April 28, 1925. 1,535,678

J. E. MILLER

STACKING MACHINE

Filed Oct. 8, 1923 5 Sheets-Sheet 1

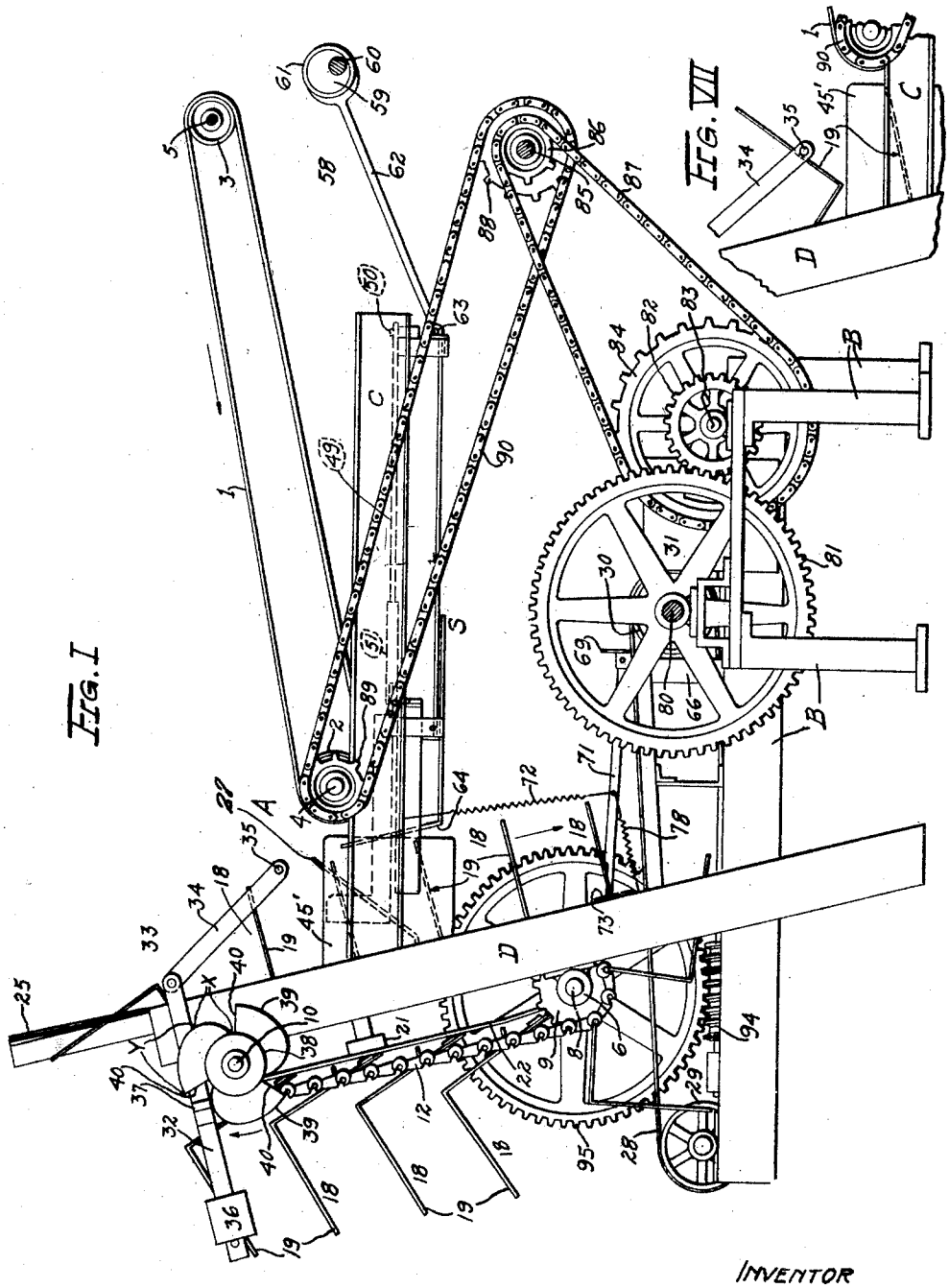


FIG. I

FIG. VII

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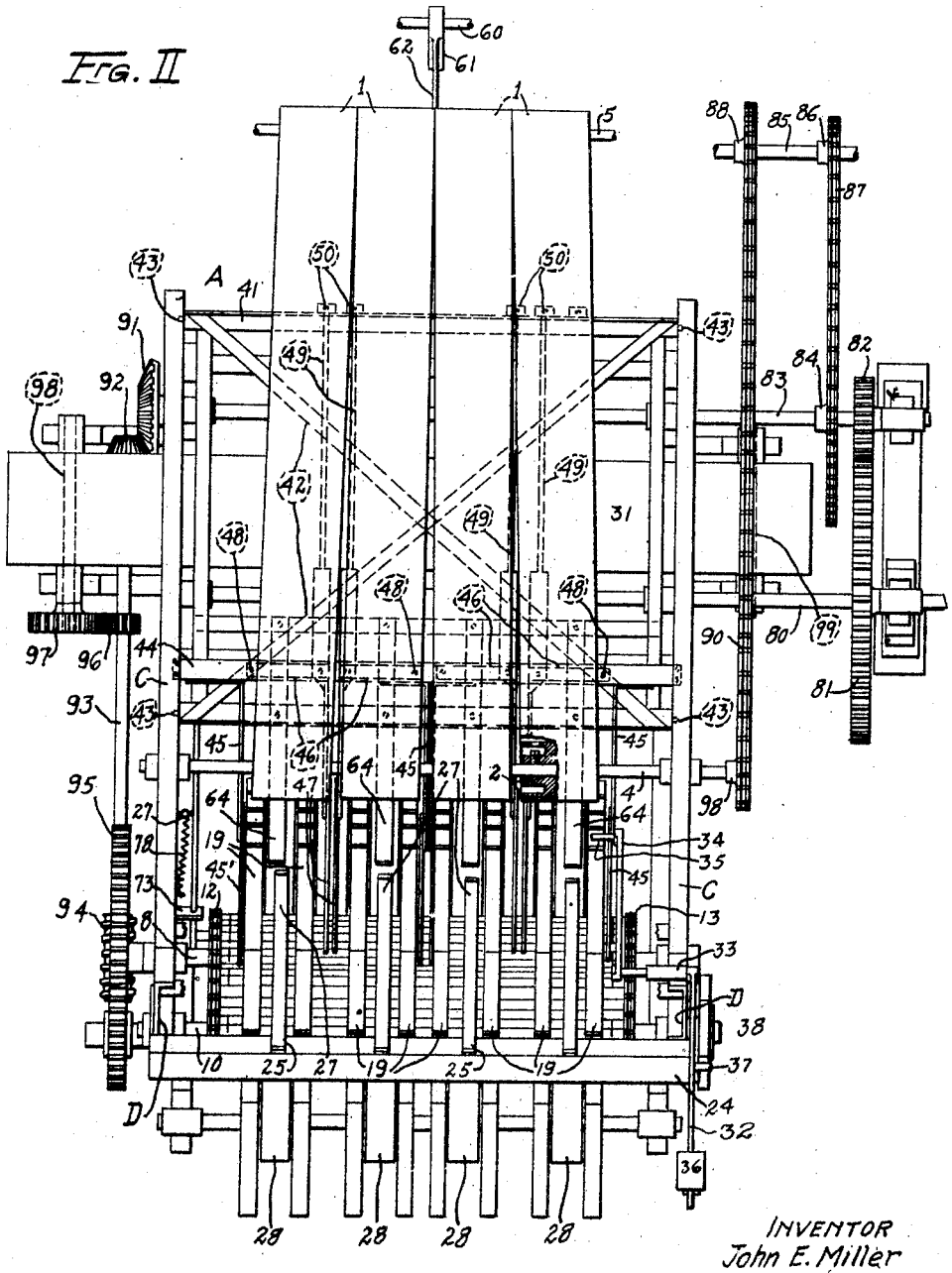
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FIG. II



