Feb. 24, 1942. W. H. AYRES 2,273,823

SHEET FEEDING MECHANISM

Filed May 4, 1940 3 Sheets-Sheet 1

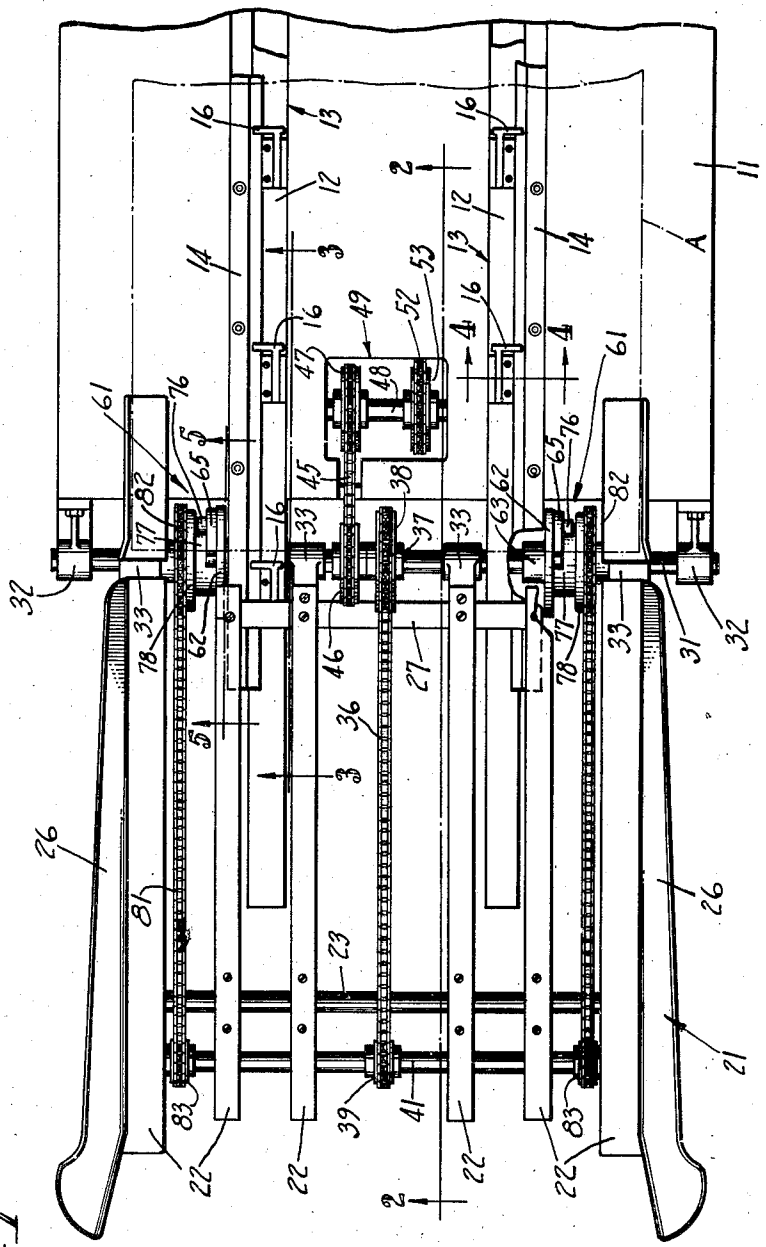

Fig 1

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SHEET FEEDING MECHANISM

Filed May 4, 1940 3 Sheets-Sheet 2

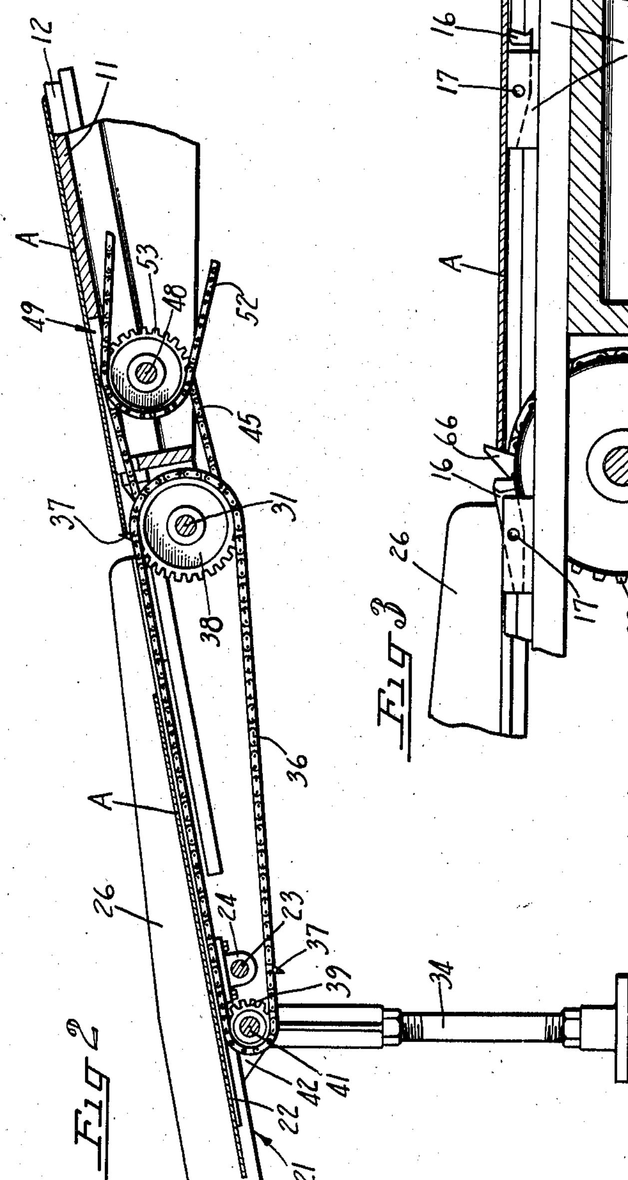

Fig 2

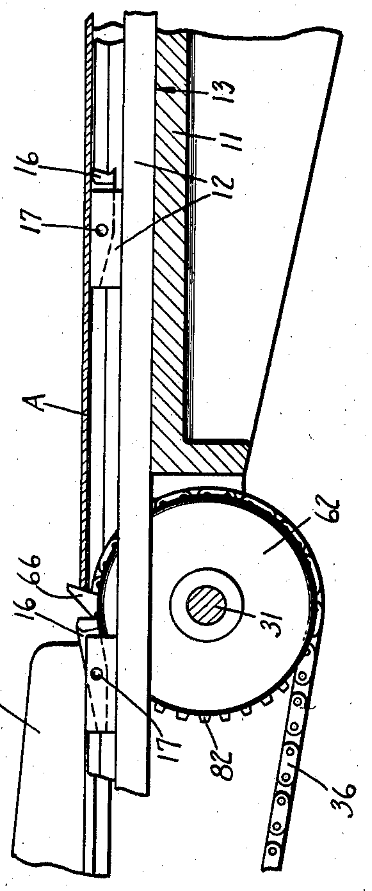

Fig 3

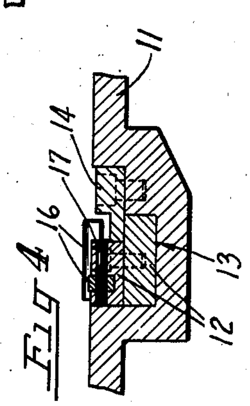

Fig 4

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SHEET FEEDING MECHANISM

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Fig 5

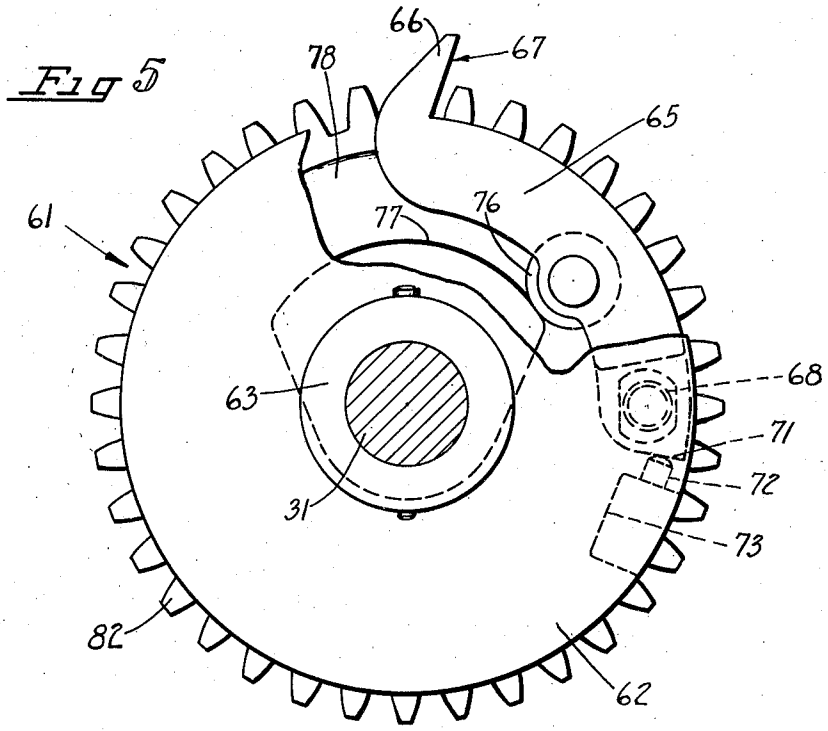
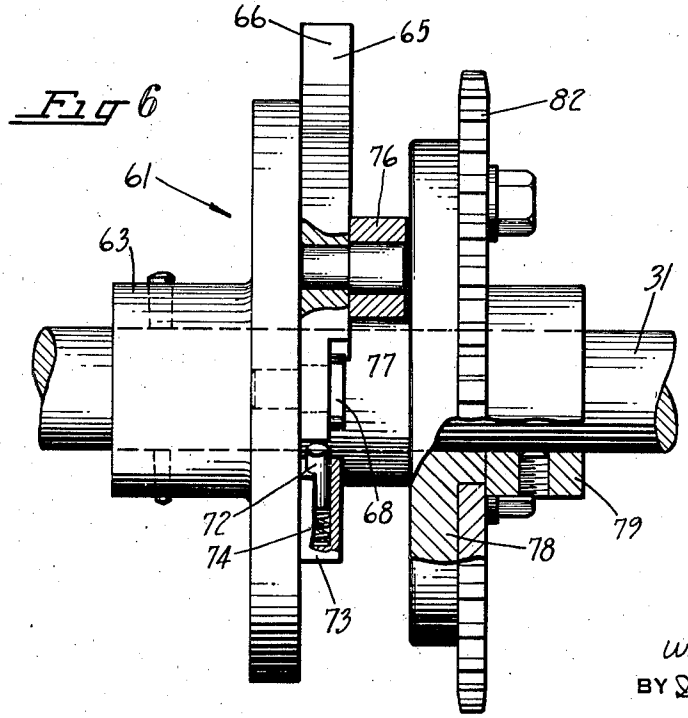


Fig 6



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UNITED STATES PATENT OFFICE

2,273,823

SHEET FEEDING MECHANISM

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Application May 4, 1940, Serial No. 333,395

4 Claims. (Cl. 271—50)

The present invention relates to a sheet feeding mechanism for a can making machine or the like and has particular reference to feeding metallic sheets at high speed without denting the feeding edges of the sheets.

In the feeding of metallic sheets such as tin plate and the like through container or can making machines, the sheets are sometimes propelled by the engagement along one edge of fingers or dogs disposed in reciprocating feed bars. There are sometimes two of these feed bars in spaced and parallel relation extending longitudinally of the machine and each bar is provided with feed dogs which are transversely parallel.

A sheet upon entering the region of the feed bars sometimes has its rear or feeding edge out of parallel with the first set of feed dogs and usually the engagement of the feed dogs with the sheet brings this edge into parallelism with them. At high speeds it has been found that such aligning of the sheet by a single dog striking against the sheet edge dents it to such an extent that considerable trouble is caused in subsequent operations upon the sheet or parts thereof.

