Sept. 4, 1928. 1,682,878

F. D. WILLI

PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

Original Filed Dec. 22, 1924 9 Sheets-Sheet 1

Fig. 1.

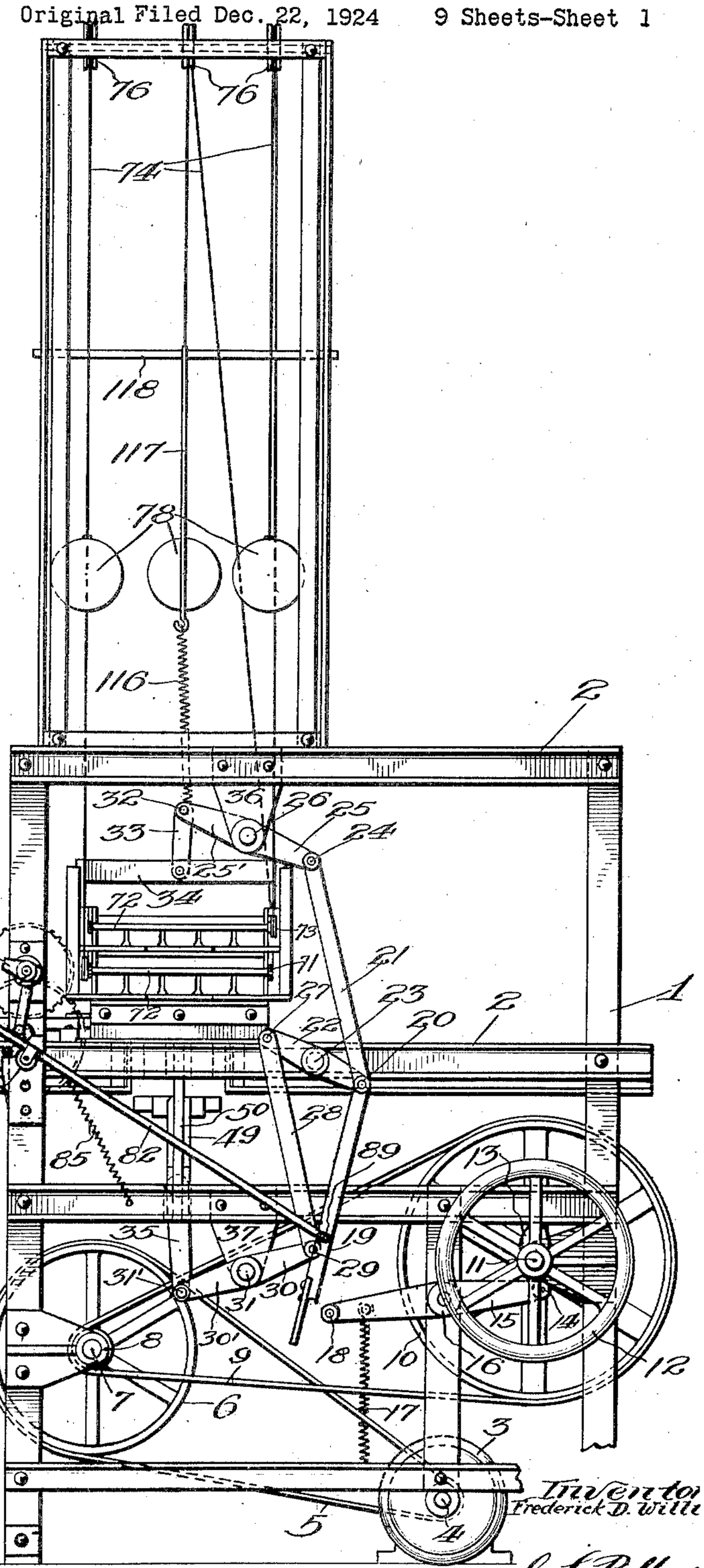
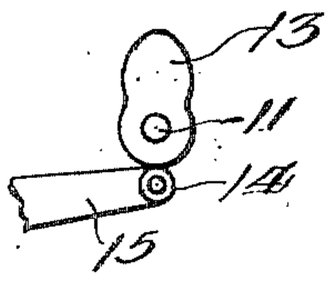


Fig. 2.



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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

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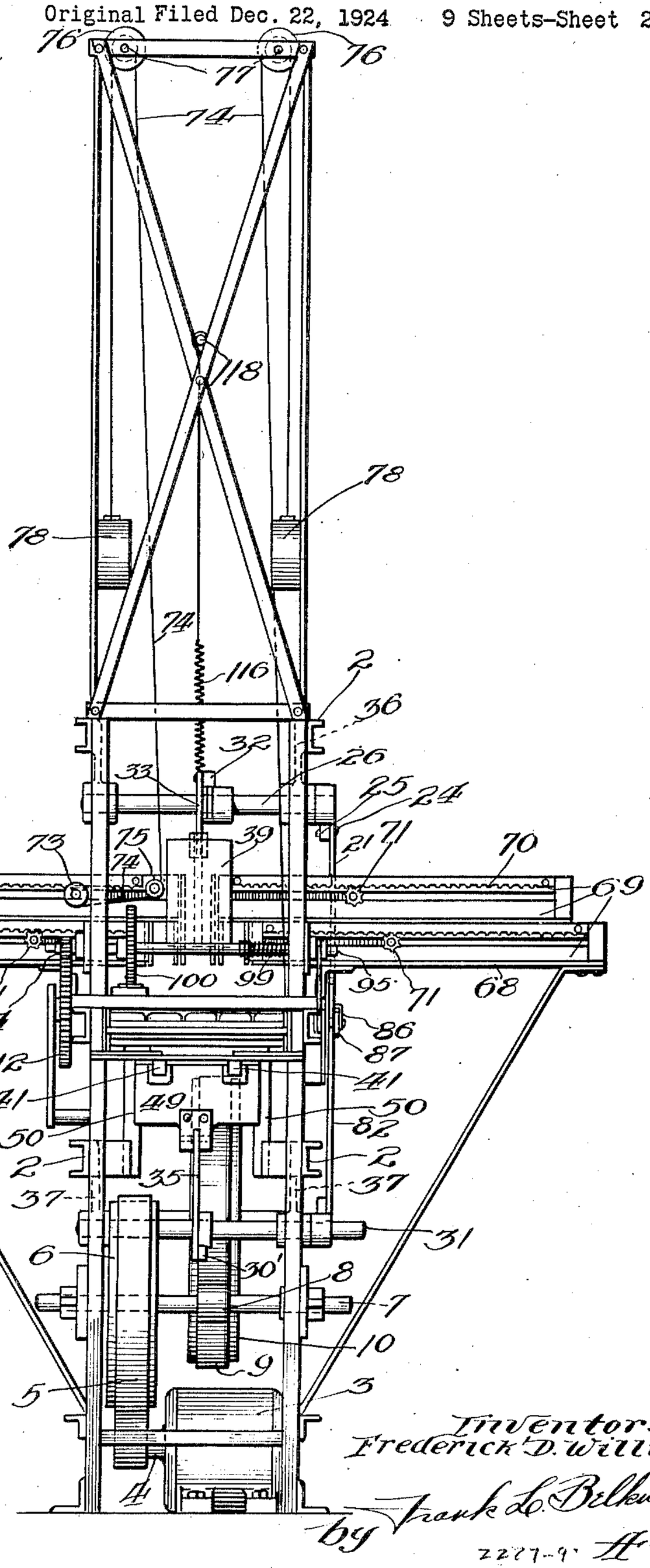
Fig. 3.



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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