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1,535,678

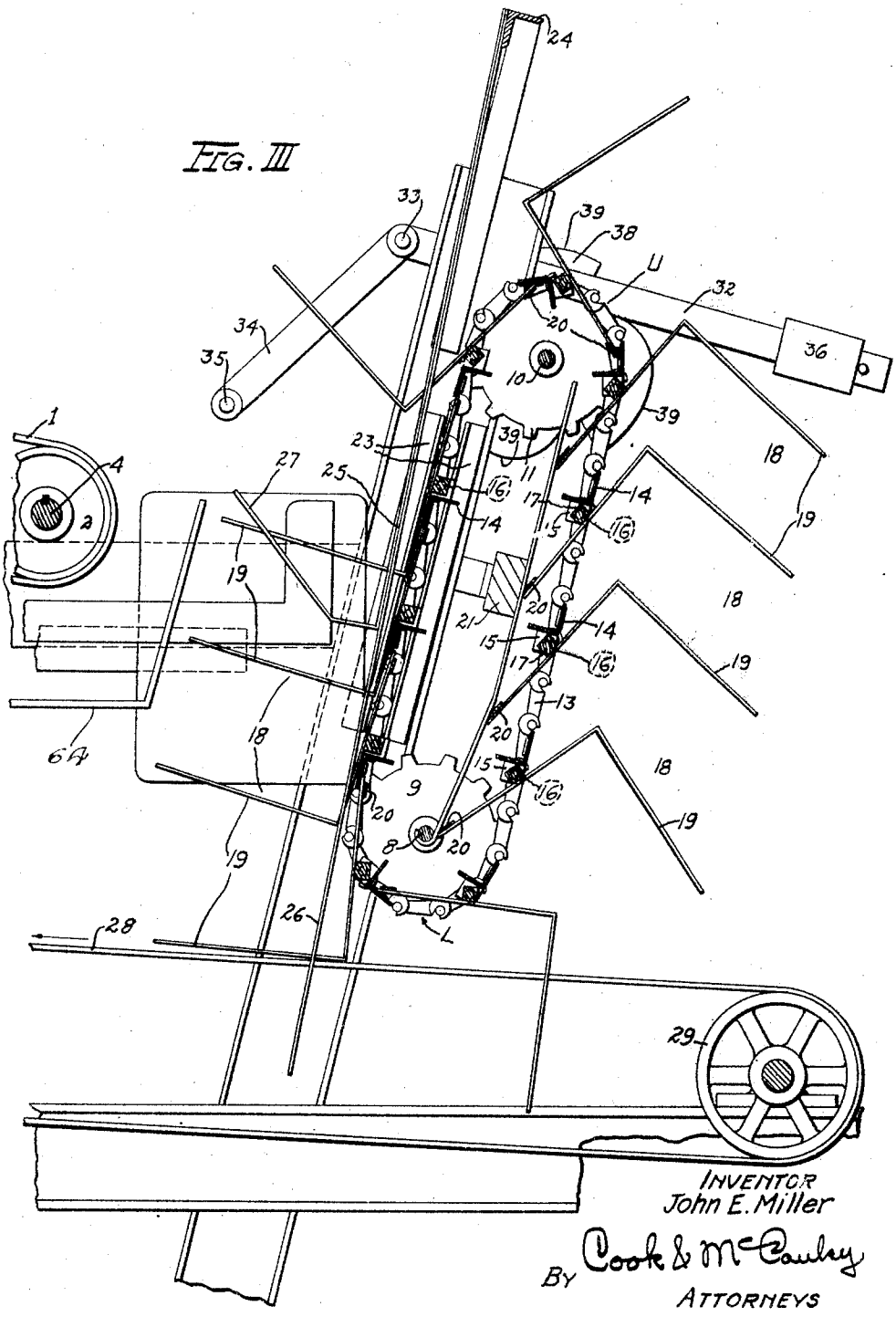
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FIG. III



