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PATENTED NOV. 13, 1906.

F. F. BACKSTROM.
ASSORTING APPARATUS.
APPLICATION FILED DEC. 16, 1905.

4 SHEETS—SHEET 1.

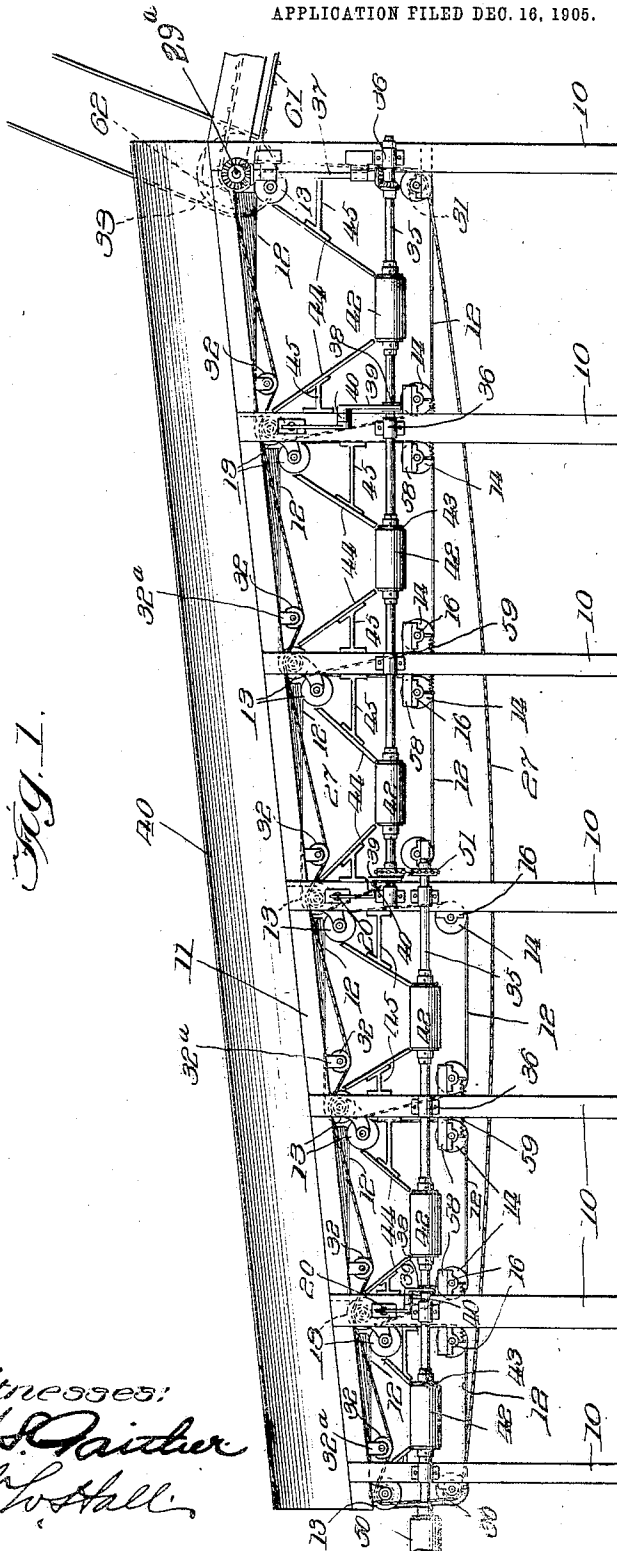


Fig. 1.

