) is secured on a shaft 52 which extends through the sleeve 32 and carries a worm-wheel 53 on its outer end. The worm-wheel 53 meshes with a worm 54 which is secured on a shaft 55. The shaft 55 is mounted to rotate and slide in bearings 56, 57 and 58 (Figure 1) and has an elongated pinion 59 secured on it. The pinion 59 meshes with a gear-wheel 60 which is integral with a bevel-wheel 61. These two wheels are pinned on a shaft 62 which rotates in bearings 63 and 64, and is restrained from axial movement by collar 65 pinned on it. The bevel-wheel 61 meshes with a bevel-wheel 66 secured on the shaft 29 which, it will be recalled, turns at the same speed as the shaft 28. The gear-wheel 60 is driven at the same speed as the shaft 28 and drives the shaft 55 at three times this speed. The worm 54 drives the worm-wheel 53 and the gear-wheel 51 at one-third of the speed of the shaft 55, so that the gear-wheel 51 normally turns at the same speed as the sprocket wheels 20 and 34.

The shaft 55 has collars 67 and 68 (Figure 1) secured on it and an inverted U-shaped member 69 fits between these collars. This member is connected by pins 70 to the forked top of a bell-crank lever 71 (see Figure 3). The lever 71 is pivoted at 72, and carries a roller 73 which engages a cam 74 and a second collar 75 which engages a cam 76. The cams 74 and 76 co-operate to oscillate the lever 71 once during each rotation of the shaft 28 and thus to reciprocate the shaft 51 and the worm 54.

The operation of the mechanism is as follows:—

During one rotation of the shaft 28 a pusher 37 is moved from the position A to the position B and feeds an article along the track defined by the parts 13, 14, 16, and 17 (Figure 3). During this time the pusher 37 is maintained in the position shown in Figure 1 by the engagement of its block 42 in the track 43. When the pusher reaches the position B, a pinion 77, which is secured to it, engages and meshes with the gear-wheel 51 (see Figure 3) which at this time is being driven at the same speed as the sprocket wheels 20 and 34. At the moment of engagement the linear velocity of the teeth of the pinion 77 and the linear velocity of the gear-wheel 51 are the same, so that these parts can engage without shock. At this time the article has reached the delivery station and the operative part 41 of the pusher must be moved backwardly and transversely of the track of the article so as to leave the article at the delivery station.

With the parts in the positions shown in Figure 1, further rotation of the shaft 28 will result in the cam 74 rocking the lever 71 counter-clockwise and moving the shaft 55 and worm 54 to the left. As the worm moves to the left it acts, in the manner of a rack, to impart to the worm-wheel 53 a forward rotation in addition to that which it imparts to this wheel by acting as a worm pure and simple. In other words, as the worm is moved to the left, the angular velocity of the worm-wheel 53 is accelerated. Consequently, the angular velocity of the gear wheel 51 is accelerated and the linear velocity of its teeth becomes greater than that of the chains 35 and 36. The pinion 77 which is in mesh with the gear-wheel 51 is therefore rotated relatively to the chain and rocks its pusher 37 into the position shown in Figure 2. The pusher 37 has the motion which is compounded of rotation about the centre of the shaft 52 and a rotation in the reverse direction about its own pivot 38. The operative part 41 of the pusher will thus move transversely of the track for the articles and below the supporting members 13 and 14. After the parts have reached the position shown in Figure 2 the cam 74 holds the lever 71 in its extreme counter-clockwise position for a short period and then rocks it back to its normal position. While the lever 71 is in its extreme displaced position and the gear-wheel 51 is rotating at the same speed as the sprocket wheels so that the pusher 37 does not rotate about its spindle 38 but moves around the shaft 52 as centre. While the lever 71 is being restored to the normal right-hand position, the worm 54 acts to retard the gear-wheel 51 which in turn rocks the pusher 37 back to its normal position relatively to the conveyer chains. The cam 75 is complementary to the cam 74 and co-operates therewith in rocking the lever 71 in the manner just explained.

It should be noted that the cams are shaped to rock the lever from the position of Figure 1 to that of Figure 2 and back to the position of Figure 1 in slightly less than one half revolution of the shaft 28. Thus, the pusher 37 will move from the position shown in Figure 1 to that shown in Figure 2 and then back to a position in which it projects downwardly from the chain during one half revolution of the shaft 28 and of the sprocket wheels 20 and 34 (Figure 3). The pusher 37 will therefore be in the correct position for its block 42 to enter the lower length of the track 43.