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FIG. IV

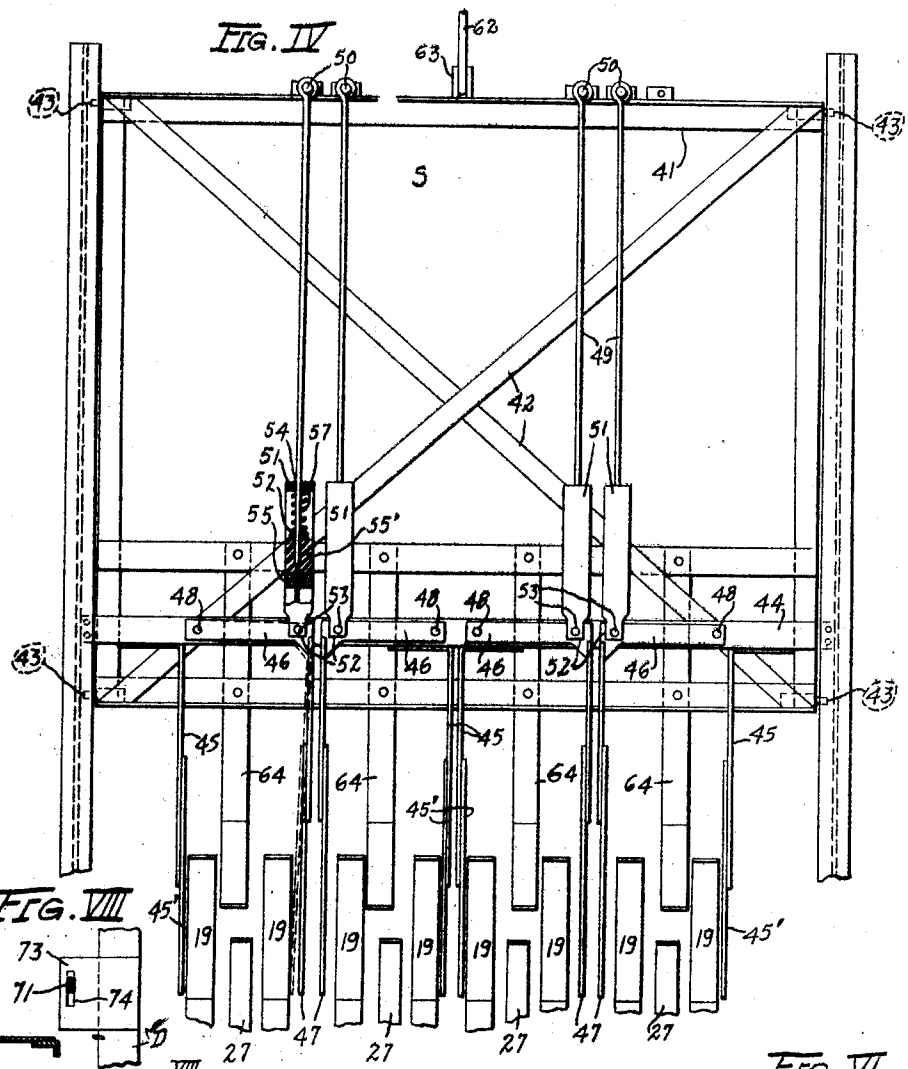


FIG. VIII

FIG. V

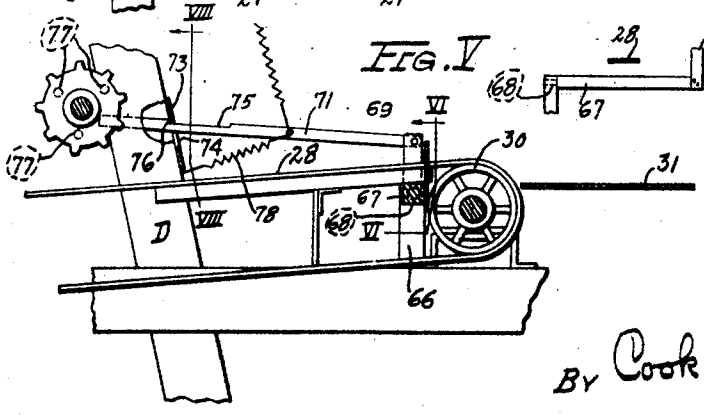
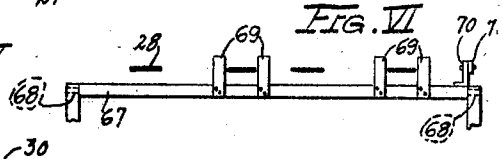


FIG. VI



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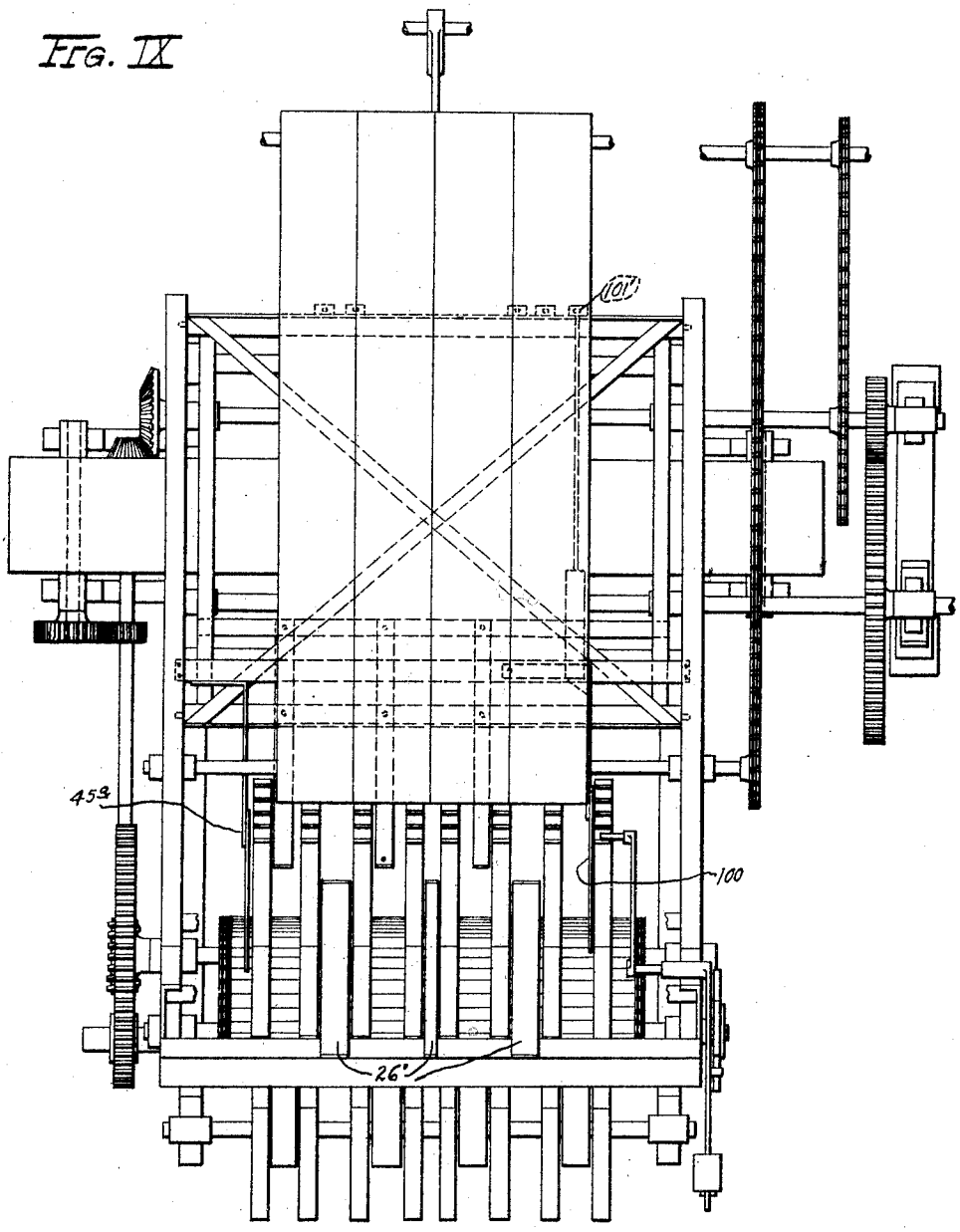
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STACKING MACHINE

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FIG. IX



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Patented Apr. 28, 1925. 1,535,678

UNITED STATES PATENT OFFICE.

JOHN E. MILLER, OF MARSEILLES, ILLINOIS, ASSIGNOR TO CERTAIN-TEED PRODUCTS CORPORATION, OF ST. LOUIS, MISSOURI, A CORPORATION OF MARYLAND.

STACKING MACHINE.

Application filed October 8, 1923. Serial No. 667,223.

To all whom it may concern:

Be it known that I, JOHN E. MILLER, a citizen of the United States of America, a resident of Marseilles, in the county of La Salle, State of Illinois, have invented certain new and useful Improvements in Stacking Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings forming a part of this specification.

This invention relates generally to stacking machines, and particularly to a stacking machine which is intended for use in arranging shingles or like articles in stacks, each of which contains a predetermined number of said shingles or other articles.