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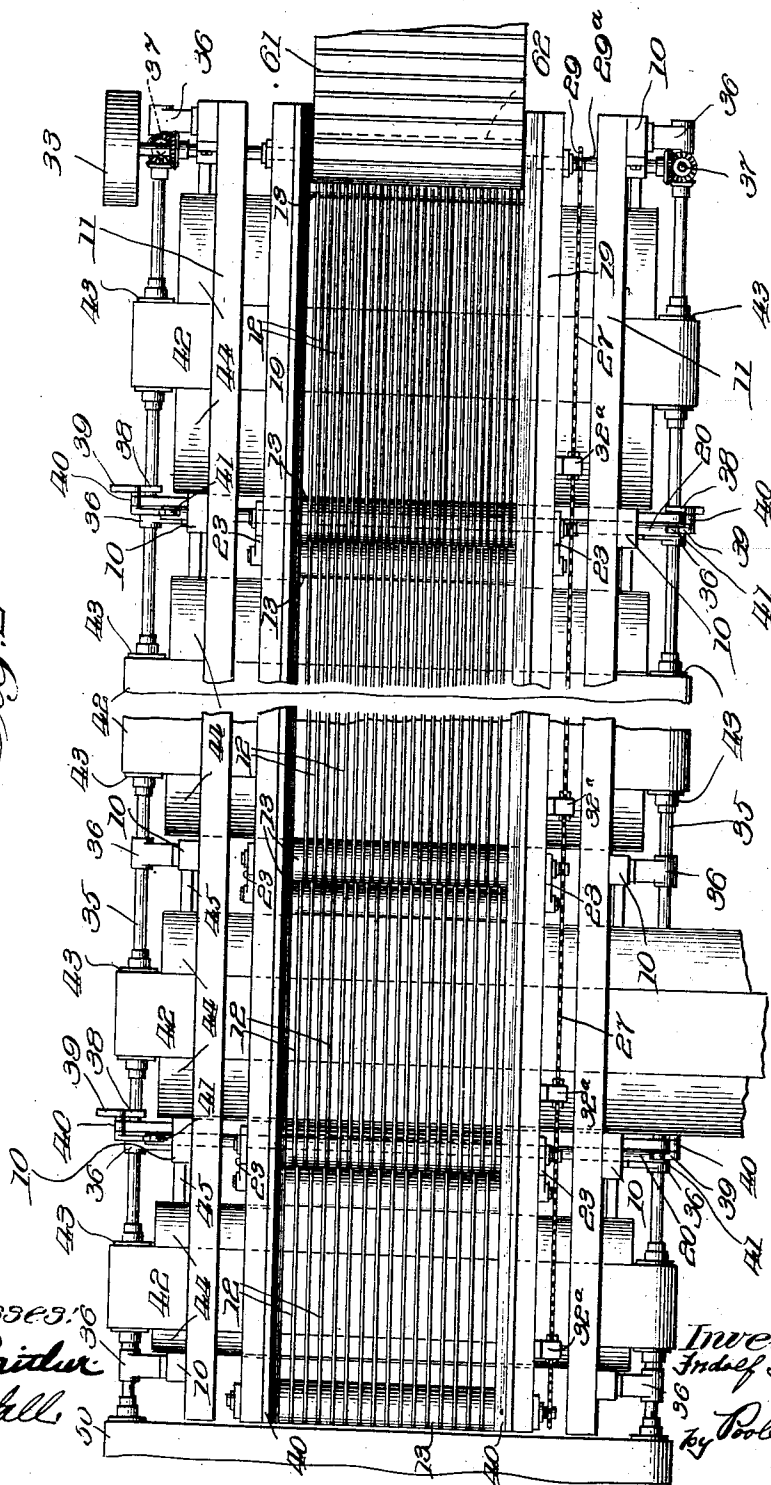
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4 SHEETS—SHEET 2.