I claim:—

1. Conveyer apparatus comprising a track along which an article is to be fed to a delivery station at one end thereof, an endless chain, a plurality of supporting wheels supporting the chain with one lap thereof extending alongside

of the track, means for driving the chain, a pusher pivoted on the chain to move therewith, a rail engaging the pusher to determine its position relatively to the chain and to cause operative parts of the pusher to move along the track, a pinion secured on the pusher and a toothed member arranged to engage the pinion when the pusher is adjacent the delivery station and to rotate the pinion and pusher in the direction to move the operative part of the pusher rearwardly and transversely of the track and off the track.

2. Conveyer apparatus comprising an endless chain, a plurality of wheels supporting the chain, a track along which an article is to be fed and which extends parallel to one lap of the chain and terminates adjacent one of the supporting wheels, means for driving the chain at a constant speed, a pusher pivoted on the chain to move therewith, a rail engaging the pusher to determine its position relatively to the chain and guide an operative part of the pusher along the track, a pinion secured to the pusher, a gear wheel mounted to rotate about the axis of the supporting wheel adjacent the end of the track and to engage the pinion while the pusher is moving round the periphery of the said supporting wheel, and means for normally driving the gear wheel at a speed such that its teeth move with the same linear velocity as the chain which means is arranged to accelerate the gear wheel after it has engaged the pinion.

3. Conveyer apparatus comprising a track having a delivery station at one end, an endless chain, a plurality of wheels supporting the chain with one lap thereof extending alongside of the track, one of which wheels is located adjacent the delivery station and is partly encircled by the chain, means for driving the chain at a constant speed, a pusher pivoted on the chain, a rail engaging the pusher and holding it in position relatively to the chain for an operative part of it to move along the track, which rail terminates adjacent the delivery station, a pinion secured on the pusher, a gear wheel mounted to rotate about the axis of the supporting wheel that is adjacent to the delivery station and to engage the pinion as the pusher moves round the periphery of the said supporting wheel and a variable speed driving gear arranged normally to drive the gear wheel at a speed such that its periphery moves with the same speed as the chain and to accelerate and decelerate the movement of the gear wheel while it is engaged with the pinion.

4. Conveyer apparatus comprising an endless chain, a pair of supporting wheels which are spaced apart and around which the chain is stretched, a track extending parallel to one straight lap of the chain, means for driving the chain at a constant speed, a pusher pivoted on the chain, a guide rail extending parallel to the track and engaging the pusher to hold an operative part of the pusher in the track in position to push an article along the track to a delivery station adjacent one of the supporting wheels, a pinion secured to the pusher, a gear wheel mounted to turn about the axis of the supporting wheel adjacent the delivery station and engage the pinion while the pusher is travelling round the periphery of the said supporting wheel, a worm wheel connected to said gear wheel, a worm meshing with said worm wheel, means for rotating said worm at a constant speed and means for reciprocating the worm while the gear wheel is engaged with the pusher.

5. Conveyer apparatus according to claim 4 wherein the means for reciprocating the worm comprises a cam and a lever engaging the cam to be rocked thereby and connected to the worm to reciprocate it.

6. Conveyer apparatus comprising a chain, a pair of spaced supporting wheels around which the chain is stretched to have upper and lower horizontal laps, a track along which an article is to be fed extending above and parallel to the upper lap, a plurality of pushers each pivotally mounted on the chain, a guide rail extending adjacent the chain and engaging the pushers to hold them in a position relatively to the chain in which an operative portion extends outwardly from the chain to engage an article and feed it along the track, which guide rails are interrupted adjacent the supporting wheel at the delivery end of the track, means for driving the chain at a constant speed, a pinion secured on each pusher, a gear wheel mounted to rotate about the axis of the supporting wheel adjacent the delivery end of the track and to engage each pinion as it is carried around said supporting wheel, and means for normally driving the gear wheel at a speed such that its teeth move with the same linear velocity as the chain, which means is operable in synchronism with the means for driving the chain to accelerate the gear wheel after it has engaged a pinion and then to decelerate it to its normal speed before it becomes disengaged from said pinion.

ALFRED GERMAN ROSE.