The instant invention contemplates overcoming this difficulty by the use of a device which aligns the sheet prior to its engagement by the feed dogs so that when the feed dogs pick it up for further advancement the force of impact is distributed between the dogs and hence denting of the sheet has been eliminated.

An object therefore of the invention is the provision in a machine using feed dogs for advancing metallic sheets, of a feeding mechanism which aligns the sheet with the feed dogs prior to engagement thereby so that the force of impact of the dogs with the sheet edge will be distributed sufficiently to prevent denting of the sheet feeding edge.

Another object is the provision of such a feeding mechanism which permits of considerably greater feeding speeds so that the sheets may be propelled through the machine at high speed without damage to the sheet edges.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a portion of a scroll shear machine embodying the instant invention, with parts broken away;

Fig. 2 is a longitudinal section taken substantially along the line 2—2 in Fig. 1, with parts broken away, the section also showing a sheet entering the machine;

Fig. 3 is an enlarged longitudinal section taken substantially along the line 3—3 in Fig. 1 and showing a sheet being fed, with parts broken away;

Fig. 4 is an enlarged transverse section taken substantially along the line 4—4 in Fig. 1, with parts broken away;

Fig. 5 is an enlarged detail of the feeding device as viewed substantially along the line 5—5 in Fig. 1, with parts broken away; and

Fig. 6 is an end elevation of the detail shown in Fig. 5, with parts broken away and parts shown in section.

As a preferred embodiment of the instant invention the drawings illustrate principal parts of the sheet feed-in portion of a scroll shear machine of the character disclosed in United States Patent 1,846,330, issued February 23, 1932, to M. L. Heald. In such a machine metallic sheets A to be operated upon are fed along a horizontal table 11 (Figs. 1, 2, 3, and 4) in an intermittent or step-by-step motion so that a plurality of scroll edged strips will be cut from each sheet. This step-by-step motion is preferably effected by a pair of spaced and parallel feed bars 12 which operate in grooves 13 formed in the top of the table and which extend longitudinally of the machine. Gibs 14 secured in the table overlap the feed bars and thus retain them against displacement.

Each feed bar 12 is provided with a plurality of spring held depressible feed dogs 16 which are spaced at equal intervals along the length of the bar. These dogs are mounted on pivot pins 17 which are secured in the feed bars. Transversely of the table 11 the feed dogs 16 in the feed bars are arranged in parallelism so that a sheet delivered onto the table in front of the dogs will be carried forward in a squared position. For this purpose the feed bars are preferably tied together and are reciprocated in unison on a forward feeding stroke and then on a return stroke in any suitable manner operating in time with the other movable parts of the machine.

Delivery of a sheet A onto the table 11 in a proper position relative to the first set of feed dogs 16 is preferably brought about by a feeding device which is connected to the feed-in end of

the table. This feeding device includes a feed table 21 which forms an extension of the machine table 11.

The feed table 21 comprises a plurality of spaced and parallel flat bars 22 which extend longitudinally of the machine. At one end of the table these bars are tied together by a round cross bar 23 which extends through brackets 24 bolted to the bottom of the bars. The two outside table bars 22 are formed with outwardly flared side guides 26 which guide the sheet in a straight line along the table. At the inner end of the table the bars 22 between the outer bars are tied together by a flat cross bar 27.

Adjacent the machine table 11 the feed table 21 is supported on a rotating cross shaft 31 which is journaled in bearing brackets 32 secured to the outer end of the table 11. Brackets 33 which are secured to the outer table bars 22 and to two of the intermediate table bars 22, surround the shaft and thus support this end of the feed table. The outer end of the feed table is supported on upright legs 34.

A sheet A placed upon the feed table 21 is propelled therealong toward the machine table 11 by an endless chain conveyor 36 having a plurality of spaced feed fingers 37 secured thereto. This conveyor is disposed in the middle of the table and takes over a driving sprocket 38 which is secured to the cross shaft 31 and over an idler sprocket 39 which is keyed to a rotatable cross shaft 41 carried in bearing brackets 42 secured to the bottoms of the two outer table bars 22.