Fig. 2



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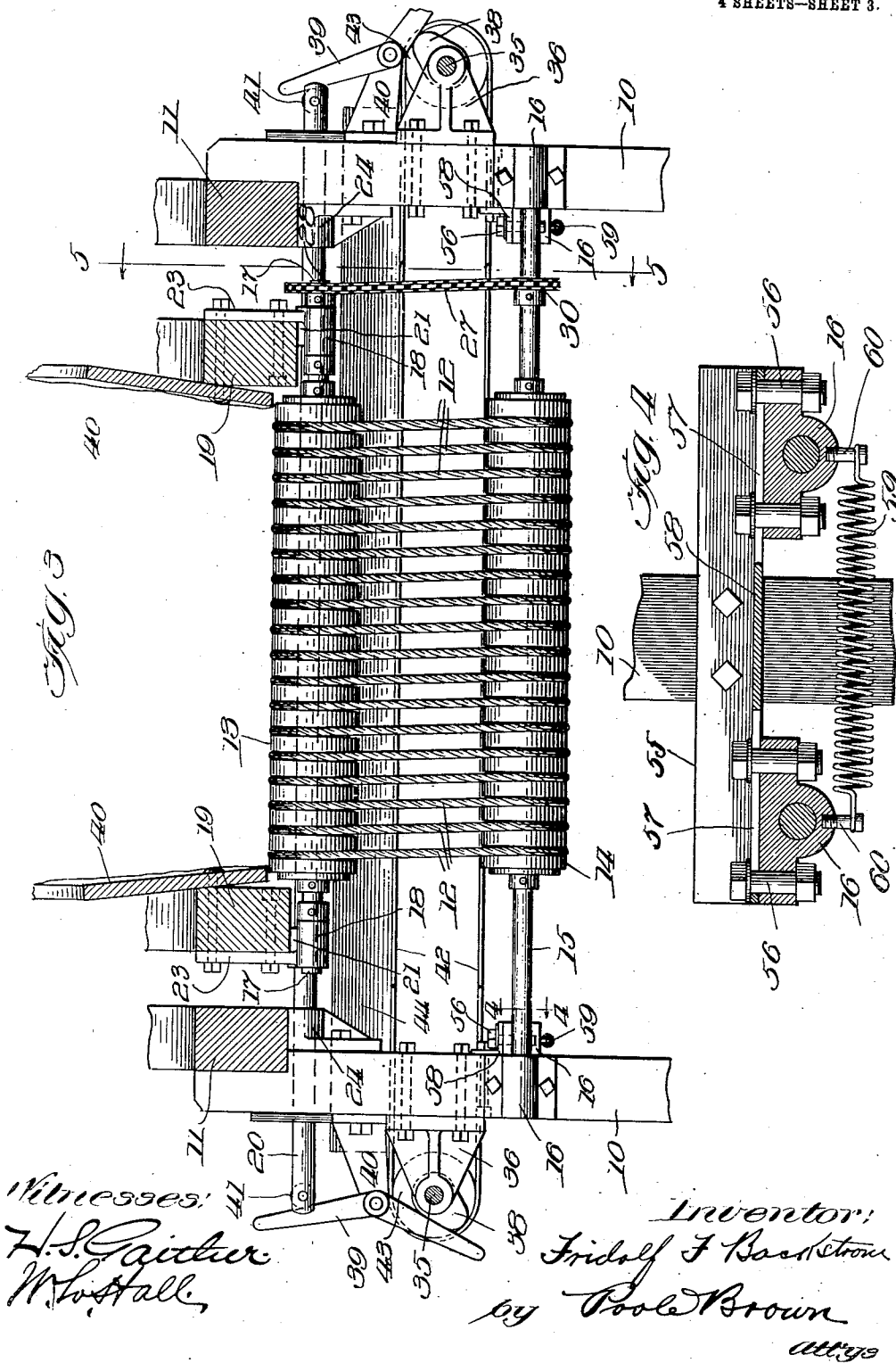
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4 SHEETS—SHEET 3.