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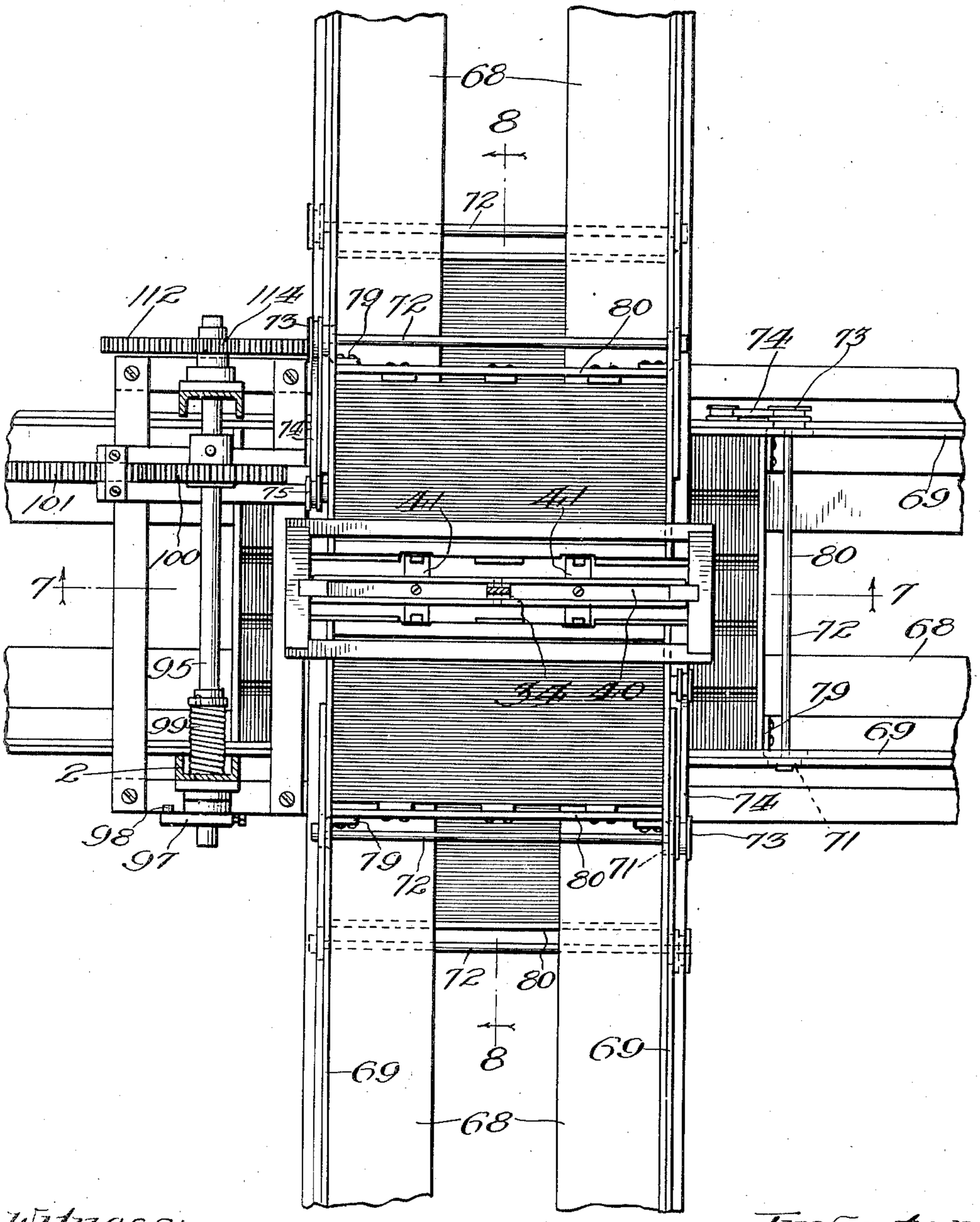
Fig. 4.



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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

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Fig. 5.

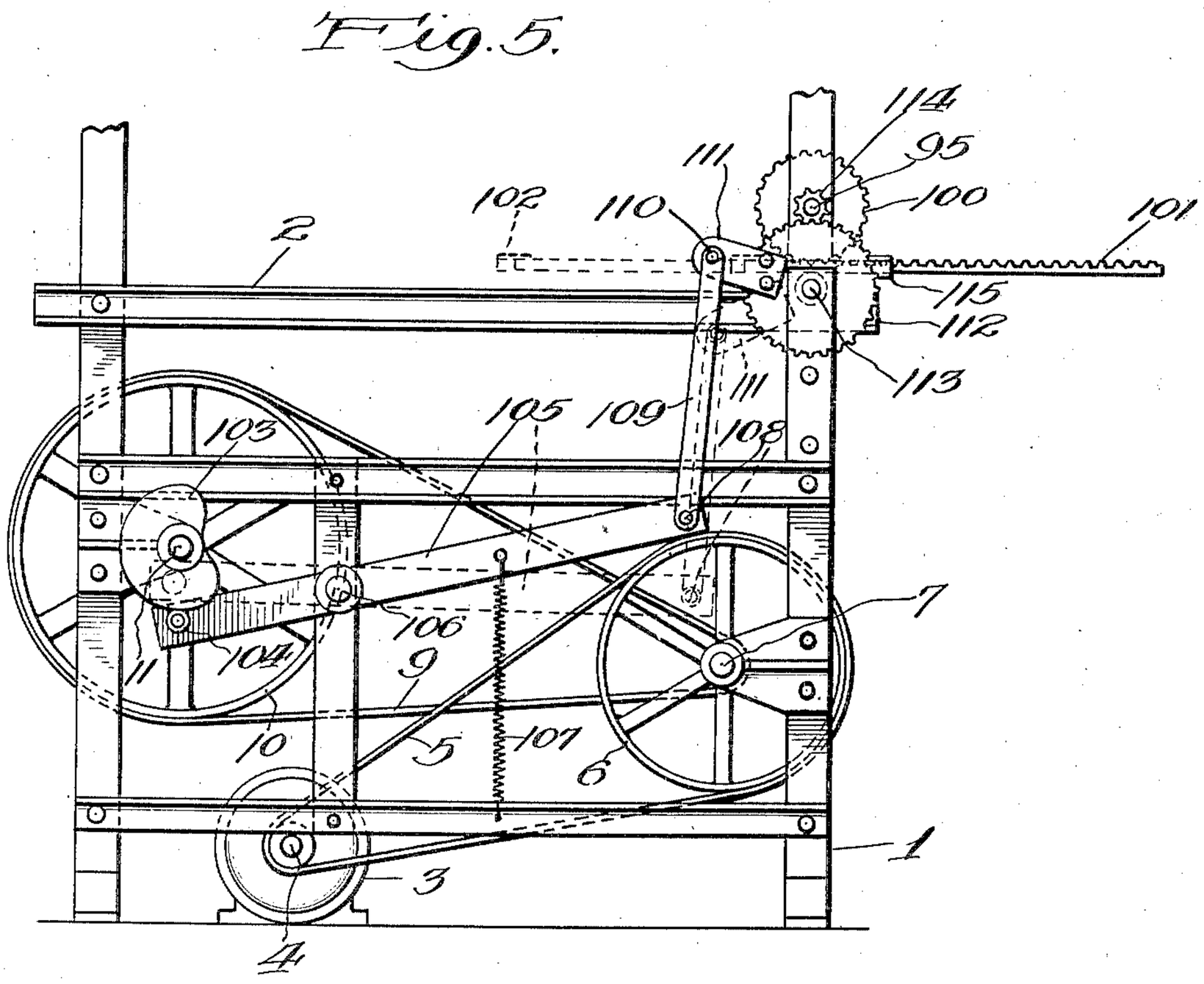
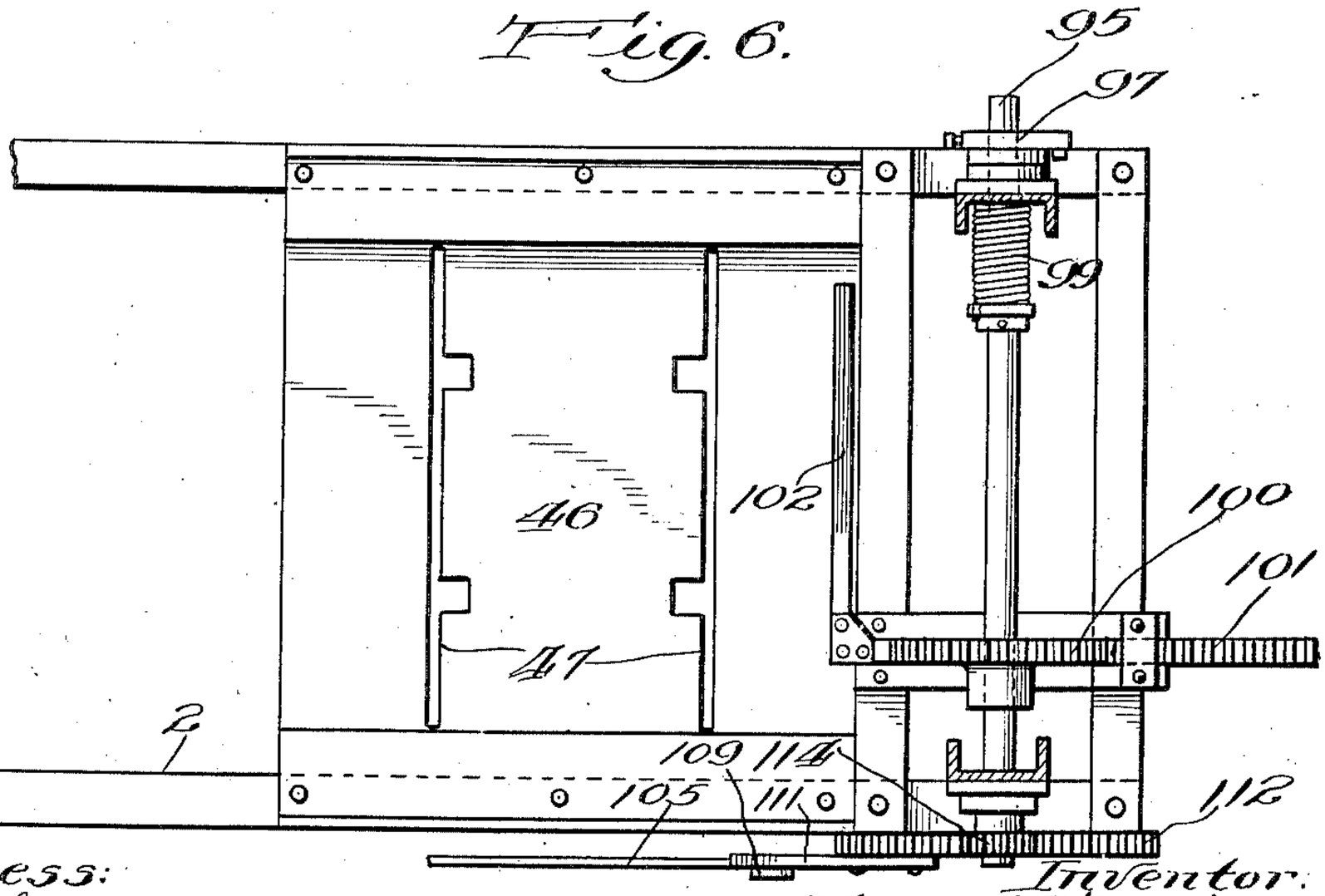


Fig. 6.