Briefly stated, my invention comprises an endless conveyor to which the shingles or other articles are delivered individually. Arranged adjacent to the discharge end of said endless conveyor is a mechanism provided with a plurality of receiving baskets. The baskets mentioned travel vertically with relation to the endless conveyor, said baskets moving downwardly after receiving their loads. The mechanism with which the baskets are associated is so timed and the baskets are so arranged thereon that each basket will receive a predetermined number of shingles, which shingles will then be carried downwardly by said baskets and be deposited in stacks on another endless conveyor to be conveyed thereby to the position of an operator, who will place a binding cord around the stacks of shingles or other articles.

With the foregoing and other objects in view the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown the preferred embodiment of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Fig. I is a side elevation of my improved stacking machine.

Fig. II is a plan view of the stacking machine shown in Fig. I.

Fig. III is a vertical section through the mechanism which supports the shingle-receiving baskets and the mechanism adjacent thereto.

Fig. IV is a fragmentary plan view illustrating the straightening mechanism of my improved stacking machine, an element of said mechanism being shown in section.

Fig. V is a fragmentary vertical section showing the mechanism for controlling the discharge of certain of the stacks of shingles from the machine.

Fig. VI is a section on line VI—VI of Fig. V.

Fig. VII is a fragmentary view showing certain parts of the machine as they will appear when the row of baskets following the baskets being loaded is retarded.

Fig. VIII is a section on line VIII—VIII, of Fig. V.

Fig. IX is a plan view showing my improved stacking machine as it will appear when arranged to handle 4-width shingles.

In the drawings, A designates my improved stacking machine which includes a suitable supporting frame, said supporting frame comprising lower frame members B, upper frame members C, and end frame members D. The frame members B, C and D are bolted or otherwise secured together to produce a rigid frame upon which the mechanism of the machine is supported.

Located at the upper portion of the stacking machine A is an endless conveyor comprising a plurality of endless belts 1, said belts being arranged to operate over pulleys 2 and pulleys 3. The pulleys 2 are mounted on a shaft 4 which is supported in bearings secured to the upper frame member C, and the pulleys 3 are fixed to a shaft 5 which may be supported in any convenient manner adjacent to the point where the shingles are delivered to the endless belts 1. The pulleys 3 are permanently fixed to the shaft 5 in such positions that the side edges of the adjacent belts 1 are in close proximity to each other, but the pulleys 2 are slidably mounted on the shaft 4 so that they may be adjusted longitudinally of said shaft to provide spaces between the end portions of the adjacent belts when these spaces are desired. To permit the adjustment of the pulleys 2 as described, I provide said pulleys with set screws which secure said pulleys to said shaft 4, which set screws may be unscrewed when it is desired to move said pulleys on said shaft.

Secured to the oppositely disposed end frame members E is a pair of lower bearings

6 and a pair of upper bearings 7, said bearings 6 supporting a shaft 8 on which is mounted a pair of sprocket wheels 9, and said bearings 7 supporting a shaft 10 on which is mounted a pair of sprocket wheels 11. Arranged adjacent to one of the end frame members D and operating over one of the sprocket wheels 9 and one of the sprocket wheels 11 is a sprocket chain 12, and arranged adjacent to the other end frame member D and operating over the other sprocket wheels 9 and 11 is a similar sprocket chain 13. 14 designates a plurality of angle bars which are carried by the sprocket chains 12 and 13, the opposite end portions of each of said angle bars being secured to the oppositely disposed sprocket chains, and said angle bars spanning the space between said sprocket chains.

Fixed to each angle bar 14 is a pair of bearings 15 which receive the circular end portions 16 of one of the non-circular bars 17, one of said non-circular bars being supported by each associated pair of bearings 15, and because of the circular end portions of said bars extending into circular openings in said bearings, said bars are capable of rotation. 18 designates receiving baskets which are secured to the non-circular bars 17, each of said bars being provided with a plurality of said receiving baskets. Each receiving basket comprises a pair of L-shaped bars 19 which are secured to the associated bar 17, and each bar 17 is preferably provided with four of the receiving baskets 18. Consequently there will be eight of the L-shaped bars 19 secured to each bar 17. To add rigidity to the basket structure a bar 20 extends from the L-shaped bar adjacent to one end of each bar 17 to the opposite end of said bar 17, and each of said L-shaped bars of each group is secured to the associated bar 20. 21 designates a member which extends transversely of the machine at a point between the shafts 8 and 10, said member being supported by the end frame members D. Secured to the transverse member 21 is a plurality of vertical guide members 22, said guide members each being provided with a hooked lower portion which partially surrounds the shaft 8 (Fig. III). The utility of the guide members 22 will be subsequently pointed out.

Secured to each of the frame members D is a pair of angle bars 23 which are so arranged relative to each other that a guideway is provided. One of these guideways is located adjacent to the sprocket chain 12 and another of said guideways is located adjacent to the sprocket chain 13. Said sprocket chains 12 and 13 pass through said guideways. By the use of the guideways described, it is apparent that when shingles are deposited in the baskets carried by the sprocket chains 12 and 13, said chains will not be permitted to move rearwardly under the weight of said shingles.

Arranged at a point above the end frame members D and supported by said frame members is an angle bar 24 from which is suspended pairs of guide members 25 and 26, there being one pair of guide members 25 and 26 between the associated L-shaped bars of each basket 18. The guide members 25 each terminate at a point adjacent to the pulleys 2, and said guide members are each provided with an upwardly inclined portion 27. The guide members 26 are comparatively straight and extend downwardly some distance below the sprocket wheels 9. The purpose of the guide members 25 is to guide the shingles into the baskets, and the purpose of the guide members 26 is to insure the discharge of said shingles from said baskets, and the manner in which these guide members perform their functions will be subsequently pointed out.

Arranged below the basket-carrying mechanism and below the endless belts 1 is a group of endless belts 28, said belts being adapted to operate over pulleys 29 and 30 and being arranged to travel in the direction indicated by the arrow in Fig. III. Located adjacent to the pulley 30 and traveling in a direction which is approximately at a right angle to the direction of travel of the belts 28 is an endless belt 31 which is arranged to travel over suitable pulleys. The position and elevation of the belt 31 is such that stacks of shingles or other articles being carried by the belts 28 will be deposited on the belt 31 when said stacks of shingles pass over the pulley 30.

Later in the specification the exact operation of the machine will be set forth in all of its details, but it would probably be well at the present point to know that shingles or other articles are deposited on the endless belts 1 and are carried by said belts toward the basket-carrying mechanism. The belts 1 travel rather rapidly, and when each article reaches a point adjacent to the pulley 2 said article is projected into one of the baskets 18. The baskets 18, when in position to receive their loads and after receiving said loads, move slowly downwardly with respect to belts 1, and when the baskets in one row have received their loads the baskets of the next row will be in the proper positions to receive their loads. My improved stacking machine includes mechanism for controlling the movement of the row of baskets immediately succeeding the baskets to which shingles are being delivered, so that said first mentioned baskets will not interfere with the delivery of shingles to said load-receiving baskets, and this mechanism will now be described.