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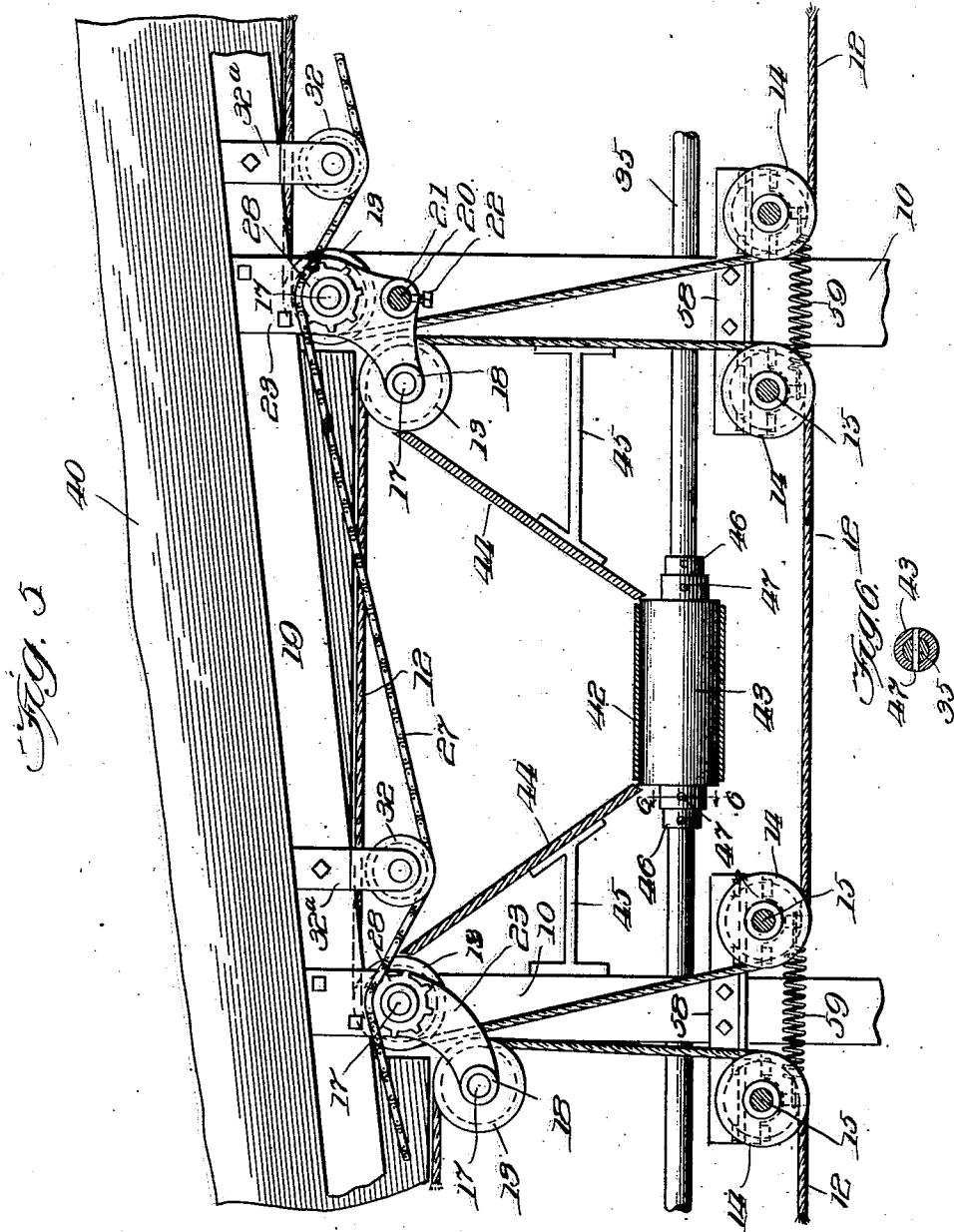
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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ASSORTING APPARATUS.

No. 835,805.

Specification of Letters Patent.

Patented Nov. 13, 1906.

Application filed December 16, 1905. Serial No. 292,042.

To all whom it may concern:

Be it known that I, FRIDOLF F. BACKSTROM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Assorting Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to an improved assorting or grading apparatus designed to receive articles of different sizes from a mass and to assort them into different groups characterized by uniform-sized individual articles in each group. The machine is adapted for use in assorting fruits, nuts, pickles, or, in fact, any article or commodity of varying size which is to be assorted in the manner described.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of a machine made in accordance with my invention. Fig. 2 is a top plan view thereof, partially broken away. Fig. 3 is a transverse vertical section of the machine. Fig. 4 is an enlarged detail section taken on line 4 4 of Fig. 3. Fig. 5 is a vertical longitudinal section taken on line 5 5 of Fig. 3. Fig. 6 is a cross-section taken on line 6 6 of Fig. 5.

An assorting apparatus made in accordance with my invention embraces, in general terms, a plurality of sections located successively one in advance of the other and provided with traveling forwarding-surfaces which carry the articles to be assorted from one end of the apparatus to the other, and the construction of which forwarding-surfaces is such as to provide longitudinal spaces in each section through which the articles to be assorted drop, the space of succeeding sections being made gradually wider from the receiving to the discharge end of the apparatus, so that the smallest articles are dropped through the spaces of the first section of the apparatus, the larger articles are carried to the delivery end of the apparatus, and the articles of intermediate sizes are dropped through the spaces of the forwarding-surfaces of the intermediate sections thereof. The said carrying-surfaces are formed by the upper laps of ropes or strands which are trained about suitably-ar-

ranged pulleys, and the ropes of the several sections are spaced apart the required distance to provide the graduated spaces through which the articles to be assorted are dropped. Means are provided which act upon the articles being assorted to facilitate the passage of said articles through the assorting-spaces formed between the forwarding-ropes. This may be accomplished by mounting the rollers engaged by the upper laps of said ropes in a frame which is given lateral vibration or may be otherwise accomplished. Located beneath the ropes constituting the forwarding-surface of each section in position to receive the articles dropping through the spaces between the ropes are means for conveying away from the apparatus the several sizes of the assorted articles. Said conveying means consists conveniently of transversely-disposed conveyer-belts which travel toward the sides of the apparatus.