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Sept. 4, 1928. 1,682,878

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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

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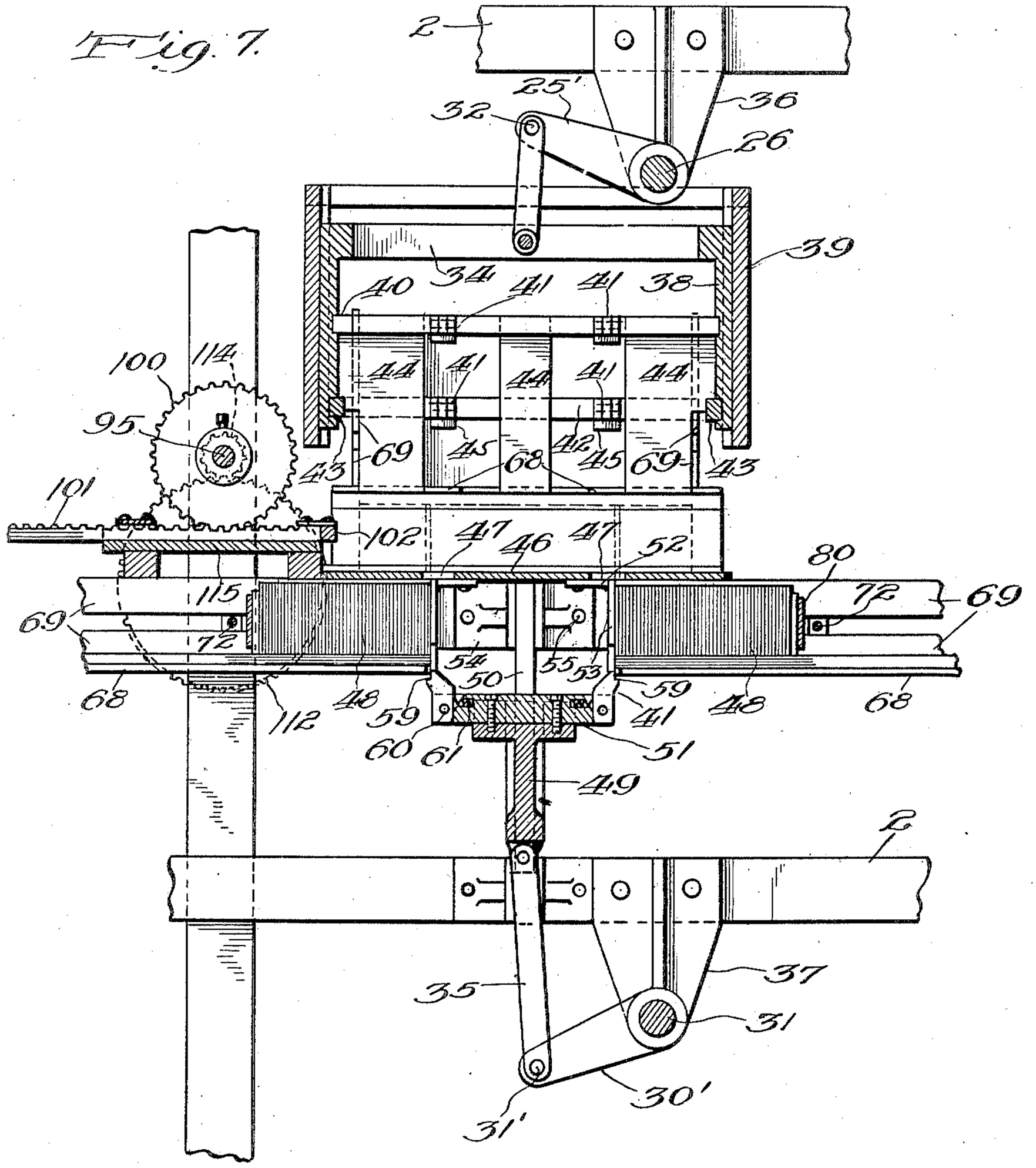
Fig. 7.



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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

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Fig. 8.

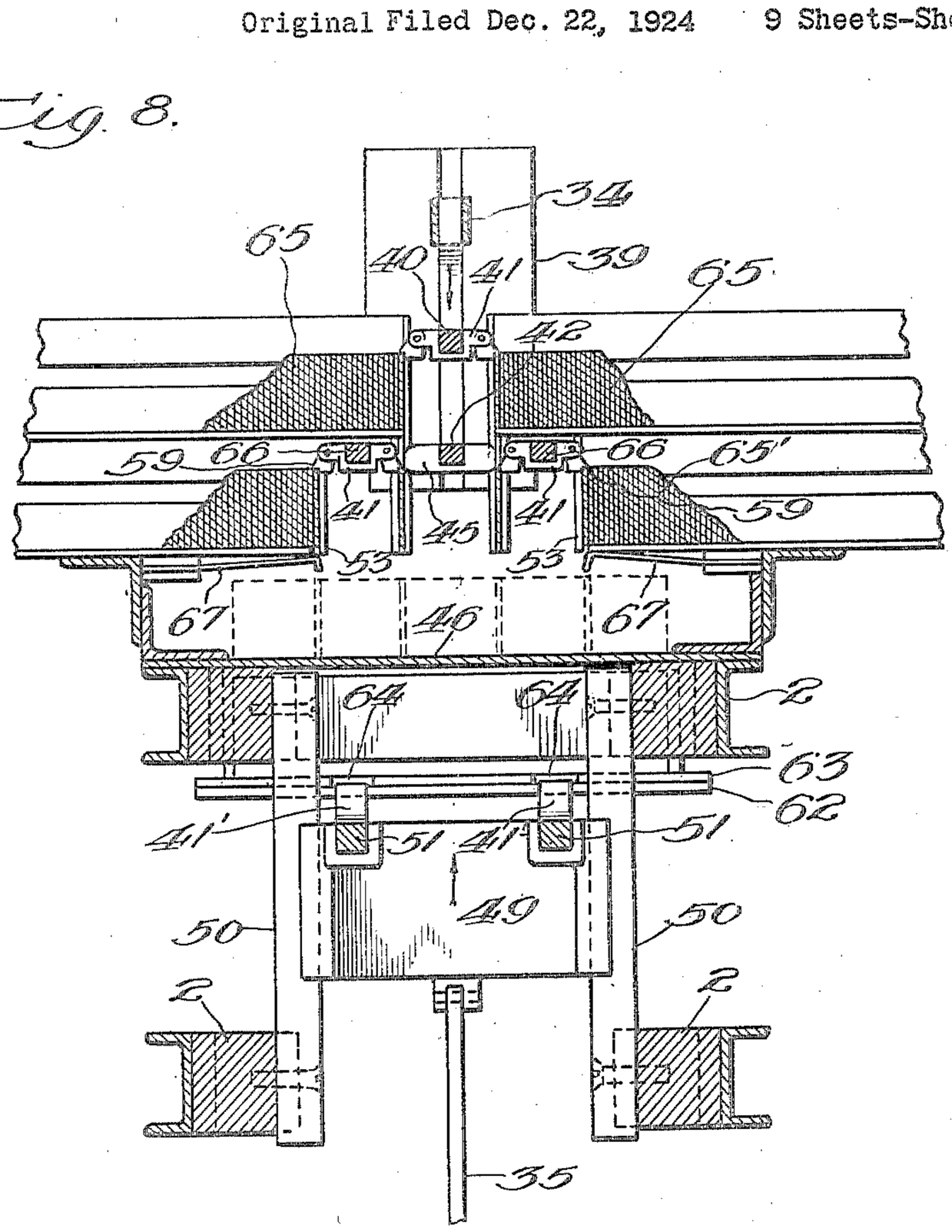


Fig. 9.

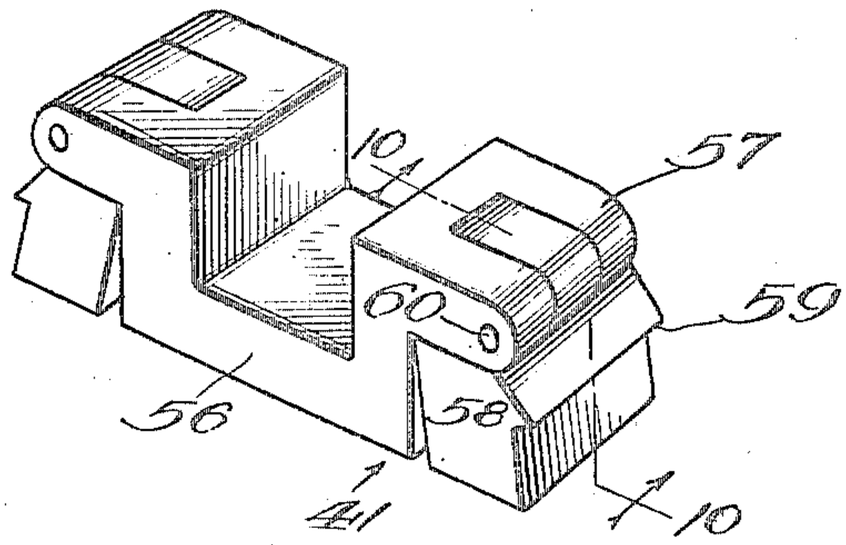
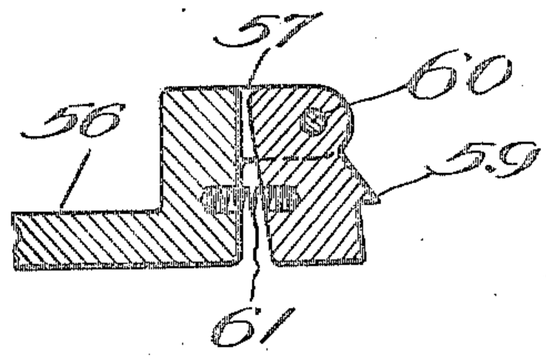


Fig. 10.