The driving sprocket 38 and its cross shaft 31 is rotated by an endless chain 45 which takes over a sprocket 46 mounted on the shaft 31 adjacent the sprocket 38 and over a sprocket 47 carried on a shaft 48 journaled in suitable bearings formed in the machine table 11. The sprocket 47 and the chain 45 are disposed in an opening 49 formed in the machine table. Shaft 48 constitutes the main machine drive shaft and is rotated in time with the other moving parts of the machine by way of a driving chain 52 which takes over a sprocket 53 carried on the shaft.

In order to properly advance a sheet when engaged by the feed dogs 16 so that all of the operations may be performed on the sheet and the sheet removed from the machine table 11, the feed bars 12 may be reciprocated back and forth so that the actual lineal travel forward of the feed dogs 16 when in engagement with the sheet may be five times as fast as the lineal travel of a feed finger 37 when engaged with the next succeeding sheet.

The sheet A propelled along the feed table 21 by the conveyor 36 is carried up onto the machine table 11 by the conveyor fingers 37 and just as the rear edge of the sheet comes adjacent the inner conveyor sprocket 38 this edge of the sheet is squared up or brought into parallelism with the first set of dogs 16 of the feed bars 12 which are at this time in a rear-most position ready to engage the sheet and carry it forward through the machine.

Squaring of the sheet in this manner is brought about by a pair of squaring devices 61 (Figs. 1, 5 and 6) which are carried on the rotating cross shaft 31. There is one of these squaring devices located on each side of the feed table 21 in the path of travel of the sheet.

Each squaring device 61 includes a disc 62 having a hub 63 which is pinned onto the rotating shaft 31. On its inner face the disc carries an arm 65 having at its outer end a sheet squaring finger 66 formed preferably with a straight squaring surface 67. At its opposite or inner end the arm is mounted on a pivot stud 68 secured in the disc. This pivoted end of the arm is formed with a boss 71 which engages against a spring barrel 72 retained in a lug 73 formed on the disc. A compression spring 74 disposed in the spring barrel presses the latter outwardly against the arm.

Intermediate its length the squaring arm 65 carries a cam roller 76 which operates on an edge cam 77. The spring barrel 72 maintains the cam roller in engagement with this cam. The cam is formed integrally with a plate 78 which is disposed on the cross shaft 31 but is free to rotate thereon, a collar 79 secured to the shaft being provided to prevent endwise displacement of the cam and its plate relative to the disc 62.

The cam 77 and its plate 78 are positively rotated on the cross shaft 31 in a predetermined timed order relative to the other moving parts of the machine. This is brought about by an endless chain 81 which takes over a sprocket 82 bolted to the outer face of the plate 78 and over a driving sprocket 83 which is secured to the rotating cross shaft 41. There is one of these chains 81 and its sprockets 82, 83 for each squaring device 61.

Sprockets 82, 83 rotate the cam 77 at a speed one half as fast as the squaring finger disc 62. In other words the cross shaft 31 which operates the sheet conveyor 36 makes two revolutions for each sheet delivered from the feed table 21 while the cam 77 makes only one revolution for each sheet. Thus the independently driven disc and cam constitute a differential mechanism in which the disc rotates faster than the cam.

The normal position of the squaring finger 66 as it is carried around with the disc is below or within the periphery of the disc where it is out of engagement with a sheet A passing over the squaring device. While in this position the cam roller 76 traverses a low part of the rotating cam. However, once for every two revolutions of the disc the cam roller catches up with a high portion of the cam and the squaring finger 66 is forced outwardly beyond the periphery of the disc.

The outward shifting of the squaring fingers 66 is effected in time with the travel of the sheet conveyor fingers 37. This timing is such as to bring the squaring fingers up behind the rear edge of the sheet just at the critical moment when the conveyor fingers 37 are delivering the sheet A from the feed table 21 onto the machine table 11 where the feed dogs 16 are waiting to engage the sheet.

