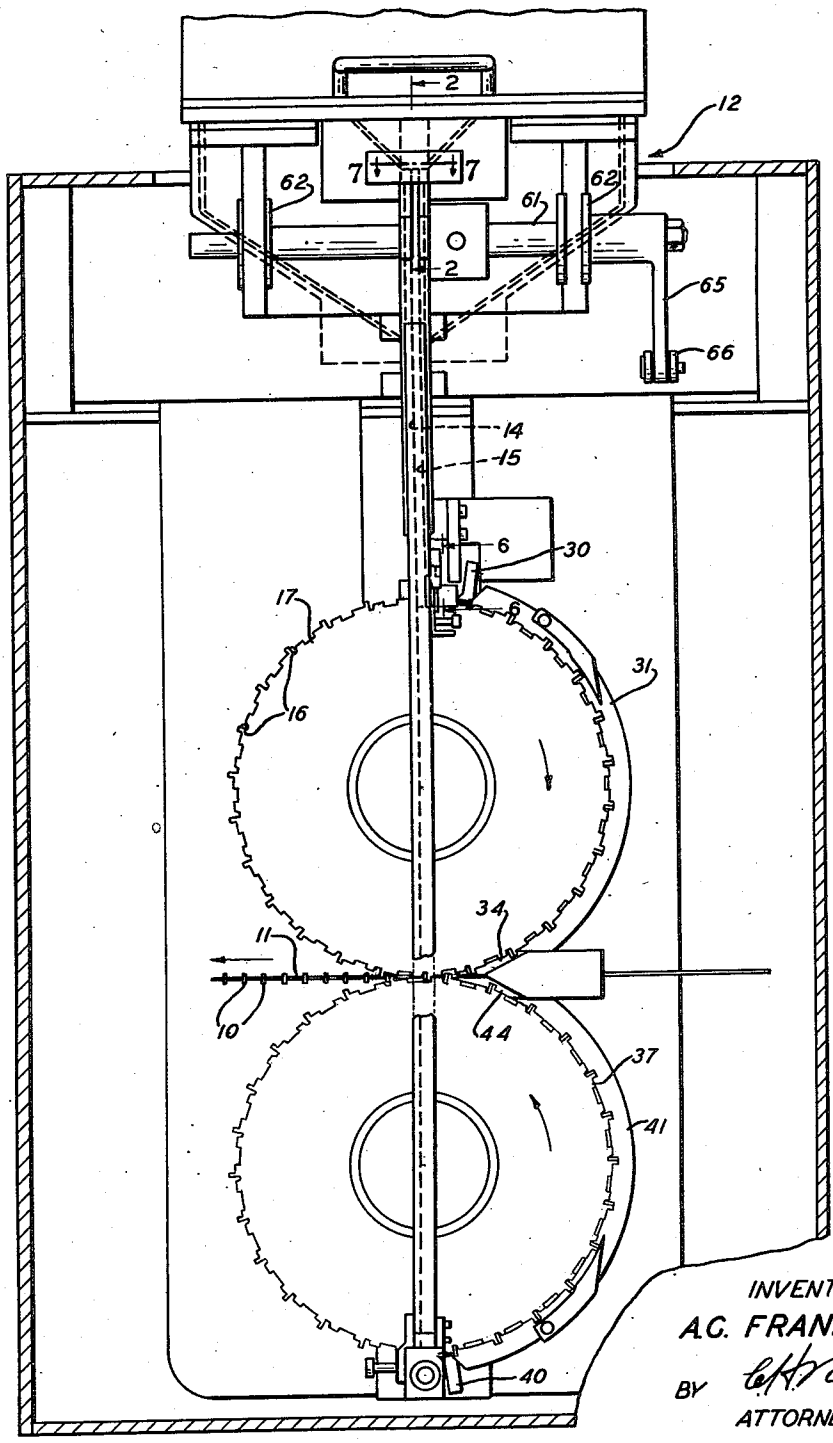
Dec. 25, 1951 A. C. FRANKWICH 2,579,486

HOPPER FEED

Filed Oct. 10, 1946 2 SHEETS—SHEET 1

FIG. 1



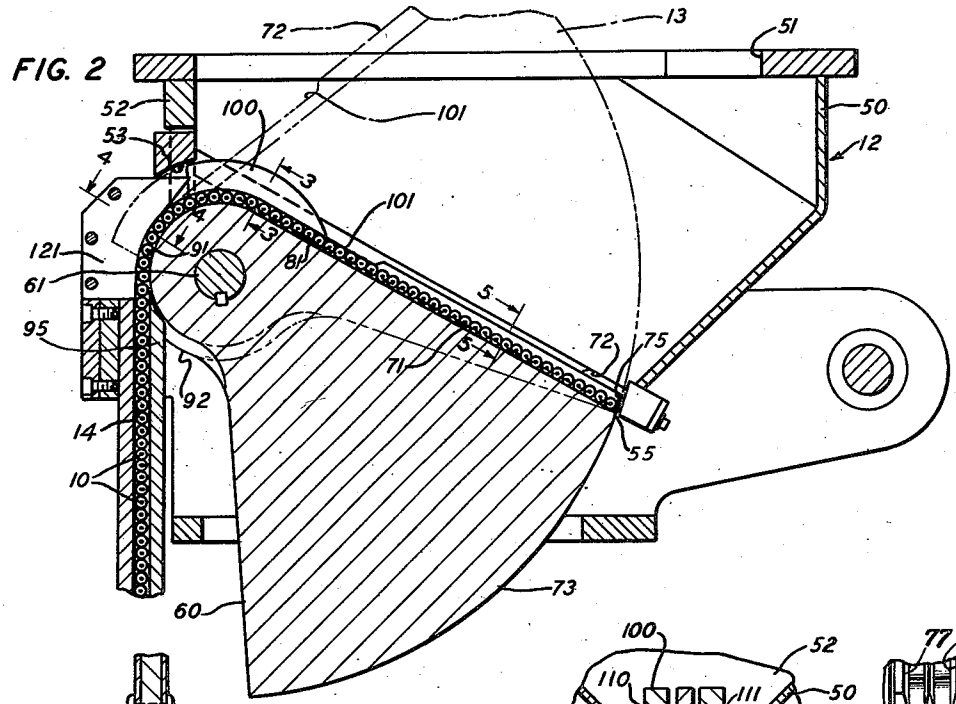
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HOPPER FEED