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Sept. 4, 1928. **1,682,878**

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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

Original Filed Dec. 22, 1924 9 Sheets-Sheet 7

Fig. 11.

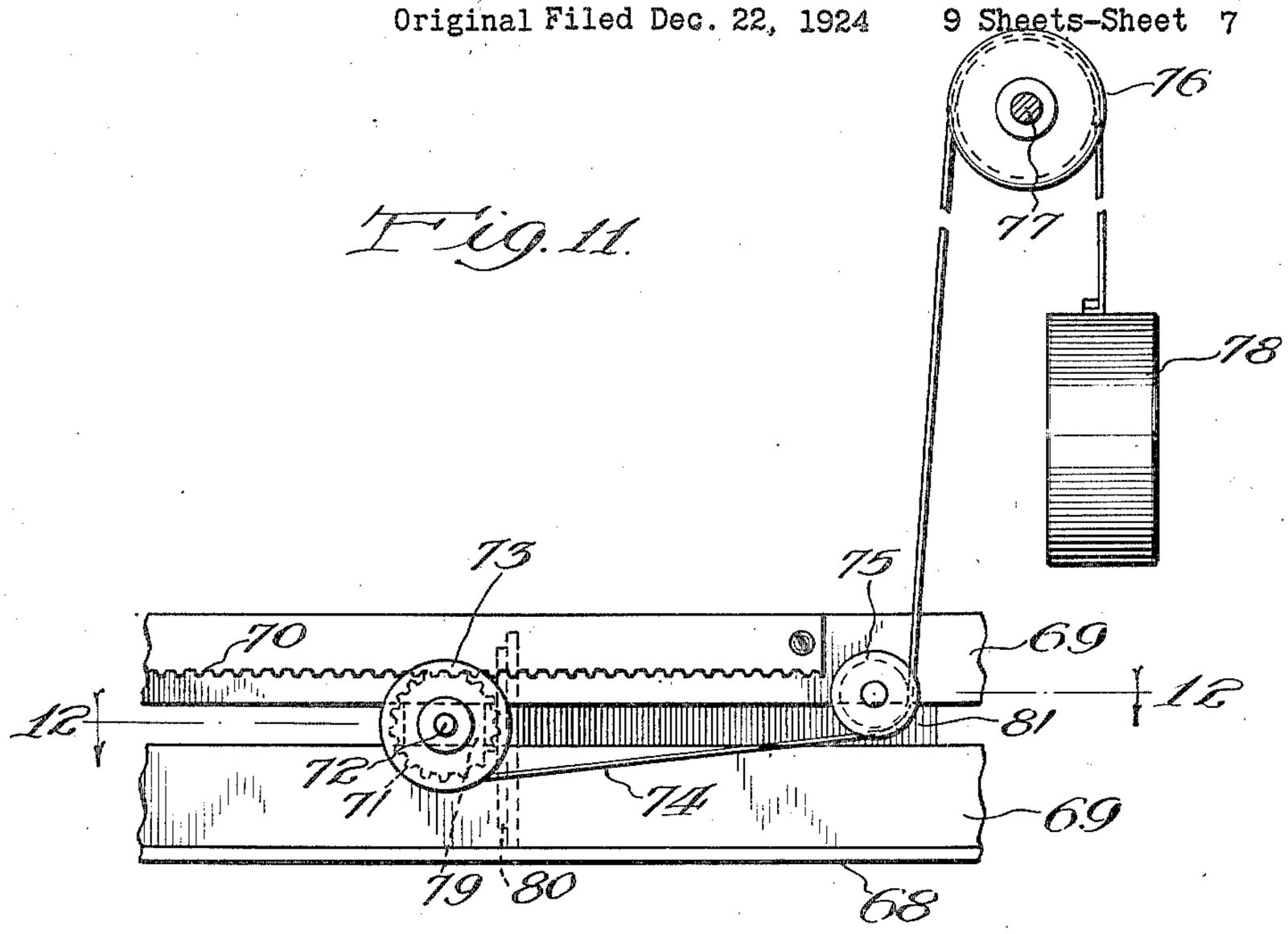
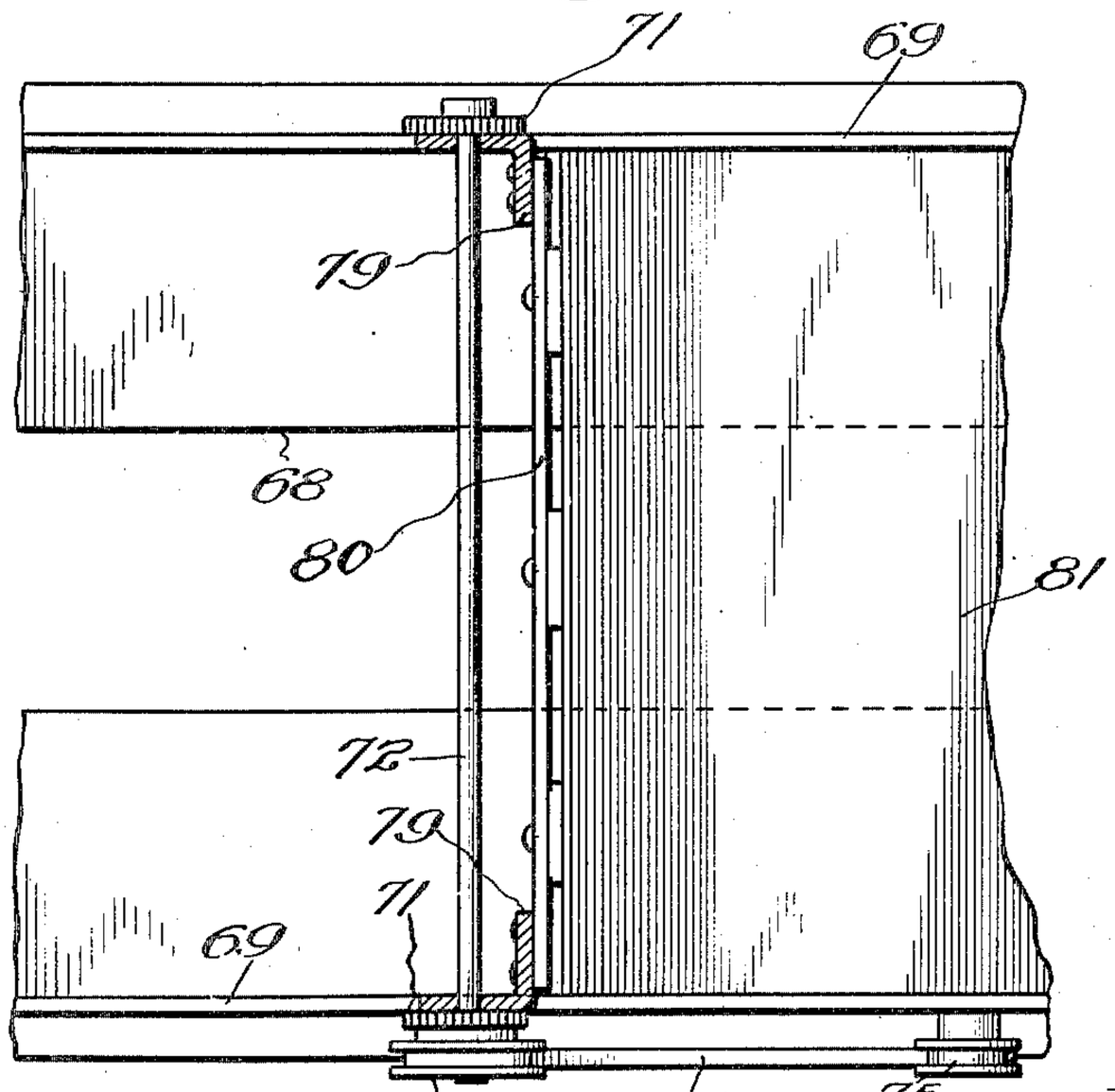


Fig. 12.



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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

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Fig. 13.