The motion of the squaring fingers 66 is the resultant of two component motions, i. e., the rotation of the disc 62 and the movement produced by the arcing which takes place when the cam 77 shifts the finger outwardly. These two motions impart to the squaring finger a resultant speed which slightly exceeds that of the conveyor finger 37 at the point of transfer from the feed table 21 to the machine table 11. The faces 67 of the squaring fingers therefore engage the rear edge of the sheet and take it away from the conveyor finger 37 the while squaring the sheet into proper position. When the rear edge of the sheet is against the face 67 of both

squaring fingers 66 it is in a squared and proper position.

The feed bars 12 of the machine proper are also actuated in time with the operation of the squaring devices 61 just explained and hence the duly squared sheet is immediately picked up, while still in motion with the squaring finger still in engagement with the rear edge of the sheet and while still squared as shown in Fig. 3, by the feed bars as they operate through a forward stroke. This carries the sheet through the machine.

As the feed bars 12 advance the sheet through its first stepped movement the rear edge of the sheet is moved away from the squaring fingers 66 so that the fingers may return immediately to their normal positions within the periphery of discs 62 for a subsequent sheet. Since the sheet is in motion and is already in a squared position with its rear edge in parallelism with the feed dogs 16 of the machine feed bars 12, the impact of engagement of the feed dogs with the sheet edge is gentle and is equally distributed between the dogs and denting of the sheet edge by this impact is thereby prevented. With such a feeding device high feeding speeds are readily obtainable.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A sheet feeding mechanism, comprising in combination feeding means including feed dogs for engaging the rear edge of a sheet for advancing the sheet along a predetermined path of travel, instrumentalities for conveying said sheets and for delivering them onto said feeding means, and rotary devices between said feeding means and said instrumentalities for aligning said sheet edge with said feed dogs prior to engagement by them so that the impact of engagement of the dogs with the sheet edge will be evenly distributed between them to prevent denting of the sheet edge.

2. A sheet feeding mechanism, comprising in combination feeding means including feed dogs for engaging the rear edge of a sheet for advancing the sheet along a predetermined path of travel, instrumentalities for conveying said sheets and for delivering them onto said feeding means, and rotary devices between said feeding means and said instrumentalities for aligning said sheet edge with said feed dogs prior to engagement by them, said rotary devices also maintaining said aligned sheet in motion while the feed dogs engage the feeding edge of the sheet so that the impact of engagement of the dogs with the sheet edge will be gentle and evenly distributed between them to prevent denting of the sheet edge.

3. A sheet feeding mechanism, comprising in combination a plurality of reciprocating feed bars having feed dogs secured thereto for engaging the rear edge of a sheet for advancing the sheet along a predetermined path of travel, an endless chain conveyor having feed fingers for delivering a sheet onto said feed bars, and a plurality of sheet squaring fingers operable in time with the delivery of said sheet onto said feed bars and engageable against the feeding edge of said sheet for bringing said sheet edge into parallelism with the dogs on said feed bars and for maintaining the squared sheet in motion while the feed dogs come into feeding engagement with the sheet edge to prevent denting of the edge during this initial feeding engagement.

4. A sheet feeding mechanism, comprising in combination a plurality of reciprocating feed bars having feed dogs secured thereto for engaging the rear edge of a sheet for advancing the sheet along a predetermined path of travel, an endless chain conveyor having feed fingers for delivering a sheet onto said feed bars, a pair of spaced rotatable discs adjacent the path of travel of the sheet on said conveyor, a squaring finger pivotally mounted on each of said discs, a cam adjacent each of said discs for actuating said squaring fingers, and means for rotating said cams in a differential relation to the rotation of said discs to give said squaring fingers a component arcuate motion in time with the delivery of the sheet onto the feed bars for engaging the feeding edge of the sheet and for bringing it into parallelism with said feed dogs prior to its engagement thereby, said squaring fingers accelerating the sheet to carry it away from said conveyor fingers and maintaining the sheet in motion while the feed dogs come into feeding engagement therewith to prevent denting of the sheet edge by the dogs.

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