Filed Oct. 10, 1946 2 SHEETS—SHEET 2

FIG. 2



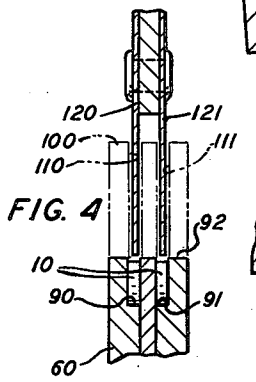


FIG. 4

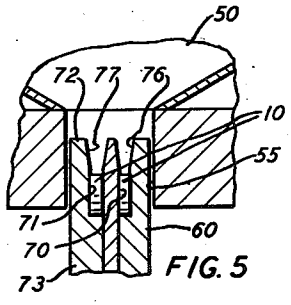


FIG. 5

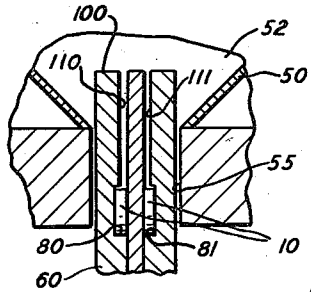


FIG. 3

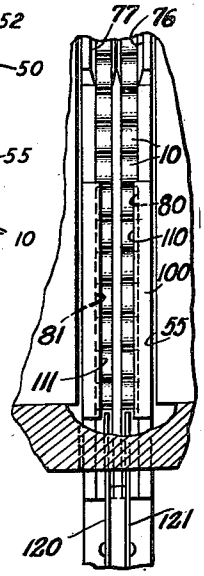


FIG. 7.