I have herein illustrated one approved embodiment of my invention, which is hereinafter described in detail with reference to the drawings; but it will be understood that the apparatus shown is merely illustrative and the detailed description which follows is not intended as limiting the scope of the invention.

The illustrated apparatus comprises an outer frame consisting of a plurality of standards or posts 10 10 and two side rails 11 11, fixed to the upper ends of said posts, said side rails slanting from the receiving to the discharge end of the apparatus.

12 12 designate the ropes or strands the upper laps of which constitute the forwarding and assorting surfaces of the section. The said forwarding-ropes are arranged to constitute a plurality of assorting-sections, each section differing from the others in the width of spaces between the ropes. The several sections of forwarding-ropes are supported upon a common frame, as will hereinafter appear, and, as shown, the ropes of each section are distinct from the ropes of the other sections. The forwarding-ropes of each section are trained about two upper and two lower rollers 13 13 and 14 14, respectively. The shafts 15 of the lower rollers are mounted in bearing-boxes 16, affixed to the standards of the main frame, while the shafts 17 of the upper rollers are mounted in bearing-boxes 18, which are fixed to the side members 19 19 of an inner frame, which latter is the vibratory frame herein-

before described. The transverse members of said inner vibratory frame consist of shafts 20 20, as herein shown, which extend through and are fixed to sleeves 21, Figs. 3 and 5, which are fixed to the side members or rails of the inner frame, the said sleeves 21 being herein shown as made an integral part of a casting 23, on which is formed the bearing-sleeves 18 for shafts of the adjacent upper rollers 13, as indicated in Fig. 5. It will be observed that the upper roller 13 at the discharge end of each section is located somewhat above the level of the adjacent upper roller 13 at the receiving end of the adjoining section, so as to facilitate the delivery of the articles being assorted from one set of forwarding-ropes to the next succeeding set. The bearing-sleeves 18 of such two adjacent upper rollers are therefore conveniently formed integral with the casting 23, as are also the sleeves 21 for the shafts 20 at the points where such sleeves occur. Set-screws 22 22 fix the said shafts 20 to the sleeve 21, Fig. 5.

The rollers 13 and 14 are peripherally grooved to maintain the ropes properly spaced. The upper rollers 13 only partake of the vibratory motion of the inner frame, the lower rollers 14 remaining stationary. Said shafts 20 constitute not only the transverse members of the inner vibrating frame, but are also associated with the devices for giving vibratory motion to the frame, as will hereinafter appear. To this end the shafts extend laterally beyond the outer side frames and have endwise-sliding movement in bearing-brackets 24, that are fastened to the standards 10, as shown in Fig. 3.

The upper rollers 13, about which the ropes are trained, are driven by means of a sprocket-belt 27, which is trained over sprocket-wheels 28, fixed to certain of the upper rollers 13. The said belt is trained also about a sprocket-wheel 29, fixed to the shaft 29^a, extending transversely across the receiving end of the machine, and is trained also about idler sprocket-wheels 30 31, Fig. 1, at the delivery and receiving ends of the apparatus, respectively. The sprocket-belt is held in mesh with the sprocket-wheels 28 of the upper rollers 13 by means of idlers 32, mounted in brackets 32^a, fixed to the adjacent side rail 19 of the vibrating frame. The transverse shaft 29^a constitutes the driving-shaft of the apparatus and is driven through the medium of a belt-wheel 33 at one side of the apparatus. It will be observed that, as herein shown, but one of the upper rollers 13 of each section (that at the discharge end of the section) is driven by the sprocket-belt 27, while the other roller 13 and the lower rollers 14 are idler-rollers.