32 designates a lever which is pivoted at the point designated by the reference char-

acter 33 to one of the end frame members D. The lever 32 is provided with a downwardly inclined forward portion 34 which is provided with a pin 35 adjacent to its end. The lever 32 is provided with a counterbalance weight 36 and is also provided with an outwardly extending projection 37. Fixed to the shaft 10 at a point adjacent to the lever 32 is a cam 38 having a plurality of cam faces 39 which successively contact with the projection 37 on the lever 32 (Fig. I). In the operation of the machine assume that shingles are being deposited on the endless belts 1 and that said shingles are being carried forwardly by said belts and are being delivered to the baskets of a transverse row of baskets. The sprocket chains 12 and 13 are constantly driven, and if some provision were not made to prevent it the row of baskets following the baskets receiving the shingles from the belts 1 might interfere with the delivery of shingles to said last mentioned baskets. To prevent the interference mentioned, the cam faces 39 are so shaped that when the cam is rotating in the direction indicated by the arrow in Fig. I they will act upon the projection 37 to cause the rearmost end of the lever 32 to be lifted. This will cause the forward end of said lever to move downwardly, whereby the pin 35 will be moved into the path of travel of one of the L-shaped bars 19 of the row of baskets following the row of baskets being loaded. When said L-shaped member is moved downwardly a sufficient distance it will contact with said pin and the continued downward movement of the baskets will cause the bar 17 to which said baskets are attached to be rocked in its bearings. This will cause the L-shaped bar contacting with the pin 35 and its associated L-shaped bars on said bar 17 to be swung in an arc of a circle, as indicated in Fig. VII. With the baskets immediately following the baskets receiving their loads being retarded as described, it is apparent that the shingles may be projected from the belts 1 into the baskets in the loading positions without interference from the other baskets. Each of the cam faces 39 includes a portion X which is eccentric to the circumferential face of the shaft 10. During the period that one of these portions X is in contact with the projection 37, and when the cam 38 is rotating in the direction indicated by the arrow in Fig. I, the rearmost end portion of the lever 32 will be moved upwardly due to the shape of said portion X. This, of course, will cause the pin 35 on the forward end of the lever 32 to be moved downwardly and rearwardly into the path of travel of one of the L-shaped bars of the row of baskets following the row of baskets being loaded. Each cam face 39 also includes a portion Y. This portion is concentric with the circumferential face of the shaft 10, and during the period of the rotation of the cam that one of these portions is contacting with the projection 37 the end of the lever which is provided with the pin 35 will be stationary and will be retained in its innermost position. Each cam face terminates abruptly in a shoulder 40, so that when the portion Y has traveled a sufficient distance to permit the shoulder 40 to pass beyond the projection 37 the counterbalance weight 36 will cause the rearmost portion of the lever 32 to drop downwardly until the projection 37 strikes the hub of the cam 38. This will cause the pin 35 to be withdrawn from beneath the L-shaped bar with which it was in contact, and will permit the row of baskets of which said L-shaped bar forms a part to drop into position to receive their loads. The cam 38 is so timed with relation to the baskets that the pin 35 starts to move into the path of travel of one of the L-shaped bars of the row of baskets following the baskets receiving their loads as soon as the first shingles are delivered to said last mentioned baskets, and said pin is withdrawn from the path of travel of said L-shaped bar immediately after the last shingles of the loads of said baskets have been delivered thereto, thus permitting the baskets which have been retarded to drop suddenly into place so that they may receive the next row of shingles projected from the belts 1.

S designates the shingle-straightening mechanism of my improved shingle stacker, which mechanism comprises a rectangular frame 41 composed of a plurality of members secured together and braced by the members 42 to produce a rigid carriage. Located at each corner of the rectangular frame 41 is an outwardly extending member 43. The rectangular frame 41 is located between the pair of upper frame members C, said frame members preferably being I-beams, and the outwardly extending members 43 rest upon the lower flanges of said I-beams, whereby said rectangular frame is slidably supported. Secured to the frame members C immediately above the rectangular frame 41 is a bar 44, the position of said bar being fixed and the rectangular frame being adapted to move relative to said bar. Secured to the bar 44 is a plurality of members 45, there being one of said members associated with each basket 18, and each of said members 45 being provided with a plate 45′ which may be secured to the member 45 in any convenient manner. Pivoted to the fixed bar 44 is a plurality of bell crank levers 46, each of said bell crank levers having an extension 47 attached to it, and said bell crank levers being pivoted to said bar 44 at the points indicated by the reference character 48. 49 designates a plurality of rods each of which is pivotally secured to the rec-

tangular frame 41 at the point indicated by the reference character 50. Associated with the rods 49 is a plurality of members 51, each of which comprises a pair of bars spaced apart one from the other. The bars of each of the members 51 are provided with portions 52 which incline toward each other, and each of said members is provided with apertures which are located in these portions and which are adapted to receive a pivot pin 53. The members 51 are pivotally attached to the bell crank levers 46, as shown in Fig. IV, one of said bell crank levers and one of said members 51 being connected together by means of one of the pivot pins 52. The members 51 are each provided with a fixed end wall 54 and a fixed intermediate wall 55, each of said walls 54 and 55 being provided with an aperture through which the associated rod 49 passes. The rods 49 are each provided with a fixed collar 56 which is located approximately midway between the fixed walls 54 and 55 of the associated member 51. Interposed between the intermediate wall 55 of each member 51 and the collar 56 of the associated rod is a block of resilient material 55′ such as rubber, and interposed between the collar 56 and the end wall 54 is a coil spring 57.

58 designates the mechanism for reciprocating the rectangular frame 41 relative to the frame members C and comprises an eccentric disk 59 mounted on a shaft 60 which is supported in suitable bearings (not shown). Associated with the eccentric disk 59 in the usual manner is an eccentric strap 61, which strap is provided with an eccentric rod 62, the end of said rod opposite to the end connected to the eccentric strap being pivotally attached at the point indicated by the reference character 63 to the rectangular frame 41. Secured to the rectangular frame 41 in fixed positions is a plurality of straightening members 64, said members 64 each having an upwardly extending portion 65 which is intended for a purpose hereinafter set forth.

In the operation of my improved stacker the loads of a transverse row of baskets are deposited on endless belts 28 simultaneously. However, it is not desirable in the use of the machine illustrated in the drawings to deliver four stacks of shingles to the endless belt 31 at the same time. This is due to the fact that two of the stacks of shingles delivered to the belt 31 comprise a complete bundle of shingles as they are marketed. It is, therefore, desirable to deliver two stacks of shingles to the belt 31 at a time, so that an operator may tie the various pairs of stacks together, and to permit this I provide my machine with mechanism which will retard the movement of two stacks of every group of four stacks of shingles, so that only two stacks of shingles will be delivered at a time to the endless belt 31. The mechanism referred to above will now be described.