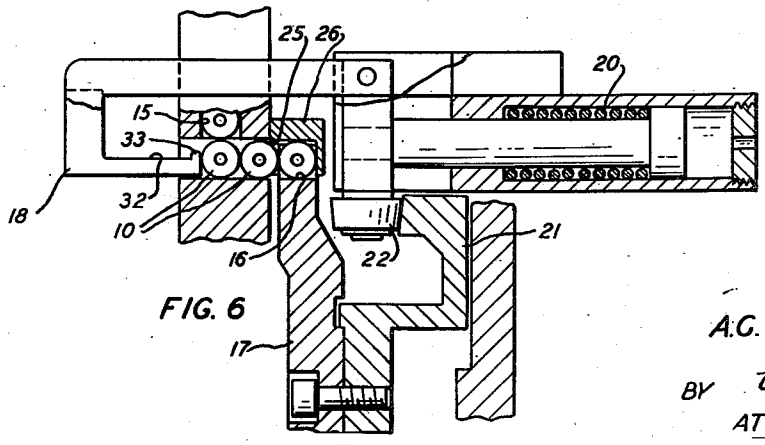


FIG. 6

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UNITED STATES PATENT OFFICE

2,579,486

HOPPER FEED

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Application October 10, 1946, Serial No. 702,493

2 Claims. (Cl. 10—167)

1

This invention relates to hopper feeds, and more particularly to hopper feeds for orienting and feeding insulating discs in a coaxial cable forming machine.

In automatic assembling machines of various types, such as, for example, machines for applying insulating discs to central conductors to form coaxial cable core units, small articles, such as discs, washers, nuts, bolts, or the like, are placed in hoppers in unoriented positions. The articles are oriented and are fed from the hoppers to guide chutes which direct the articles toward their place of assembly. In feeding such articles from the hoppers to the guide chutes, it is essential to prevent jamming of the articles so that uninterrupted feed of the articles from the hopper may take place, and injury to the articles and apparatus is avoided.

An object of the invention is to provide new and improved hopper feeds.

A further object of the invention is to provide new and improved hopper feeds for feeding insulating discs from hoppers to guide chutes uninterruptedly without jamming the discs.

A hopper feed illustrative of the invention includes a hopper having a vertical slot in a side wall thereof. A vane having a groove along a portion of an upper edge thereof for receiving insulating discs is mounted for oscillation in a vertical plane in the hopper. The vane is provided with an arcuate portion concentric with the axis of oscillation of the vane, which arcuate portion fits closely against the top of the slot in the hopper wall. The groove in the vane communicates with a passage extending through the arcuate portion thereof to the guide chute. The grooved upper edge of the vane is substantially chordal to the arcuate portion of the vane so that, as the vane oscillates, the arcuate portion of the vane seals the slot in the hopper wall and the upper edge of the vane is prevented from approaching the hopper wall closely enough to jam washers thereagainst.

A complete understanding of the invention may be obtained from the following detailed description of a hopper feed forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a fragmentary, vertical section of an apparatus including a hopper feed forming one embodiment of the invention;

Fig. 2 is an enlarged, fragmentary, vertical section taken along line 2—2 of Fig. 1;

Fig. 3 is an enlarged, substantially vertical section taken along line 3—3 of Fig. 2;

2

Fig. 4 is an enlarged, fragmentary section taken along line 4—4 of Fig. 2;

Fig. 5 is an enlarged, fragmentary section taken along line 5—5 of Fig. 2;

Fig. 6 is an enlarged, fragmentary, vertical section taken along line 6—6 in Fig. 1, and

Fig. 7 is an enlarged, fragmentary, horizontal view taken along line 7—7 of Fig. 1.

Referring now in detail to the drawings, there is shown in Fig. 1 an apparatus for applying insulating discs 10—10 to a conductor 11 to form a core unit of a coaxial cable. The discs are fed by a hopper feed 12 to straight guide chutes 14 and 15, which are disposed vertically. The discs are propelled by gravity down the vertically disposed guide chutes 14 and 15 and the discs in the guide chute 15 are fed into notches 16—16 formed in an applicator wheel 17 by a plunger 18, the height of which is less than the diameter of the discs 10—10. The complete apparatus, of which the hopper feed 12 forming the subject matter of this application is a part, is disclosed and claimed in copending application Serial No. 702,491, filed October 10, 1946, by S. E. Brillhart, which has since matured into U. S. Patent No. 2,579,468, granted December 25, 1951.