Referring now to the means for vibrating the inner frame and upper rollers and the upper laps of the forwarding-ropes, these parts are made as follows: 35 35 designate horizon-

tal rotative shafts extending longitudinally of the apparatus, one on each side thereof, and mounted in bearing-brackets 36, extending laterally from the posts 10 of the outer frame of the apparatus. Said shafts are driven from the main shaft 29^a, through the medium of two vertical shafts 37 37, located at the feed end of the apparatus, which are connected at their upper and lower ends, respectively, by beveled gears with said main shaft and said longitudinal shafts 35. In this manner said shafts 35 are rotated in opposite directions. Fixed to said rotary shafts 35 adjacent to each of the transverse shafts 20 of the vibratory frame are cams 38, which engage the lower ends of levers 39 39, pivoted to brackets 40, extending laterally from the main frame of the machine and bearing at their upper ends against the ends of said shafts 20. Preferably said shafts 20 are provided with antifriction-rollers 41, against which the upper ends of said levers 39 directly bear. The cams 38 of the shafts 35 are so set that the levers 39, associated with the opposite ends of each shaft, are swung alternately on their pivots, whereby the levers at one side shift the vibrating frame in one direction and the levers at the other side shift the frame in the opposite direction.

The upper laps of the forwarding and assorting ropes 12 of each section are disposed substantially horizontal, and the receiving end of each forwarding-surface formed by said separated ropes is located below the discharge end of the section in rear thereof, as clearly shown in Figs. 1 and 5. Side boards 40 are provided at the sides of said forwarding-surfaces of the sections, which extend from end to end of the apparatus and hold the articles being assorted properly in place on the belts. The lower margins of said boards 40 are fashioned to fit closely the successively lower elevations of the upper laps of the forwarding-ropes, as indicated clearly in Fig. 5.

Located beneath each section of the upper laps of the forwarding-ropes before described is a conveying device for conveying the assorted articles from the machine. Said conveying devices consist, as herein shown, of transverse belts 42, trained about rollers or pulleys 43 on the side shafts 35, each located centrally beneath the upper laps of the forwarding-ropes of its section. The assorted articles are directed to said shelf 42 by means of oblique directing-boards 44 44, which are fastened to the posts 10 of the main frame by means of brackets 45 45. Said pulleys 43 are fixed to the shafts 35 between collars 46, which hold the pulleys from endwise movement. The companion pulleys 43 on opposite sides of the apparatus, about which each belt 42 is trained, are loosely mounted upon the shafts 35, and one pulley of each pair is

designed to be fixed to the shaft by pins 47, extending through the reduced ends of the pulley and the associated shaft, Fig. 6, while the other pulley of the pair is designed to remain loose on its shaft. The fast pulleys therefore constitute the driving-pulleys, while the loose pulleys are idlers. Each belt or conveyer 42 may therefore be driven in either of two opposite directions by fixing one or the other of its pulleys to the rotating shafts 35. In this manner the articles being assorted may be delivered to either side of the machine. If desired, one or all of said discharging belts or conveyers 42 may be extended some distance laterally from the machine, so as to carry the assorted articles to a distant place. One of the belts 42 is shown in Fig. 2 as thus extending from the machine. The larger articles, which do not pass through the spaces between the forwarding-ropes, are discharged from the last section upon a transverse conveyer-belt 50, like the belt 42, Figs. 1 and 2, which direct the said larger articles laterally away from the apparatus.

The apparatus may be provided with any number of assorting-sections desired. In some instances the length of the apparatus will make it desirable that each shaft 35 be made of two parts or sections disposed in different horizontal planes and connected at their ends by sprocket-belts 51, trained about sprocket-wheels on the adjacent ends of said sections. This arrangement is advantageous in a long apparatus, inasmuch as it avoids locating the ends of the shafts at the receiving end of the apparatus and the conveyer-belts 42, carried thereby, too far below the upper laps of the assorting-ropes, thus avoiding too great a distance of the drop for the smaller articles.

Certain of the bearings 16 for the shafts 15 of the lower rollers 14 are fixed stationary to the posts 10 of the outer frame. To provide means of taking up the slack of the forwarding-ropes, others of the bearings 16 for the shafts of said lower rollers are fastened to said outer frame by means permitting movement of the bearings and said rollers. A convenient construction by which this result is effected is shown in Fig. 4, wherein two adjacent bearings 16 are attached to an angle-bar 55, that is bolted to an adjacent post 10 of the outer frame. Said bearings 16 are attached to the said angle-bar by means of bolts 56, which extend through lugs of said bearings and through longitudinal slots 57 in the horizontal flange 58 of said angle-bar, the attachment being sufficiently loose to permit the bearings to move toward and from each other. A spiral contractile spring 59 is stretched between and is connected with said two bearings in a manner to draw them together, and thereby take up the slack of the ropes of the two sections associated with said

lower rollers. As herein shown, each spring 59 is attached at its ends to studs 60 60, that have screw-threaded engagement with said bearings 16. The articles being assorted which do not pass between the ropes of the first section are carried to the succeeding sections, the various sizes of said articles finding and falling through their proper spaces.