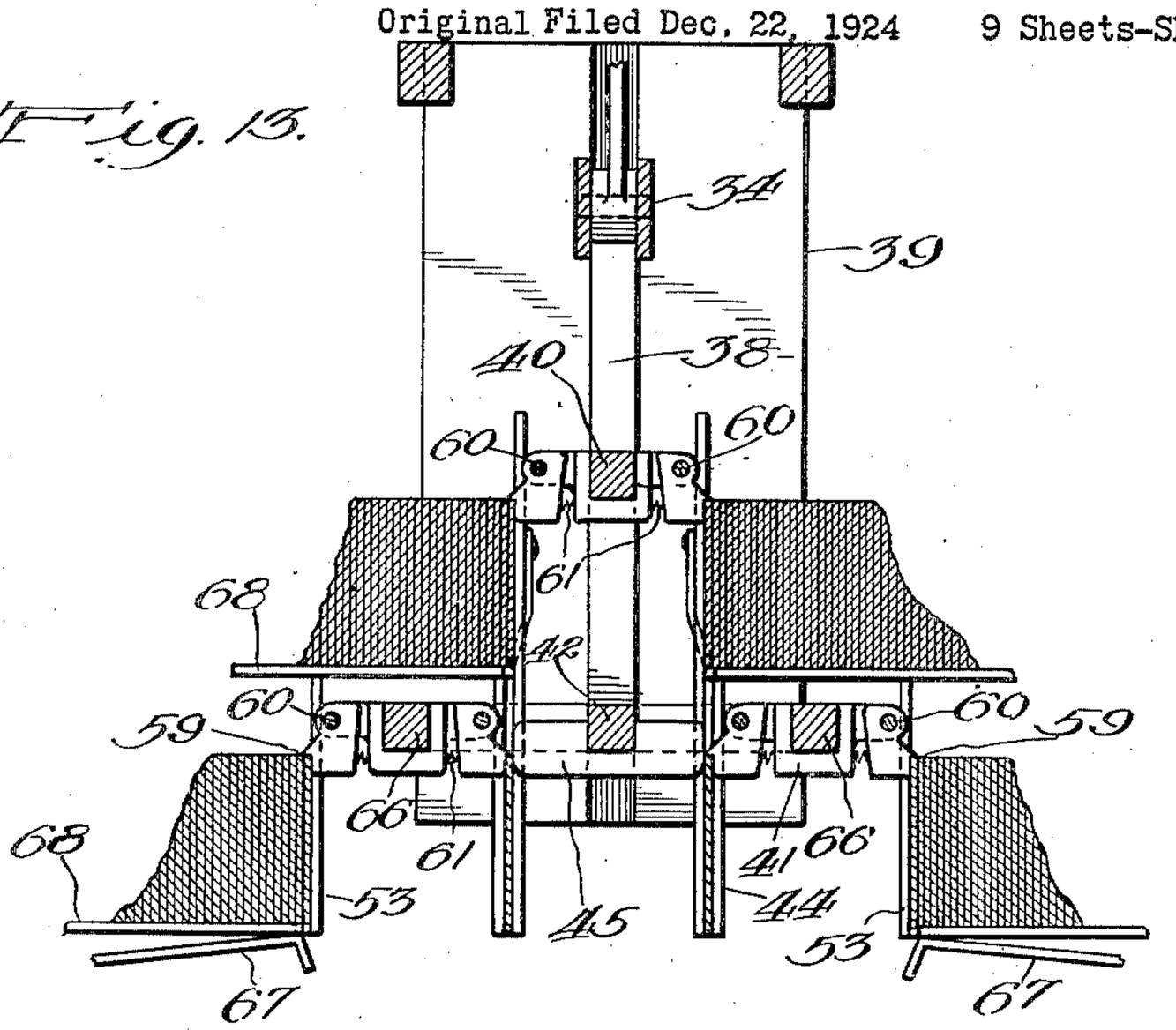
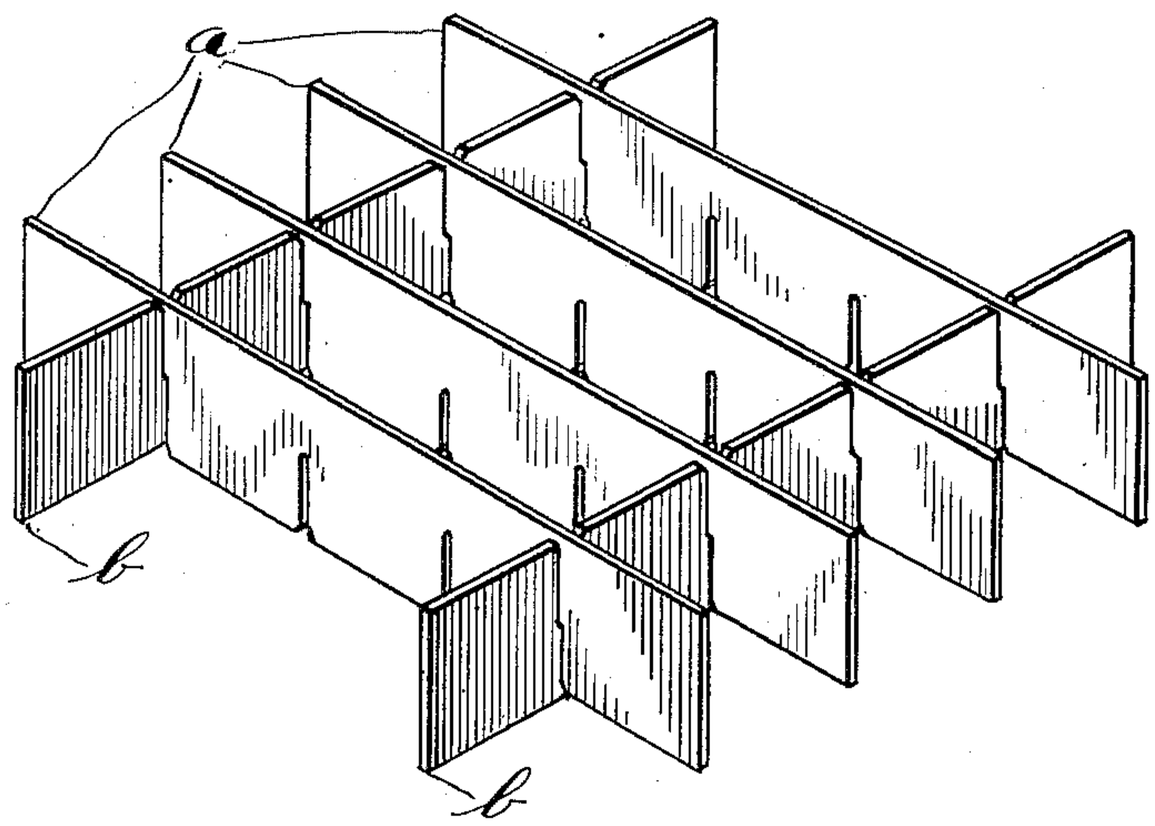


Fig. 14.



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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS

Original Filed Dec. 22, 1924 9 Sheets-Sheet 9

Fig. 15.

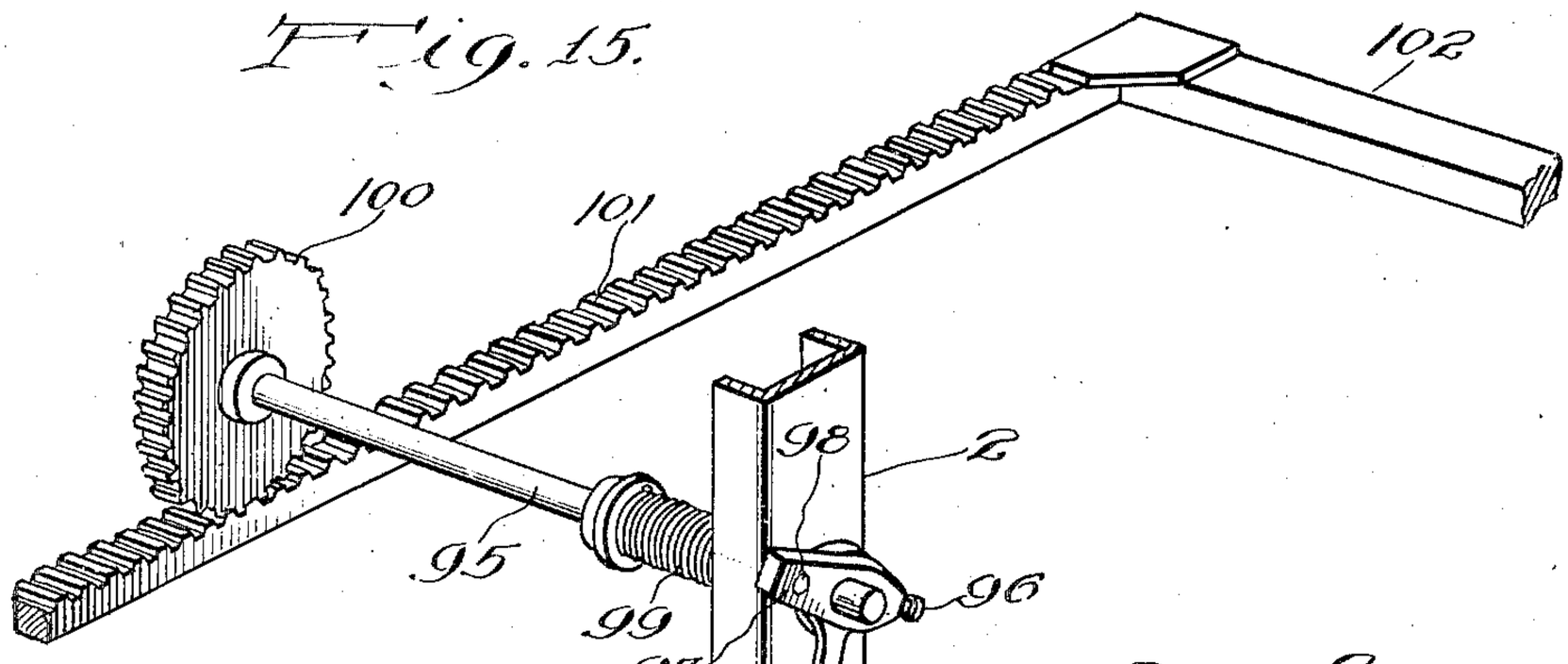

Fig. 16.