The plunger 18 is urged to the right, as viewed in Fig. 6, by a compression spring 20, but is prevented by a cam 21 carried by the applicator wheel 17 from moving to the right except when one of the notches 16—16 is in a position to receive one of the discs and the cam engages a cam follower 22 carried by the plunger. The discs 10—10 fed to the applicator wheel 17 pass through a notch 25 formed in a U-shaped guide 26, which holds the discs centered in the notches 16—16 while the wheel 17 moves the discs over a knife 30 (Fig. 1), which forms radial slits in the discs. The wheel 17 moves the discs along a thin arcuate guide 31 positioned to enter the slits and keep the slit discs oriented. A wedge-shaped expander 34 expands the slits gradually to a condition in which the discs may be wiped onto the conductor without contact between the major portions of the walls of the slit and the slits.

On each movement of the plunger 18 to the right, as viewed in Fig. 6, the plunger 18 moves one of the discs 10—10 into one of the notches 16—16 which is in a notch-receiving position, and in so doing moves the lowermost one of the discs in the guide chute 15 out from under the remainder of these discs. The remainder of the discs then drop upon a relieved portion 32 of the plunger 18 while the plunger is at its farthermost position to the right. As the plunger is moved back

to the left from this position by the cam 21, a jiggling finger 33 projecting above the relieved portion 32 of the plunger moves the column of discs in the guide chute 15 upwardly to dislodge any of the discs which might possibly stick in the guide chute 15.

The movement of the plunger 18 to the left continues until the finger 33 moves out completely from under the column of discs in the guide chute 15, and the column of discs then drops to the bottom of the guide chute 15. The total height of the plunger 18 and the finger 33 is slightly over half of the diameter of one of the discs 10—10 so that the plunger engages the discs 10—10 at the centerline of the discs and does not slide under the discs as it is moved toward the right, as viewed in Fig. 6. However, in the operation of the plunger 18, the discs in the guide chute 15 drop somewhat over half the diameter of one of the discs as the plunger 18 is moved to its farthermost right position, and as the plunger 18 is moved to the farthermost left position, the finger 33 of the plunger 18 moves the column of discs upward enough to dislodge any stuck discs. The plunger then permits the discs to drop the combined height of the finger 33 and the plunger 18, which height is substantially less than the diameter of one of the discs. The dropping of the discs in the guide chute 15 through the distance of the diameter of one of the discs in two almost equal steps during each reciprocation of the plunger insures that there is sufficient time for the lowermost one of these discs to reach the bottom of the guide chute 15 before the movement of the plunger 18 to the right begins, even at very high operating speeds of the plunger 18. The jiggling finger 33 continually jiggles the column of discs in the guide chute 15 to prevent sticking of the discs in the guide chute and thereby insures continuous feed of the discs down the guide chute.

The discs 10—10 are fed down the guide chute 14 and are fed into an applicator wheel 37 positioned below the wheel 17 by means of elements similar to the plunger 18, the cam 21 and their associated elements. A knife 40 (Fig. 1) slits the discs and the wheel 37 moves the discs along a thin guide 41 and a wedge-shaped expander 44, and applies the discs on the conductor 11. The expanders 34 and 44 and their associated elements are described and claimed in copending application Serial No. 702,494, filed October 10, 1946 by A. C. Frankwich.

The hopper feed 12, which comprises one embodiment of the invention, includes a hopper 50 having an opening 51 (Fig. 2) for placing the insulating discs 10—10 in an unoriented condition into the hopper, and also includes a side wall 52 provided with a vertical slot 53 therein. The hopper is also provided with a bottom slot 55. A vane 60 is keyed to a shaft 61 whose axis is located slightly to the right of and below the side wall 52 of the hopper 50, as viewed in Fig. 2. The shaft 61 is rotatably mounted in bearings 62—62 (Fig. 1), and is oscillated by an arm 65 connected by a link 66 to a suitable crank (not shown). The shaft 61 oscillates the vane 60 between a position in which the vane is shown in full lines in Fig. 2, which position is its lowermost position, and a position in which the vane is shown in broken lines, which position is its uppermost position.