The articles to be assorted are delivered to the receiving end of the apparatus by means of a delivery-belt 61, that is trained about a roller 62, (shown in dotted lines in Fig. 1,) fixed to the driving-shaft 29^a, said roller being located a distance over the receiving end of the forwarding-surface constituted by the ropes 12 of the first section.

The operation of my improved assorting apparatus will be obvious from the foregoing. The articles to be assorted are delivered in mass by the feed-belt 61 to the forwarding and assorting surface of the first section and are by the ropes constituting said surface advanced forwardly thereover. During the forward movement of said articles over said forwarding-surface the inner frame is vibrated laterally in a manner to facilitate the agitation of the articles and the smaller articles pass through the spaces between the ropes constituting the forwarding-surface of said first section. The articles which do not pass through the ropes of any given section are delivered successively to the next forward section. The largest articles of the mass are finally delivered by the forwarding-ropes of the last section to the transverse conveyer-belt 50 at the discharge end of the apparatus. The articles of assorted sizes are carried by the conveyer-belts 42 to either side of the machine desired in assorted lots and delivered to suitable receptacles placed to receive the same.

I claim as my invention—

1. In an assorting-machine for the purpose set forth, a plurality of traveling forwarding-surfaces, each formed with a plurality of closely-spaced, parallel, longitudinal, assorting-spaces through which articles to be assorted drop, said forwarding-surfaces being disposed in sections located successively one in advance of the other from the receiving to the discharge end of the apparatus, and the spaces of each succeeding section being wider than the last section.

2. In an assorting-machine, a plurality of traveling forwarding-surfaces having parallel, longitudinal, assorting-spaces through which articles to be assorted drop, said forwarding-surfaces being disposed in sections located successively one in advance of the other from the receiving to the discharge end of the apparatus, and the spaces of each succeeding section being wider than the last section, the several forwarding-surface sections being located in different horizontal planes, and the discharge end of each section being

located above and in position to deliver articles to the receiving end of the next forward section.

3. In an assorting-machine for the purpose
5 set forth, a plurality of assorting and forwarding surfaces, each formed with a plurality of closely-spaced, parallel spaces through which articles to be assorted pass, said surfaces being disposed in sections located successively one in advance of the
10 other from one end of the machine to the other, the spaces of each succeeding section being wider than the last section, and means located beneath each traveling-surface section which receive the assorted articles which
15 drop through said spaces, and convey the assorted articles away from the machine.

4. In an assorting-machine for the purpose set forth, a plurality of traveling, laterally-
20 vibrating, forwarding-surfaces, each formed with a plurality of closely-spaced, parallel, longitudinal, assorting-spaces through which articles to be assorted drop, said forwarding-surfaces being disposed in sections located
25 successively one in advance of the other from the receiving to the discharge end of the apparatus, and the spaces of each succeeding section being wider than the last section.

5. An assorting-machine including a forwarding-surface consisting of a plurality of
30 elongated, transverse, grooved rollers and ropes trained about said rollers, the upper laps of which constitute forwarding-surfaces, and the spaces between the ropes constituting assorting-spaces through which the articles to be assorted drop by gravity, said rollers
35 being arranged to dispose the said upper laps of the ropes one in advance of the other with the receiving end of each forwarding-surface in position to receive the articles being assorted from the forwarding-surface
40 next in rear thereof.

6. An assorting-machine including a traveling forwarding-surface consisting of a plurality
45 of ropes trained about rollers and spaced at gradually-widening distances apart from the receiving to the discharge end of the machine, and means for laterally vibrating said rollers and the ropes.

7. An assorting-machine for the purpose
50 set forth comprising a frame, a plurality of rollers mounted transversely in said frame, and closely-spaced parallel forwarding ropes trained about said rollers and disposed in
55 sections, one in advance of the other, the upper laps of which constitute forwarding-surfaces, the ropes of the several sections being spaced gradually farther apart from the receiving to the delivery end of the machine to
60 provide spaces of increasing width through which the articles to be assorted drop.