Extending upwardly from certain of the lower frame members B is a pair of supporting members 66, which members are separated from each other a distance somewhat greater than the width of the group of endless belts 28. Arranged between the pair of supporting members 66 is a bar 67, said bar being non-circular in cross section and being provided with circular end portions 68 which extend into circular apertures in said supporting members 66 (Fig. V). Secured to and extending upwardly from the square portion of the bar 67 is a plurality of stops 69. The stops 69 are arranged in pairs, there being two pairs of stops and said pairs of stops being located adjacent to two of the endless belts 28. The stops 69 are so arranged that if they were held rigid any articles being carried by the belts with which said stops are associated, and which articles extend over the side edges of said belts a sufficient distance, would strike said stops and would be arrested thereby, the belts 28 being permitted to slide beneath said arrested articles. Secured to the bar 67 and extending upwardly therefrom is an ear 70 to which is attached an end of a bar 71, the opposite end of said bar being supported by a coil spring 72 which is secured to said bar and to some stationary part of the machine. Secured to an end frame member adjacent to the bar 71 is a plate 73, said plate being provided with an elongated slot 74 through which the bar 71 extends. The free end of the bar 71 is held in contact with the upper wall of the elongated slot 74 by the spring 72, and said bar is provided with a notch 75 to produce a shoulder 76. When the shoulder 76 is in contact with the rear face of the plate 73, as shown in Fig. V, the bar 71 is prevented from moving forwardly. Consequently any article or stack of articles which is being carried by the belts with which the stops are associated and which come into contact with said stops would be arrested thereby. Located on one of the sprocket wheels 9 is a plurality of pins 77. These pins 77 are so located with respect to the free end of the bar 71 that said pins will successively depress said free end of said bar as said sprocket wheel 9 rotates. 78 designates a coil spring, one end of which is secured to the bar 71 and the other end of which is secured to a stationary part of the machine. The spring 78 is intended to return the bar 71 and the mechanism associated therewith to their normal positions after said parts have been actuated in the manner which will be hereinafter set forth.

The driving mechanism of my improved stacking machine comprises a drive shaft 80 which is mounted in suitable bearings

supported by the frame of the machine. The drive shaft 80 is provided with a comparatively large gear wheel 81 which meshes with a similar gear wheel 82 mounted on a shaft 83. Mounted on the shaft 83 is a sprocket wheel 84, and mounted on the shaft 85 is a smaller sprocket wheel 86. A sprocket chain 87 operates over the sprocket wheels 84 and 86, as shown in Fig. I, whereby said shaft 85 will be rotated. Mounted on the shaft 85 is a sprocket wheel 88, and mounted on the shaft 4 is a sprocket wheel 89. The sprocket wheel 89 is slightly smaller in diameter than the sprocket wheel 88, and a sprocket chain 90 operates over said sprocket wheels 88 and 89. From the foregoing it is apparent that motion is transmitted from the drive shaft 80 through the gear wheels 81 and 82 to the shaft 83 and through the sprocket wheels 84, 86 and sprocket chain 87 to the shaft 85. It is likewise plain that the motion of the shaft 85 will be transmitted to the shaft 4 through the sprocket wheels 88 and 89 and the sprocket chain 90 whereby the endless belts 1 will be driven.

Mounted on the shaft 83 at the end thereof opposite from the end which supports the gear wheel 82 is a bevel gear 91 which bevel gear meshes with a bevel gear 92 mounted on the shaft 93. The shaft 93 is also provided with a worm 94 which meshes with a worm wheel 95 mounted on the shaft 8. Mounted on the shaft 93 intermediate of the bevel gear 92 and the worm 94 is a gear wheel 96 which meshes with a gear wheel 97 mounted on the shaft 98. The shaft 98 supports one of the pulleys over which the belt 31 operates, the other pulley being mounted on the shaft 99. It has already been explained how motion is transmitted from the drive shaft 80 to the shaft 83. This motion is in turn transmitted from the shaft 83 through the bevel gears 91 and 92 to the shaft 93, and through the gear wheels 96 and 97 to the shaft 98, whereby the belt 31 is driven. Motion is also transmitted from the shaft 93 through the worm 94 and worm wheel 95 to the shaft 8, thus causing the basket-carrying mechanism to be operated. The means for rotating the shaft 60 to actuate the mechanism for reciprocating the rectangular frame 41 of the straightening mechanism S is not shown, but it is to be understood that this shaft may be rotated in any suitable manner.

The operation of my improved stacker is as follows:

Assume that shingles are being delivered to the endless belts 1. There are four belts shown in the drawing and it will be assumed that transverse rows of shingles, each of which contains four shingles, are being deposited on said belts, each belt of the group receiving one shingle of each row. The belts are being driven in the direction indicated by the arrow in Fig. I. The basket-carrying mechanism is being actuated very slowly in the direction indicated by the arrow in Fig. I, and as each transverse row of shingles reaches the point where the belts on which it is being carried pass over the associated pulleys 2, said shingles will be projected into the baskets of the transverse row of baskets which is moving slowly downwardly at points immediately adjacent said pulleys 2. In the operation of the basket-carrying mechanism of my improved stacking machine it will be noted by referring to Fig. III of the drawings that the bar 20 of each transverse row of baskets contacts with the vertical members 22 when said baskets are moving upwardly at the rear of the basket-carrying mechanism. As each row of baskets moves around the curve U the heavier portions of the L-shaped bars 19 swing over dead center and the ends of said L-shaped bars adjacent to the bar 20 are brought into contact with the angle bar 14 following the angle bar to which said row of baskets is attached. The upper ends of the L-shaped bars of each row of baskets contact with the next succeeding angle bar 44 throughout its downward movement at the front of the basket-carrying mechanism, and said L-shaped bars of each row of baskets also contact with the angle bar 14 to which they are attached, whereby said baskets are held in their proper positions to receive their loads and to carry said loads. When the rows of baskets pass around the lower curve L, the weight of the L-shaped bars will cause said bars to swing in an arc of a circle whereby the bars 20 will again contact with the members 22 and slide therealong during the upward movement of the baskets. As already stated, the baskets at the forward portion of the basket-carrying mechanism are moving slowly downwardly, and the shingles will be projected into the row of baskets which is in the proper position to receive said shingles, said shingles being guided into the baskets by the inclined portions 27 of the guide members 25.

As the shingles fall into the baskets as above described, said shingles will be pressed rearwardly against the guide members 27 by the members 64 on the rectangular frame 41 of the straightening mechanism S, said rectangular frame being moved back and forth toward and away from the baskets, and said members 64 pressing said shingles rearwardly as they fall into the baskets. The rectangular frame 41 is so timed that it will move toward the baskets at approximately the same time a row of shingles falls into said baskets, at which time said shingles, as stated, are pressed rearwardly against the guide members 26. Upon each movement of the rectangular frame 41

toward the baskets the bell crank levers 46 will be swung about their pivots 48 to the positions shown by dotted lines in Fig. IV. This will cause the outer end of the bars 47 carried by said bell crank levers to contact with the sides edges of the shingles, and as said bell crank levers are moved to the positions shown in dotted lines in Fig. IV, said shingles will be pressed against the plates 45′ carried by the fixed members 45. From the foregoing it is plain that as each shingle falls into one of the baskets it will be pressed rearwardly against the guide members 26 by the straightening member 64, and said shingle will also be moved in a transverse direction against the plate 45 by the extension 47 of one of the bell crank levers, whereby each group of shingles in each basket will be arranged in an even stack.