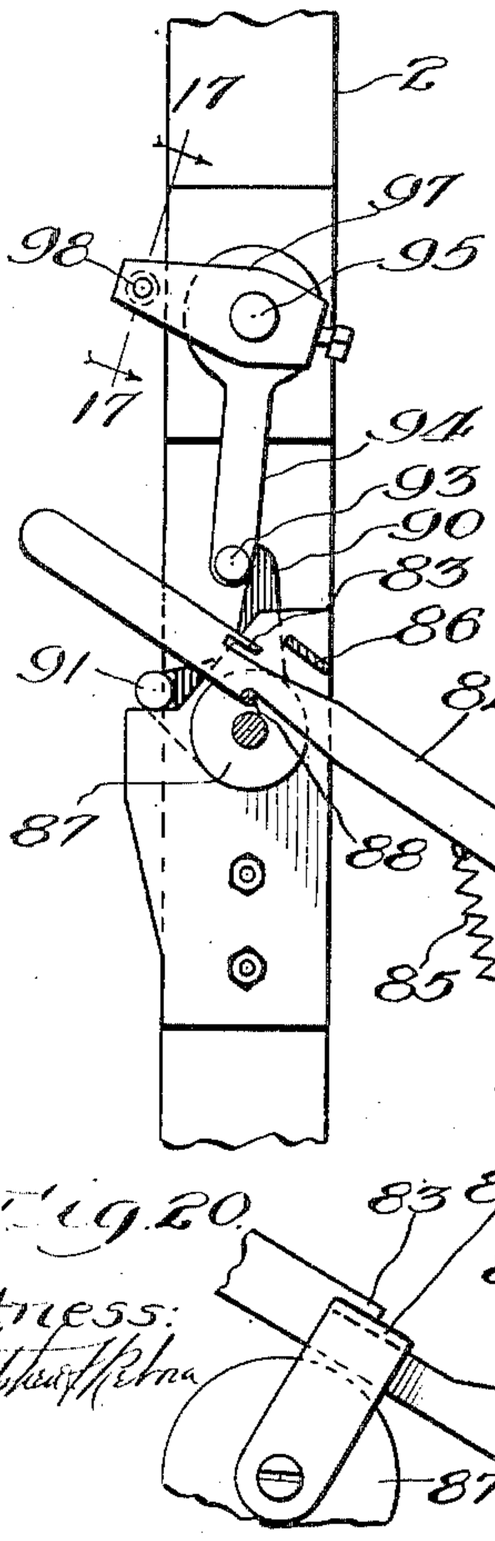

Fig. 17.

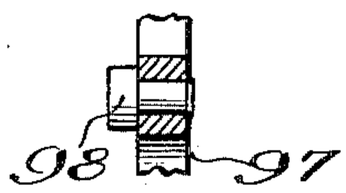

Fig. 18.

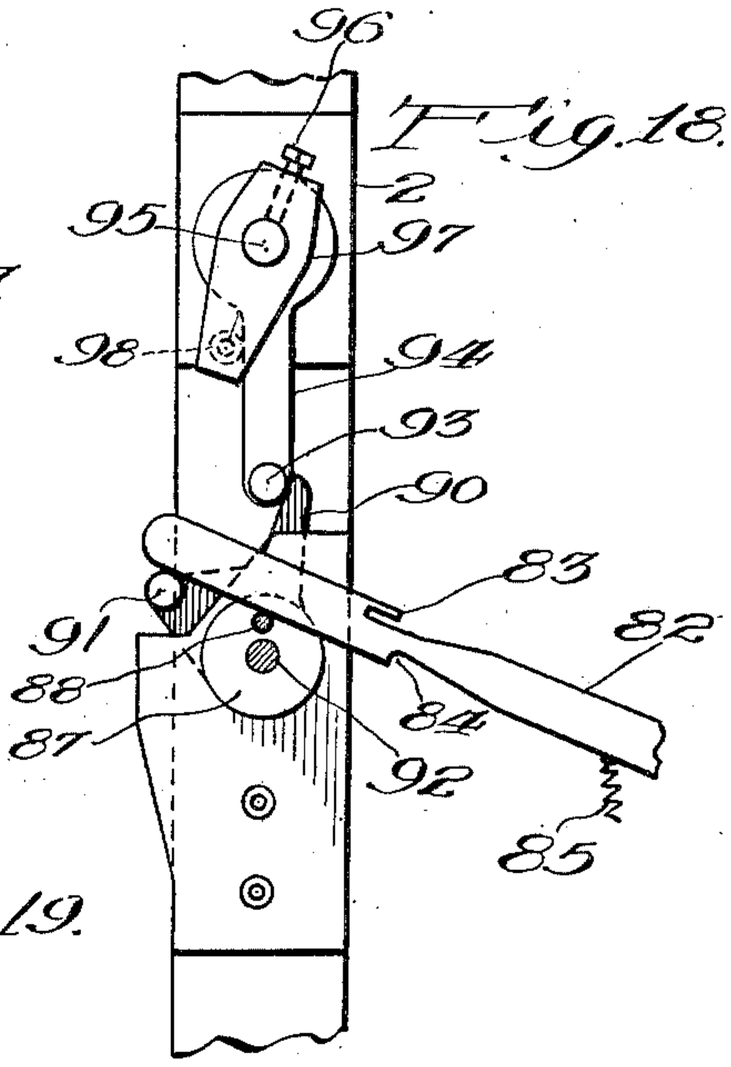

Fig. 19.

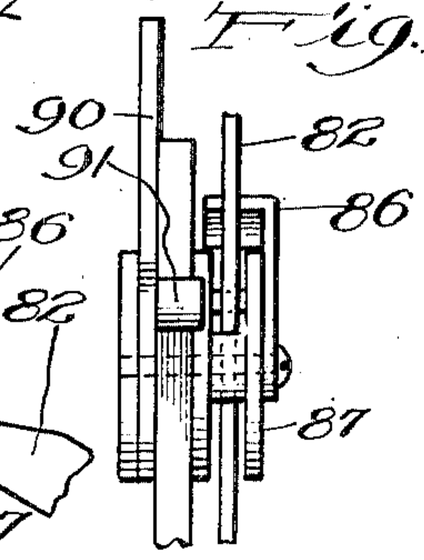

Fig. 20.

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UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR NESTING PARTITION BLANKS.

Application filed December 22, 1924, Serial No. 757,392. Renewed March 4, 1927.

This invention relates to a process and apparatus for nesting partition blanks and refers more particularly to the automatic nesting of partition blanks to form fillers for cartons to be used in shipping perishable food articles, fragile articles, and for a variety of uses. In the particular embodiment of this invention, the individual partition blanks previously scored or notched, and of a predetermined length and width are mounted in stacks in a plurality of magazines. With each actuation of the machine, a single partition blank is fed from each of the magazines, and through proper positioning of the notches in the partition blanks and the magazines, the notches of one blank are fitted into the notches of another blank to form an interior filler for cartons, which nested filler is then automatically ejected from the machine.

The advantages and nivel features embodied in this process and apparatus will be immediately apparent from the following description.

By my invention, I am able to secure a maximum production of nested fillers automatically and without any manual operation. Further, it has been found that by the use of my invention, it is possible to produce an automatically formed nesting which possesses maximum rigidity and the partitions of which have secure locking engagement with the other partitions. The nested filler itself is much more tightly connected than the hand-assembled nested filler now in use. In the embodiment of my invention, I am able to nest partitions varying in size and number with a minimum of adjustment to the machine. The machine will handle partitions varying in size from three-fourths of an inch to three and one-half inches in width, more or less, and of any desired length. Further, by increasing the number of magazines, the machine will nest any number of partitions simultaneously to produce an assembled, nested filler, which has any desired number of individual compartments. Further, it is possible to produce nested fillers in which the compartments themselves vary in size in the same nested filler.

In the drawings, Fig. 1 is a side elevational, diagrammatic view of the apparatus for use with this invention. Fig. 2 is a detail of the cam mechanism for actuating the operating mechanism. Fig. 3 is a front elevational view of the machine. Fig. 4 is an enlarged top plan view showing the feeding mechanism and magazines. Fig. 5 is an enlarged side elevational view of the mechanism for actuating the formed nesting ejector. Fig. 6 is an enlarged top plan detail of the same. Fig. 7 is a cross sectional view taken on line 7—7 of Fig. 4. Fig. 8 is a cross sectional view taken on line 8—8 of Fig. 4. Fig. 9 is a perspective view of the spring tensioned partition feeding means. Fig. 10 is a cross sectional view taken on line 10—10 of Fig. 9. Fig. 11 is an enlarged side detail showing the mechanism for insuring the proper forward feed of the partitions from the magazine. Fig. 12 is a cross sectional view taken on line 12—12 of Fig. 11. Fig. 13 is an enlarged view of the means for feeding individual partitions from the magazines. Fig. 14 is a perspective view of one form if assembled nested filler, Fig. 15 is an enlarged detail view of the mechanism actuating the ejecting bar for the nesting fillers. Fig. 16 is a side elevational view of the construction shown in Fig. 15 in locked inoperative position. Fig. 17 is a cross sectional view taken on line 17—17 of Fig. 16. Fig. 18 is a view similar to Fig. 16 showing the mechanism in open, operative position. Fig. 19 is a side view of the latch mechanism. Fig. 20 is an enlarged front view of the lock for the starting lever.