When the vane is in its lowermost position, the discs 10—10 in the hopper 50 fall edgewise into grooves 70 and 71 extending along an upper edge 72 of an arcuate blade portion 73 thereof. The grooves 70 and 71 are provided with flared entrance portions 76 and 77 (Fig. 5) to facilitate entrance of the discs therein. When the vane 60 is in its lowermost position, the grooves 70 and 71 tilt downwardly to the right, as viewed in Fig. 2, but the discs in these grooves are prevented from sliding out of the grooves by stops, of which a stop 75 is shown, positioned at the right ends of the grooves.

As the vane 60 is swung to its uppermost position, the discs 10—10 slide downwardly to the left in the grooves 70 and 71 and pass through passages 80 and 81 formed in the vane 60. The entrance portions of the passages 80 and 81 are straight and are aligned with their respective grooves 70 and 71, and the remainder of the passages 80 and 81 are arcuate with the axis of the shaft 61 at the center thereof. The passages 80 and 81 are aligned with and run into arcuate grooves 90 and 91 (Fig. 4), which have the axis of the shaft 61 as their centers.

A portion 92 of the periphery of the vane 60 is coextensive with the grooves 90 and 91 and is concentric with these grooves. The depth of the grooves 90 and 91 is substantially equal to but slightly larger than the diameter of the discs 10—10. Tangential deflecting portions, of which a tangential deflecting portion 95 of the guide chute 14 is shown, rest upon the bottoms of the grooves 90 and 91, and deflect the discs 10—10 out of the grooves 90 and 91 into the guide chutes 14 and 15. The upper right hand edge, as viewed in Fig. 2, of the guide chute 14 conforms substantially to the curve of the bottom of the groove 91.

A raised guard portion 100 of the vane 60 extends arcuately from the upper edge 72 of the blade portion 73 of the vane concentrically with the passages 80 and 81 and terminates at the right ends of the grooves 90 and 91. The periphery of the guard portion 100 is spaced substantially outwardly from the outer periphery of the passages 80 and 81 and is spaced close to the upper end of the slot 53 in the side wall 52 and serves to close that portion of the slot. The length of the guard portion 100 is such that the guard portion 100 blocks the slot 53 throughout the path of movement of the vane 60 in its oscillation thereby preventing escape of the discs from the hopper 50, but is short enough that the guard portion does not strike the guides 14 or 15 when the vane 60 is oscillated to its broken line position, as shown in Fig. 2.

The height of the guard portion 100 is such that when the vane 60 is in its uppermost position, the blade portion 73 of the vane is spaced a substantial distance from the side wall 52 of the hopper 50, which distance is sufficient to prevent jamming of the discs between the wall 52 and the edge 72 of the blade portion. Also, the blade portion 73 is provided with a relieved portion 101 at the end thereof adjacent to the guard 100, which increases the clearance between the side wall 52 and the outer edge 72 of the blade portion when the vane is in its uppermost position. However, the depth of the grooves 70 and 71 coextensive with the relieved portion 101 is equal to the diameter of the discs 10—10, and the flared entrance portions 76 and 77 are not present in these portions of the grooves so that the discs in the hopper do not tend to enter these portions of the grooves directly from the hopper.

The guard 100 is provided with slots 110 and 111 extending from the periphery thereof to the passages 80 and 81. The width of each of the

slots 110 and 111 is not enough that the discs can enter the slots 110 and 111. Arcuate guides 120 and 121 are designed to project into the slots 110 and 111, respectively, and to prevent the discs from leaving the grooves 90 and 91 in the vane 60 when the vane 60 is in its lowermost position, thereby preventing jamming of the discs. The guides 120 and 121 serve to guide the discs into the guide chutes 14 and 15, respectively.

In the operation of the hopper feed 12, the vane 60 is oscillated between its lowermost and its uppermost positions and receives the discs 10—10 in the grooves 70 and 71 when in its lowermost position. The discs slide downwardly by gravity along the grooves 70 and 71, the passages 80 and 81, the grooves 90 and 91 and the guide chutes 14 and 15 when the vane is in its uppermost position, at which time the vane is tilted sufficiently to cause the discs to slide down the grooves 70 and 71 therein. However, when the vane is in its uppermost position, the upper edge 72 thereof is spaced a sufficient distance, a distance greater than the diameter of the discs, from the side wall 52 that the discs are not jammed between the vane and the side wall 52. Also, the outer periphery of the guard 100 is spaced sufficiently above the bottom of the hopper 50 that any discs which may be slid onto the guard 100 may freely drop off of the guard. During the oscillation of the vane 60, the guides 120 and 121 keep the discs 10—10 in the grooves 90 and 91, respectively, and guide the discs directly to the guide chutes 14 and 15, respectively, thereby preventing jamming of the discs passing to the guide chutes.