It has already been explained how when one row of baskets are receiving their loads the next succeeding row of baskets will be retarded by the pin 35, so that it will not interfere with the delivery of shingles to the first mentioned row of baskets. As soon as the row of baskets receiving their loads have received the proper number of shingles the pin 35 will be withdrawn from its position in the path of travel of the retarded baskets in the manner set forth, and said baskets will drop into positions to receive their loads. The stacks of shingles are carried downwardly by the baskets and are deposited on the belts 28, said belts being in such positions relative to the baskets that the shingles are transferred from the baskets to the belts and the L-shaped bars comprising each basket passing on either side of the belt to which the load of shingles which was carried by said basket has been transferred.

After the stacks of shingles have been deposited on the belts 28 by the baskets, said shingles are carried toward the belt 31 by said belts 28. The stacks of shingles on the belts 28 with which the stops 69 are associated will travel forwardly until said stacks of shingles come into contact with said stops, when their movement will be arrested. The stacks of shingles on the other belts 28, however, will be carried forwardly and deposited on the belt 31, which belt will carry said stacks to the position of an operator who will tie said stacks of shingles in a single bundle. During the time that the unobstructed stacks of shingles are moving to the position of the operator, as described, the sprocket wheel 9 which is provided with pins 77 is rotated and eventually one of said pins will contact with the end portion of the rod 71 and depress said end portion of said rod. This will free the shoulder 76 from the plate 73 and the friction between the moving belts and the stacks of shingles will cause said stacks of shingles to press the stops 69 forwardly and downwardly, thereby permitting said stacks of shingles to pass over said stops and be deposited on the belt 31, by which belt they, too, will be taken to the position of the operator to be tied in a single bundle. After the last mentioned stacks of shingles have passed beyond the stops the coil spring 78 will draw the rod 71 rearwardly, thus permitting the shoulder 76 and the plate 73 to be again interlocked and the stops to assume their upright positions. By the use of the mechanism just described the work is timed so that it comes to the operator at uniform intervals, and instead of receiving a comparatively large amount of work at a time with a protracted interval between the deliveries of work, said work is delivered in smaller amounts and at closer intervals.

The machine illustrated in the drawing is intended for use in handling individual size shingles, but it is apparent that by making simple adjustments said machine may be capable of handling the so-called 4-width size shingles. When the 4-width size shingles are to be handled by my improved stacking machine the guide members 26 are replaced by the guide members 26′ (Fig. IX), which guide members are of a slightly different size and shape than the guide members 26. Also, all of the fixed members 45 except the one located at the right side of the machine, looking at said machine from the front, are removed as shown in Fig. IX. All of the straightening devices comprising the bell crank levers 46, members 51 and rods 49 are removed, and one of said straightening members which is designated by the reference character 100 is applied as illustrated in said figure, there being an auxiliary bearing 101 provided for this purpose. Finally the coil springs 72 and 78 are released so that the bar 71 and the stops 69 may swing downwardly out of the way. With the machine arranged as shown in Fig. IX, its operation is the same as when said machine is arranged to handle individual size shingles.

I claim:

1. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, pivoted receptacles associated with said continuously operated means to each of which a predetermined number of said articles are delivered by said conveyor, and means adapted to receive said articles from said pivoted receptacles in stacks.

2. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, said continu-

ously operated means comprising oppositely disposed endless members, rotatable members over which said endless members operate, and receptacles pivoted to said oppositely disposed endless members, said receptacles being each adapted to receive a predetermined number of the articles from said conveyor, and means adapted to receive said articles from said pivoted receptacles in stacks.

3. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, said continuously operated means comprising oppositely disposed pairs of sprocket wheels, sprocket chains operating over said oppositely disposed pairs of sprocket wheels, and receptacles pivoted to said oppositely disposed pairs of sprocket chains, said receptacles being each adapted to receive a predetermined number of the articles from said conveyor, and means adapted to receive said articles from said pivoted receptacles in stacks.

4. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyors, said continuously operated means comprising oppositely disposed pairs of sprocket wheels, sprocket chains operating over said oppositely disposed pairs of sprocket wheels, connecting members the opposite ends of which are secured to said oppositely disposed sprocket chains, bars rotatably supported by said connecting members, and receptacles secured to said bars, said receptacles being each adapted to receive a predetermined number of articles from said conveyor, and means adapted to receive said articles from said receptacles in stacks.

5. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means adjacent to the discharge end of said conveyor, pivoted receptacles associated with said continuously operated means to each of which a predetermined number of said articles are delivered by said conveyor, and traveling means adapted to receive said articles from said receptacles in stacks.

6. A stacking machine comprising a plurality of endless belts to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, said means being arranged to travel in a direction at an angle to the direction of travel of said endless belts, receptacles pivotally supported by said continuously operated means to each of which a predetermined number of said articles are delivered by said endless belts, and a second group of endless belts arranged adjacent to the discharge end of said continuously operated means, said last mentioned belts being adapted to receive the articles from said receptacles in stacks.

7. A stacking machine comprising a plurality of endless belts to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, receptacles pivoted to said continuously operated means, said receptacles being each arranged to receive a predetermined number of articles from said endless belts and to travel downwardly therefrom, and a second group of endless belts at the discharge end of said continuously operated means, said last mentioned belts being adapted to receive the articles from said receptacles in stacks.

8. A stacking machine comprising a plurality of endless belts to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, said continuously operated means comprising oppositely disposed pairs of sprocket wheels, sprocket chains operating over said oppositely disposed pairs of sprocket wheels, connecting members the opposite ends of which are secured to said oppositely disposed sprocket chains, bars rotatably supported by said connecting members, receptacles secured to said bars, said receptacles each being adapted to receive a predetermined number of articles from said endless belts and carry same downwardly, and a second group of endless belts at the discharge end of said continuously operated means, said last mentioned belts being adapted to receive the articles from said receptacles in stacks.

9. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, receptacles mounted on said continuously operated means, said receptacles being each adapted to receive a predetermined number of articles when it reaches a point adjacent to the discharge end of said conveyor, means whereby the receptacle following the receptacle receiving its load is retarded, and means adapted to receive the articles from said receptacles in stacks.

10. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, receptacles pivoted to said continuously operated means, said receptacles being each adapted to receive a predetermined number of articles

when they reach a point adjacent to the discharge end of said conveyor, means whereby the receptacle following the receptacle receiving its load is swung about its pivot to retard said receptacle, said means comprising a member movable into and out of the path of travel of a portion of said first mentioned receptacle, and means adapted to receive the articles from said receptacles in stacks.

11. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, receptacles pivoted to said continuously operated means, said receptacles being each adapted to receive a predetermined number of articles when they reach a point adjacent to the discharge end of said conveyor, means whereby the receptacle following the receptacle receiving its load is swung about its pivot to retard said receptacle, said means comprising a lever, a projection on said lever movable into and out of the path of travel of a portion of said first mentioned receptacle, means for moving said projection into the path of travel of said receptacle, and means associated with said lever for withdrawing said projection from the path of travel of said receptacle, and means adapted to receive the articles from the receptacles in stacks.

12. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, receptacles pivoted to said continuously operated means, said receptacles being each adapted to receive a predetermined number of articles when they reach a point adjacent to the discharge end of said conveyor, means whereby the receptacle following the receptacle receiving its load is swung about its pivot to retard said receptacle, said means comprising a lever, a projection on said lever movable into and out of the path of travel of a portion of said first mentioned receptacle, a cam for moving said projection into the path of travel of said receptacle, and a counterbalance weight associated with said lever for withdrawing said projection from the path of travel of said receptacle, and means adapted to receive the articles from the receptacles in stacks.

13. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, transverse rows of receptacles pivoted to said continuously operated means, said receptacles being each adapted to receive a predetermined number of articles when the row of receptacles of which it is a part reaches a point adjacent to the discharge ends of said endless belts, means whereby the row of receptacles following the row of receptacles in the load-receiving position may be swung about its pivot to retard said first mentioned row of receptacles, said means comprising a lever, a projection on said lever movable into and out of the path of travel of a portion of said row of receptacles, a cam for moving said projection into the path of travel of said row of receptacles, and a counterbalance weight associated with said lever for withdrawing said projection from the path of travel of said row of receptacles, and means adapted to receive the articles from the receptacles in stacks.

14. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, transverse rows of receptacles pivoted to said continuously operated means, said receptacles being each adapted to receive a predetermined number of articles when the row of receptacles of which it is a part reaches a point adjacent to the discharge ends of said endless belts, means whereby the row of receptacles following the row of receptacles in the load-receiving position may be swung about its pivot to retard said first mentioned row of receptacles, said means comprising a lever, a projection on said lever movable into and out of the path of travel of a portion of said row of receptacles, a cam for moving said projection into the path of travel of said row of receptacles and a counterbalance weight associated with said lever for withdrawing said projection from the path of travel of said row of receptacles, and means comprising a plurality of endless belts arranged in a transverse row adapted to receive the articles from the receptacles in stacks.

15. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, said continuously operated means comprising oppositely disposed pairs of sprocket wheels, sprocket chains operating over said oppositely disposed pairs of sprocket wheels, connecting members the opposite ends of which are secured to said oppositely disposed sprocket chains, bars rotatably supported by said connecting members, receptacles secured to said bars in transverse rows, each of said receptacles being adapted to receive a predetermined number of

articles from said endless belts when the row of receptacles of which said receptacle is a part reaches a point adjacent to the discharge end of said endless belts, means whereby the row of receptacles following the row of receptacles in the load-receiving position may be swung about its pivot to retard said row of receptacles, said means comprising a lever, a projection on said lever movable into and out of the path of travel of a portion of said row of receptacles, a cam for moving said projection into the path of travel of said row of receptacles and a counterbalance weight associated with said lever for withdrawing said projection from the path of travel of said row of receptacles, and a plurality of endless belts arranged in a transverse row at the discharge end of said continuously operated means and adapted to receive the articles from said receptacles in stacks.

16. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, and in transverse rows, continuously operated means arranged adjacent to the discharge end of said conveyor, receptacles supported by said continuously operated means, said receptacles being arranged in transverse rows on said continuously operated means and being adapted to receive articles from said conveyor, a continuously operated conveyor arranged at the discharge end of said continuously operated means and adapted to receive articles from said receptacles in stacks arranged in transverse rows, and means whereby the movement of some of said stacks of each row of stacks is temporarily halted.

17. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually and in transverse rows, continuously operated means arranged adjacent to the discharge ends of said endless belts, receptacles supported by said continuously operated means, said receptacles being arranged in transverse rows on said continuously operated means and being adapted to receive articles from said endless belts, a plurality of continuously operated endless belts arranged at the discharge end of said continuously operated means and adapted to receive articles from said receptacles in stacks arranged in transverse rows, and means whereby the movement of some of said stacks of each row of stacks is temporarily halted.

18. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually and in transverse rows, continuously operated means arranged adjacent to the discharge ends of said endless belts, receptacles supported by said continuously operated means, said receptacles being arranged in transverse rows on said continuously operated means and being adapted to receive articles from said endless belts, a plurality of continuously operated endless belts arranged at the discharge end of said continuously operated means and adapted to receive articles from said receptacles in stacks arranged in transverse rows, and means comprising stops arranged adjacent to some of said last mentioned endless belts whereby the movement of some of said stacks of each row of stacks is temporarily halted.

19. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually and in transverse rows, continuously operated means arranged adjacent to the discharge ends of said endless belts, receptacles supported by said continuously operated means, said receptacles being arranged in transverse rows on said continuously operated means and being adapted to receive articles from said endless belts, a plurality of continuously operated endless belts arranged at the discharge end of said continuously operated means and adapted to receive articles from said receptacles in stacks arranged in transverse rows, means comprising stops arranged adjacent to some of said last mentioned belts whereby the movement of some of said stacks of each row of stacks is temporarily halted, and means cooperating with said continuously operated means whereby said stops are removed to permit said halted stacks to again move.

20. A stacking machine comprising a plurality of endless belts arranged in a transverse row to which belts the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge ends of said endless belts, said continuously operated means comprising oppositely disposed pairs of sprocket wheels, sprocket chains operating over said oppositely disposed pairs of sprocket wheels, connecting members the opposite ends of which are secured to said oppositely disposed sprocket chains, bars rotatably supported by said connecting members, receptacles secured to said bars in transverse rows, each of said receptacles being adapted to receive a predetermined number of articles from said endless belts when the row of receptacles of which said receptacle is a part reaches a point adjacent to the discharge end of said endless belts, means whereby the row of receptacles following the row of receptacles in the load-receiving position may be swung about its pivot to retard said row of receptacles, said means comprising a lever, a projection

on said lever movable into and out of the path of travel of a portion of said row of receptacles, a cam for moving said projection into the path of travel of said row of receptacles and a counterbalance weight associated with said lever for withdrawing said projection from the path of travel of said row of receptacles, a plurality of endless belts arranged in a transverse row at the discharge end of said continuously operated means and adapted to receive the articles from said receptacles in stacks, arranged in transverse rows, means comprising stops arranged adjacent to some of said last mentioned belts whereby the movement of some of said stacks of each row of stacks is temporarily halted, and means cooperating with said continuously operated means whereby said stops are removed to permit said halted stacks to again move.

21. A stacking machine comprising a conveyor to which the articles to be stacked are delivered individually, continuously operated means arranged adjacent to the discharge end of said conveyor, said continuously operated means comprising oppositely disposed pairs of sprocket wheels, sprocket chains operating over said oppositely disposed pairs of sprocket wheels, connecting members the opposite ends of which are secured to said oppositely disposed sprocket chains, bars rotatably supported by said connecting members, receptacles secured to said bars, said connecting members being arranged to control the pivotal movement of said receptacles when said receptacles are traveling in one direction, means whereby the pivotal movement of said receptacles is controlled when said receptacles are traveling in the other direction, and means adapted to receive said articles from said receptacles in stacks.

In testimony that I claim the foregoing I hereunto affix my signature.

JOHN E. MILLER.