Referring in detail to the drawings, 1 designates the upright supporting structure, having the cross supporting braces 2. Mounted on the base of the upright supporting structure or at any other suitable place is the electric motor 3 having shaft 4 transmitting power to the pulley 5. This pulley 5 drives the pulley wheel 6 mounted on the shaft 7, which shaft 7 is provided with the smaller pulley wheel 8. The pulley wheel 8 drives a pulley or belt 9, which in turn drives the large pulley wheel 10, which latter is mounted on shaft 11. Also mounted on the shaft 11 is a hand wheel 12 for operating the mechanism by hand, if desired. The shaft 11 also has fixedly mounted thereon the cam 13. As the shaft 11 rotates through the power transmitted to it by the arrangement just described, cam 13 will contact the roller 14 mounted on the rocker arm 15. This rocker arm 15 is pivotally mounted at 16 on the supporting structure and intermediate its length is connected to the coil spring 17, which coil spring is anchored to the bottom of the main frame 1.

The function of this spring 17 is to return the link 15 to normal position after it has contacted the cam 13, which causes the end on which the spring is mounted to rise. On the end of the link 15 opposite its communication with the cam 13 is a roller 18. This roller 18 is adapted to contact and push upwardly the link or lever 19. This lever 19 is pivotly connected as shown at 20 with a similar upwardly extending link 21 and also with a rocker arm 22. This rocker arm 22 has a fixed pivot, as shown at 23. The upper end of the link 21 is pivotly connected at 24 with the cross arm 25, fixedly mounted on the shaft 26, which shaft also carries rock arm 25′. The opposite end of the rocking lever 22 is pivoted at 27 to the downwardly extending connecting link 28, which latter is pivotly connected at 29 with the rock arm 30, fixedly mounted on shaft 31. Also mounted on the shaft 31 is the cross arm 30′ pivoted at 31′ to the upwardly extending connecting link 35. The operation of the rocker arms 25 and 25′, 30 and 30′ are identical. The end of the cross arm 25′ opposite its connection with the shaft is pivotly connected, as shown at 32, to the downwardly extending connecting rod 33, which connecting rod 33 is connected to the cross piece 34. This cross piece 34 is more clearly shown in Fig. 7. The shaft 26 bears in bracket 36, while the shaft 31 bears in bracket 37.

Referring now to the construction shown in Fig. 7, to the cross piece 34 are connected the downwardly extending slidable brackets 38 adapted to reciprocate in the supporting stationary frame 39. The extensions 38 have fixedly connected thereto intermediate their length the cross pieces 40, on which are mounted the spring tensioned partition feeding means designated as a whole at 41. As will be seen, there are preferably two sets of two each of these partition feeding elements attached to each cross piece 40. At the lower end of the extension 38, it is provided with a similar cross bar 42, to which is fixedly connected the angular cross bar 43. In front of each of the two upper magazines are the guideways 44, which are sprung inwardly slightly to provide a friction means for preventing partitions from dropping down by gravity. Intermediate the guideways 44 and extending at right angles thereto, are the short cross bars 45 functioning to hold the partitions in place, clearly shown in Fig. 13. The arrangement is such that upon the actuation of the connecting arm 32 to cause the bar 34 to move downwardly, the entire mechanism associated therewith will move downwardly and the feeding pawls 41 will positively feed individual partitions from the upper magazines through the slideways onto the bed plate 46. This bed plate, as will be seen, is apertured at 47 to allow partitions which are fed upwardly to pass therethrough. 48 designates the lower magazines filled with stacked partitions. The connecting link 35 is pivotly connected to the vertically slidable solid carriage 49 riding in the ways 50 of fixedly mounted guide rods. This carriage 49 has mounted thereon the cross bars 51, which have mounted on the ends thereof the feeding dogs 41. As the connecting link 35 is moved upwardly through the mechanism heretofore described, the carriage 49 and cross bars 51 will be moved upwardly and the lower pawls 41 mounted on the cross bars 51 will cause partitions from each of the magazines 48 to be fed upwardly, as shown in dotted lines in Fig. 7, through the slots 47 in the plate 46. On the bottom of plate 46 are brackets 52 having downwardly extending portions 53 adapted to be positioned in front of the stacked partitions to hold same in place and prevent partitions from fouling. The frame of the slideway 50 is supported on the supporting structure 2 by the plate 54 held in place by bolts or other suitable holding elements 55.

Referring now more particularly to Figs. 9 and 10, and describing the particular construction of the feeding dogs designated as a whole 41, these dogs have a square, U-shaped body portion 56, having the bifurcated extensions 57 projecting outwardly from the open face of the U. In the bifurcated extensions 57 are adapted to be mounted the movable pawls 58, provided with shoulders 59 and pivoting in the bifurcated extension 57 by means of pins 60. The pawls 58 are maintained under a constant spring tension by means of the coil spring 61. 62 designates a supporting cross plate fixedly connected to the bottom plate of the magazine 63, which is slightly cut away, as shown at 64, to accommodate the feeding pawls 41.

In the drawings, as shown in Figs. 7 and 8, there are provided six magazines, four upper magazines having partitions stacked in the same angular plane and two lower magazines having partitions stacked in a plane at right angles to the plane at which the partitions in the upper magazines are stacked. The magazines are superimposed and adapted to feed from both sides. These upper magazines I have designated as 65, and 65′. Connected with the cross connecting rod 43 are the right angular bars 66, which carry feeding dogs 41. The arrangement is such that the first downward movement of the cross bar 34 in the stationary guide 39 will cause the feeding dogs carried by the cross bar 40 to feed an individual partition from each of the upper magazines, forcing said partitions into the guideways 44 so that they will then lie in substantially the same horizontal plane as the partitions contained in the intermediate magazine 65′. At the same time, the cross bar 42 will force the feeding dogs carried by the bars 66 to feed two partitions on their outer edges from the magazines

65′ and at the same time feed partitions from the slideways 44 which had previously been forced into said slideways on the previous actuation of the machine from the upper magazine 65, as explained. In order to prevent any fouling of the partitions forced downwardly from the intermediate magazines 65′, spring tensioned bands 67 may be provided, which are forced downwardly, say, from one-fourth to one-half inch, then springing back into normal position.

Describing now more particularly the mechanism for causing the partition to be positively fed forward in the magazine in order that individual partitions may be fed one at a time as shown in Figs. 11 and 12, the magazine comprises a skeleton frame having a base plate 68 and side guide 69. Above the side guide 69 is mounted a rack 70, which rack is adapted to mesh with the pinion 71 mounted on shaft 72. The shaft extends transversely across the magazine, having the pinions 71 on both ends thereof. Adjacent one end and on the outside of the pinion is a wheel 73, on which is wound the wire or band 74. This wire or band 74 is adapted to pass around the guide wheel 75 mounted on the side frames 69 and over the top of sheaves 76 mounted on shaft 77 and anchored on the weight 78. As shown clearly in Figs. 1 and 2, shafts 77 are anchored at the top of the supporting frame. At each end of the shaft between the pinions 71 are the angular supporting brackets 79 (Fig. 12) fixedly connected with any suitable form of plate or follower 80, which contacts the individual partitions 81.

By the arrangement just describd, it is possible to at all times positively insure that the feed of the magazines shall be uniform and automatically insuring that the individual partitions will be properly fed forward.

Describing now the novel features of the mechanism for ejecting the nested filler from the machine (Figs. 15 to 19), I provide a spring tensioned lever 82 having a notch 83 adjacent its upper end and a slightly rounded cut-away portion 84 immediately below said notch 83. This locking lever 82 is held under spring tension by means of the coil spring 85, having its opposite end anchored in the main frame. When the machine is idle, the notch 83 registers with the plate 86, which, as shown in Fig. 15, is connected with the wheel 87. This wheel 87 is non-rotatably held in fixed position on a bracket attached to the main supporting structure and is provided with the pin 88. The opposite end of the connecting link 82 is connected, as shown at 89, with the link 19. The arrangement is such that in normal closed position, the lever 82 being locked on the plate 86 will hold the link 19 away from contact with the roller 18 on the cross arm 15. When out of contact, of course, even though the driving mechanism should be started, the machine will idle.