The vane 60 serves to keep the guide chutes 14 and 15 filled with the discs 10—10 so that the discs may be fed uniformly to the applicator wheels 17 and 37 (Fig. 1). The above-described hopper feed 12 serves to effectively supply the guide chutes 14 and 15 with insulating discs and does so without any jamming of the discs. The guard 100 permits the vane to be tilted greatly while keeping the vane spaced from the side wall 52 of the hopper 50 so that the discs are not jammed between the upper edge 72 of the vane and the side wall 52 even though the vane is tilted sufficiently to insure sliding of the discs down the grooves 70 and 71 thereof. The above-described hopper feed is simple and inexpensive in its construction, and is highly effective in its operation.

The oscillation of the vane 60 is slow so that the discs in the hopper are agitated only enough to insure proper feeding thereof to the vane. As a result, formation of static charges on the discs is minimized. This substantial prevention of static charges on the discs prevents sticking of the discs in the guide chutes 14 and 15 thereby eliminating jamming from such sticking.

What is claimed is:

1. A hopper feed, which comprises a hopper having a slot formed in a side wall thereof, a vane mounted in a vertical plane and also being mounted for oscillation about a predetermined horizontal axis spaced near said side wall, said vane having an arcuate portion concentric with the axis of oscillation thereof, said arcuate portion extending through and serving to seal the slot in the side wall of the hopper, an upper edge of said vane being joined to the arcuate portion thereof along an extension of a chord of the arcuate portion, said upper edge having a groove

formed therein for receiving articles and for guiding the articles to the arcuate portion of the vane, said arcuate portion having a substantially completely enclosed passage extending through the interior thereof from the groove for receiving the articles from the groove, the end of said passage adjacent to the end of the groove being in alignment with the groove, at least a portion of said passage extending in an arc having the axis of oscillation of the vane as its center, a second arcuate portion concentric with the first-mentioned arcuate portion and having an open, arcuate groove forming a continuation of the arcuate portion of the passage, means for oscillating the vane between predetermined limits, means for holding articles in the arcuate groove, and means mounted tangentially with respect to the arcuate groove and resting on the bottom thereof for deflecting articles out of the last-mentioned groove.

2. A hopper feed, which comprises a hopper having a side wall provided with a slot lying in a vertical plane, a vane disposed vertically in the hopper and having a horizontal axis of oscillation near the slot in the side wall of the hopper, said vane being provided with a groove having a predetermined width and extending along an upper edge thereof for receiving articles, one end of said vane projecting through the slot, a shaft mounting the vane for oscillation about said axis, a portion of said groove extending along said end arcuately about the axis of oscillation of the vane, said end of the vane being provided with an arcuate, segmental guard portion positioned concentric with and over a part of the length of the last-mentioned portion of the groove starting with the beginning of that portion of the groove for preventing articles from being displaced in that portion of the groove and for sealing the upper portion of the slot in the wall of the hopper, said guard portion being provided with a slot positioned over a part of the length of the last-mentioned portion of the groove and having a width substantially less than that of the groove, a guide chute extending tangentially from the open portion of the arcuate portion of the groove, an arcuate blade concentric with the last-mentioned portion of the groove for maintaining articles in the open portion thereof and being designed to have the slot in the guard portion pass thereover during a portion of the movement of the vane, means for guiding articles from the arcuate portion of the groove into the guide chute, and means for oscillating the shaft to oscillate the vane through an angle through which the guard portion spaces the top of the point of the groove at the juncture thereof substantially from the side wall of the hopper to prevent jamming of articles in the hopper.

ALEXANDER C. FRANKWICH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
678,827	Morris	July 16, 1901
821,946	Marshall	May 29, 1906
884,211	Rodd	Apr. 7, 1908
1,149,553	Crehan	Aug. 10, 1915
1,244,466	Buehler	Oct. 30, 1917