8. An assorting-machine comprising a frame, a plurality of rollers mounted transversely in said frame, and parallel forwarding-ropes trained about said rollers and dis-

posed in sections, one in advance of the other, the upper laps of which constitute forwarding-surfaces, the ropes of the several sections being spaced gradually farther apart from the receiving to the delivery end of the machine to provide spaces of increasing width
70 through which the articles to be assorted drop, and means operating upon the articles being assorted to facilitate the delivery thereof through spaces between said ropes 75

9. An assorting-machine comprising a main frame, a frame supported thereby, means for vibrating the latter frame, a plurality of rollers mounted transversely in said
80 latter frame, and parallel forwarding-ropes trained about said rollers and disposed in sections one in advance of the other, the upper laps of which constitute forwarding-surfaces, the ropes of the several sections being spaced gradually farther apart from the receiving to the delivery end of the machine to
85 provide spaces of increasing width through which the articles to be assorted drop.

10. An assorting-machine comprising a main frame, a frame supported thereby, means
90 for vibrating the latter frame, a plurality of rollers mounted transversely in said latter frame, and parallel forwarding-ropes trained about said rollers and disposed in sections one in advance of the other, the upper
95 laps of which constitute forwarding-surfaces, the ropes of the several sections being spaced gradually farther apart from the receiving to the delivery end of the machine to provide spaces of increasing width through
100 which the articles to be assorted drop, and the upper laps of the ropes of the several sections being disposed in different planes, with the discharge ends thereof located above and in position to deliver the articles to the receiving
105 ends of the other sections.

11. An assorting-machine comprising a stationary frame, a vibratory frame supported therein, transverse upper and lower rollers
110 mounted respectively in the vibratory and stationary frames, means for vibrating the vibratory frame and the rollers mounted therein, and a plurality of parallel forwarding-ropes trained about the upper and lower rollers, the upper laps of which constitute forwarding-surfaces, said ropes and rollers
115 being so disposed as to constitute a plurality of sections of forwarding-surfaces located one in advance of the other, and the ropes of the several sections being spaced at gradually-widening distances apart from the delivery to the discharge end of the machine. 120

12. An assorting-machine comprising a stationary frame, a vibratory frame supported therein, transverse upper and lower rollers
125 mounted respectively in the vibratory and stationary frames, means for vibrating the vibratory frame and the rollers mounted therein, and a plurality of parallel forwarding-ropes trained about the upper and lower 130

rollers, the upper laps of which constitute forwarding-surfaces, said ropes and rollers being so disposed as to constitute a plurality of sections of forwarding-surfaces located one
 5 in advance of the other, the ropes of the several sections being spaced at gradually-widening distances apart from the delivery to the discharge end of the machine, and transverse conveying-belts located beneath the upper
 10 laps of the sections of the forwarding-ropes for conveying the assorted articles laterally away from the machine.

13. An assorting-machine comprising a main frame, a vibratory frame supported
 15 therein, upper and lower rollers carried respectively by said vibratory and main frame, said vibratory frame comprising longitudinal rails in which the upper rollers are mounted and transverse shafts attached thereto and
 20 extending outwardly through and having sliding engagement with the main frame, ropes trained about said rollers, the upper laps of which constitute traveling forwarding-surfaces, and spaced gradually farther
 25 apart from the receiving to the discharge end of the machine, and opposing cams acting upon said transverse shafts for operating said vibratory frame.

14. An assorting-machine comprising a
 30 traveling forwarding and assorting surface provided with spaces through which the articles to be assorted drop, said spaces increasing in width from the receiving to the dis-

charge end of the machine, conveyer-belts
 35 extending transversely beneath the forwarding-surfaces and adapted to receive the articles that drop through the spaces of said forwarding-surface, and means whereby said
 40 belts may be driven toward one side of the machine or the other as desired.

15. An assorting-machine comprising a traveling forwarding and assorting surface
 provided with spaces through which the articles to be assorted drop, said spaces increasing
 45 in width from the receiving to the discharge end of the machine, conveyer-belts extending transversely beneath the forwarding-surfaces, pulleys about which said conveyer-belts are trained, rotative shafts upon
 50 which said pulleys are mounted, said shafts rotating in opposite directions, and means for detachably fixing said pulleys to said shafts, designed to fix one of the pulleys associated with each belt to its shaft and to release the other pulley from its shaft and vice
 55 versa, whereby the belts may be made to travel toward either side of the machine.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 11th day of December, A. D. 1905.

FRIDOLF F. BACKSTROM.

Witnesses:

W. L. HALL,
 G. R. WILKINS.