Describing now a feature of the invention, there is provided means for preventing further movement of the link 19 when the machine has not positively ejected a nested filler. This arrangement comprises a latch 90 loosely mounted on the shaft 92 on which the wheel 87 is mounted, provided with the pin 91. The upper end of the latch member 90 is adapted to contact a stud 93 carried on the lower end of a rocker arm 94, loosely mounted on the shaft 95. This shaft 95 is supported in the main supporting structure 2. Fixedly mounted on the shaft 95 by means of the screw 96 and adapted to rotate therewith is the tripping member 94, having a pin 98 on one end thereof. As the shaft 95 is rotated, the tripping member 97 being fixed thereon, will rotate therewith and the pin 98 will contact the rocking lever 94. This rocking lever 94, being loosely mounted on the shaft 95, will be moved out of normal position and the stud 93 thereon will contact the upper portion of the latch 90. This latch 90 also being loosely mounted on a shaft 92 will be rocked forward, causing the pin 91 to contact the upper end of the connecting lever 82, and release the rounded, notched portion 84 from contact with the pin 88 and through the action of the coil spring 85 will cause the connecting rod 19 to be moved over to a position which will contact with the roller 18 on rock arm 15. The arrangement of the mechanism is such that by means of the coil spring 99 on shaft 95, the gear 100 meshing with the rack 101, to which is connected the horizontal ejector rod 102, the nested fillers are positively ejected by means of spring tension. In other words, while the nesting mechanism itself is operating to nest a plurality of partitions, the spring 99 is being wound up on the shaft 95, and just after the cam has passed over its high point, this spring will be released to unwind, causing the ejector rod 102 and rack 101 to move forward to positively eject the filler just nested.

Referring now to the mechanism for returning the ejector mechanism to normal position, mounted on the shaft 11 opposite to the side of the machine on which the cam 13 is located is another cam 103, adapted in its rotation to contact the roller 104 attached to the rocker arm 105, pivoted as shown at 106 to an upright in the supporting structure of the main frame. Attached to this rocker arm 105 intermediate its length is a coil spring 107 anchored to one of the supporting cross braces of the machine. The opposite end of the rocker arm 105 is pivotly connected at 108 to the upwardly extending link 109, which link in turn is pivoted at 110 to the arm 111, fixedly connected to the enlarged gear 112. This gear 112 is mounted in a stub shaft 113 suitably bearing in the supporting structure

of the main frame. This enlarged gear 112 is adapted to mesh with a pinion 114 mounted on a shaft 95. Due to the arrangement just described, it will be seen that the rotation of the shaft 11 rotates the cam 103, which causes the rocker arm 105 to rock downwardly as shown in dotted lines in Fig. 5, forcing the connecting link 109 to be pulled downwardly, as well as the arm 111 fixed to the gear 112. By transmitting motion through this gear 112 to the small pinion 114 on shaft 95, the gear 100 is forced along the rack or track 101, returning the ejecting mechanism to normal position. It is understood, of course, that the rack 101 slides in the stationary guide 115. The operation of the machine should be apparent from the foregoing description.

The motor 3 is connected with any suitable source of electric current and when put in operation drives the various pulley wheels through the belt arrangement heretofore described, rotating shaft 11. This shaft 11 rotates the cam 13, which actuates the rock arm 15. Assume that the notch 83 on link 82 has been released from contact with the supporting bracket 86 and that the link is in the position shown in Fig. 16, having the rounded notch 84 registering with the pin 88 to hold same in place. It may be well to here point out that the purpose of the notch 83 is to provide a permanent, positive locking means when the machine is not in operation, while the rounded notch 84, as has heretofore been explained, acts as a stop with each actuation of the machine and rotation of shaft 92. The normal position of this locking arrangement for the connecting link 82 is shown in Fig. 16. At this time, the track 101 and ejector member 102 have almost returned to a position outside of the machine. As the ejector 102 and track 101 move forwardly into the machine to eject a nested filler, the member 97 will be moved downwardly until the pin 98 contacts the rocking lever 94. The pin or stud 93 of the rocking lever 94 then contacts the upward extension of the latch 90 and through the contact of the pin 91 with the upper portion of the link 82 will release the notch 84 from contact with the pin 88, as clearly shown in Fig. 18. This will bring the rounded, lower portion of the connecting link 19 into a position to register with the roller 18 on the rock arm 15. The upper movement of this bracket 15 will cause the connecting lever 19 to be raised upwardly and through the arrangement heretofore described, cause individual partitions to be singly moved from the upper magazine downwardly and simultaneously cause individual partitions to be moved upwardly from the lower magazines to cause a nesting thereof. At the instant that a complete nesting is made, the ejector bar 102 and rack 101 are at their extreme outward position and the roller 14 on rock arm 15 has just reached the highest point on the cam 13. Now, beginning to leave the high point of the cam, the spring 99, which has been wound up by the backward movement of the shaft 95 and gear 100 will be released, causing the ejector rod 102 and rack 101 to ride forward. In other words, the forward movement of this ejector mechanism is done under spring tension, whereas the return of this ejector mechanism is positively controlled and actuated by the mechanisms cooperating with the cam 103, as heretofore explained. It is understood that the downward movement of the upper feeding mechanism for feeding the partitions downwardly is positively, as well as the mechanism for feeding partitions upward, while the upward movement of the mechanism for feeding the partitions downwardly is spring controlled by means of the coil spring 116 attached to the connecting rod 117, which is anchored to the cross brace 118 supported in the main frame. On the other hand, both the upward and downward movement of the mechanism for feeding the partitions upwardly is operated by means of the cam 13.

In Fig. 14, I have shown one form of nested filler which has been produced by this machine. The four partitions referred to as "*a*" were fed downwardly from the four magazines shown in Fig. 13, while the two partitions designated "*b*" were fed upwardly. I wish to here point out that I do not wish to be limited in any way to the particular form shown in Fig. 13, as the machine is capable of nesting partitions of any desired width and of any desired number. The nested filler shown in Fig. 14 is simply shown as an illustration of a standard form of filler manufactured by the applicant for the trade. The disclosure in Fig. 14 will also serve to indicate what applicant had in mind when he referred previously to the idea of producing nested fillers which when placed in a container provide a number of individual compartments of varying size in the same container.

The filler shown in Fig. 14 is positively ejected by the ejecting rod 102, as heretofore explained, and when clear of the ejector bar 102 is collapsible by any suitable mechanism operating in connection with the shaft 12 and stacked in flat bundles for storing. It is not thought necessary to describe the details of this mechanism.

It is understood, of course, that any number of magazines may be provided without effecting the operation of the mechanism heretofore described, in other words, constituting merely a duplication of magazines.

I claim as my invention:

1. A process of nesting partition blanks, comprising feeding singly in a vertical plane, a predetermined number of spaced partition blanks having notches along one longitudinal edge from a plurality of magazines holding

blanks lying in the same plane, vertically feeding individually blanks having longitudinal notches from a plurality of magazines holding blanks lying in the same plane, but at substantially right angles to the first mentioned blanks, causing the notches in the angularly disposed blanks to register, thus nesting said blanks, and removing the formed nesting.

2. A process of nesting partition blanks, comprising removing single blanks from each of a plurality of spaced magazines, in which blanks having notches along their lower longitudinal edge are stacked in the same plane, automatically feeding said blanks downwardly, in simultaneously removing singly blanks from a plurality of spaced magazines in which blanks having notches along their upper longitudinal edge are stacked in the same plane but disposed at substantially right angles to the first mentioned blanks, automatically feeding the second mentioned blanks upwardly, causing the notches in the angularly disposed blanks to interlock, thus forming a nesting and removing said formed nesting.

3. In an apparatus for nesting partition blanks, the combination with a plurality of notched blank-containing magazines, disposed in a vertical plane, of a plurality of notched blank-containing magazines disposed in a vertical plane but at substantially right angles to the first mentioned magazines, means for vertically feeding a single blank from each of the magazines functioning to form a nesting.

4. In an apparatus for nesting partition blanks, the combination with a plurality of notched blank-containing magazines, disposed in a vertical plane, of a plurality of notched blank-containing magazines disposed in a vertical plane but at substantially right angles to the first mentioned magazines, means for vertically feeding a single blank from each of the magazines functioning to form a nesting, automatically operated means for ejecting the formed nesting.

5. In apparatus for automatically nesting partition blanks, the combination with a plurality of angularly disposed magazines in which previously severed partition blanks having longitudinal notches are stacked in different horizontal planes, blank ejecting means moving in a vertical plane for automatically ejecting individual partition blanks from each of the magazines, thus forming a nesting, means including a follower, for maintaining constant tension behind each stack to insure certain forward feed of the blanks to the blank-ejecting means and an automatically actuated ejector for discharging the formed nestings.

6. A method of nesting partition blanks which comprises feeding singly a partition blank having a notch along a longitudinal edge from each of a plurality of magazine holding blanks lying in the same plane, simultaneously feeding singly blanks having a notch along a longitudinal edge from each of a plurality of magazines, the latter holding blanks lying in the same plane but disposed at substantially right angles to the first mentioned magazine, causing the notches in the angularly disposed blanks to register, thus nesting said blanks, and removing the formed nesting.

7. In apparatus for automatically nesting partition blanks, the combination with a plurality of angularly disposed magazines in which previously severed partition blanks having longitudinal notches are stacked in different and angularly disposed planes, synchronized blank ejecting means cooperating with the blanks in each magazine for simultaneously ejecting a blank from each of the magazines whereby a nesting is formed, means for maintaining constant tension on each stack to insure positive feed of the blanks to the blank ejecting means, and automatically actuated ejector for discharging the formed nestings.

8. In apparatus for automatically nesting partition blanks, the combination with a plurality of angularly disposed magazines in which previously severed partition blanks having longitudinal notches are stacked in different and angularly disposed planes, synchronized blank ejecting means cooperating with the blanks in each magazine for simultaneously ejecting a blank from each of the magazine whereby a nesting is formed, means for maintaining constant tension on each stack to insure positive feed of the blanks to the blank ejecting means, and automatically actuated ejector for discharging the formed nestings, and means acting on the ejected nesting adapted to collapse said nesting.

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