March 7, 1950 W. P. WINTERS 2,499,439

SHEET FEEDING AND SEPARATING DEVICE

Filed Dec. 28, 1944 5 Sheets-Sheet 1

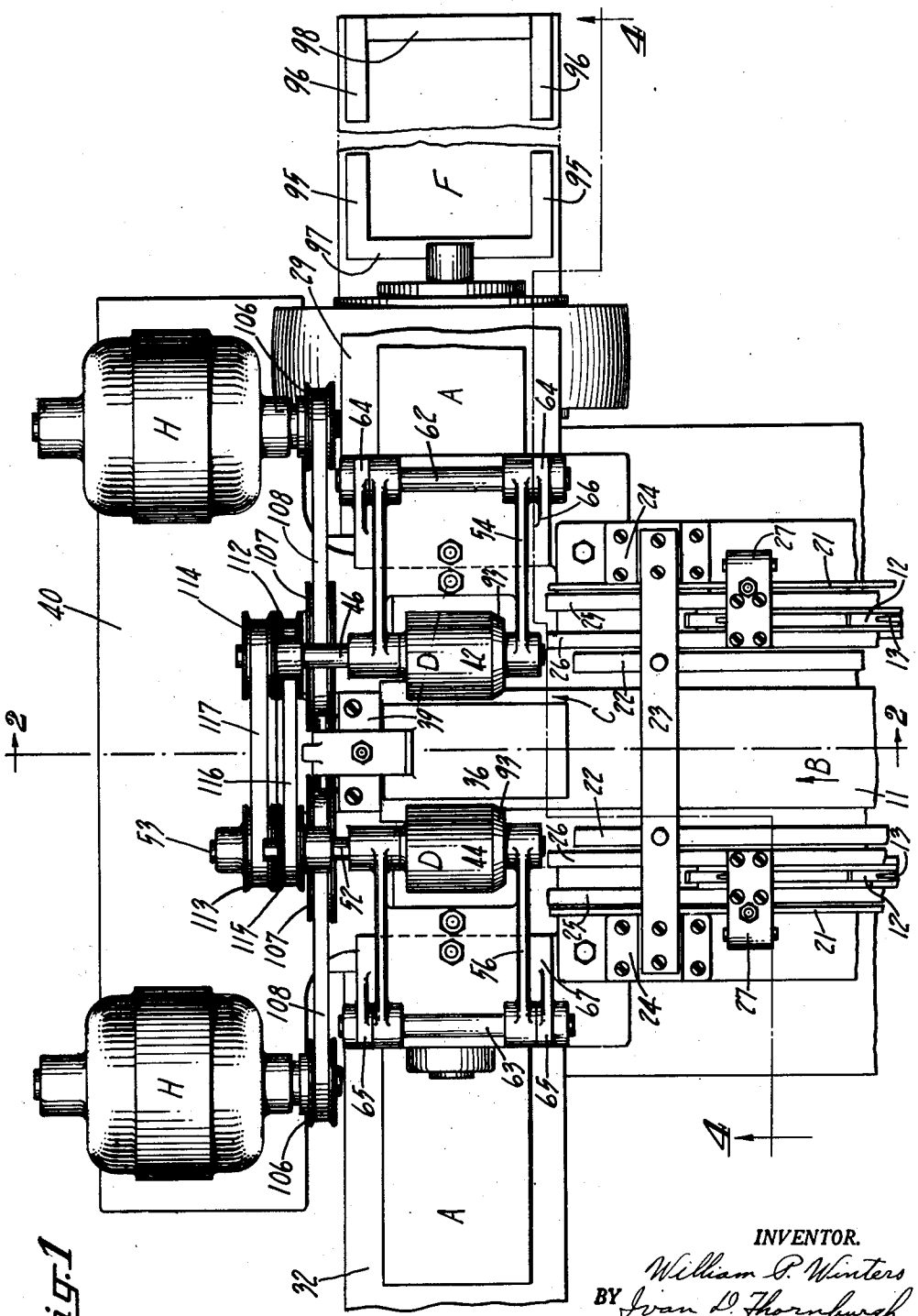


Fig. 1

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Filed Dec. 28, 1944 5 Sheets-Sheet 2

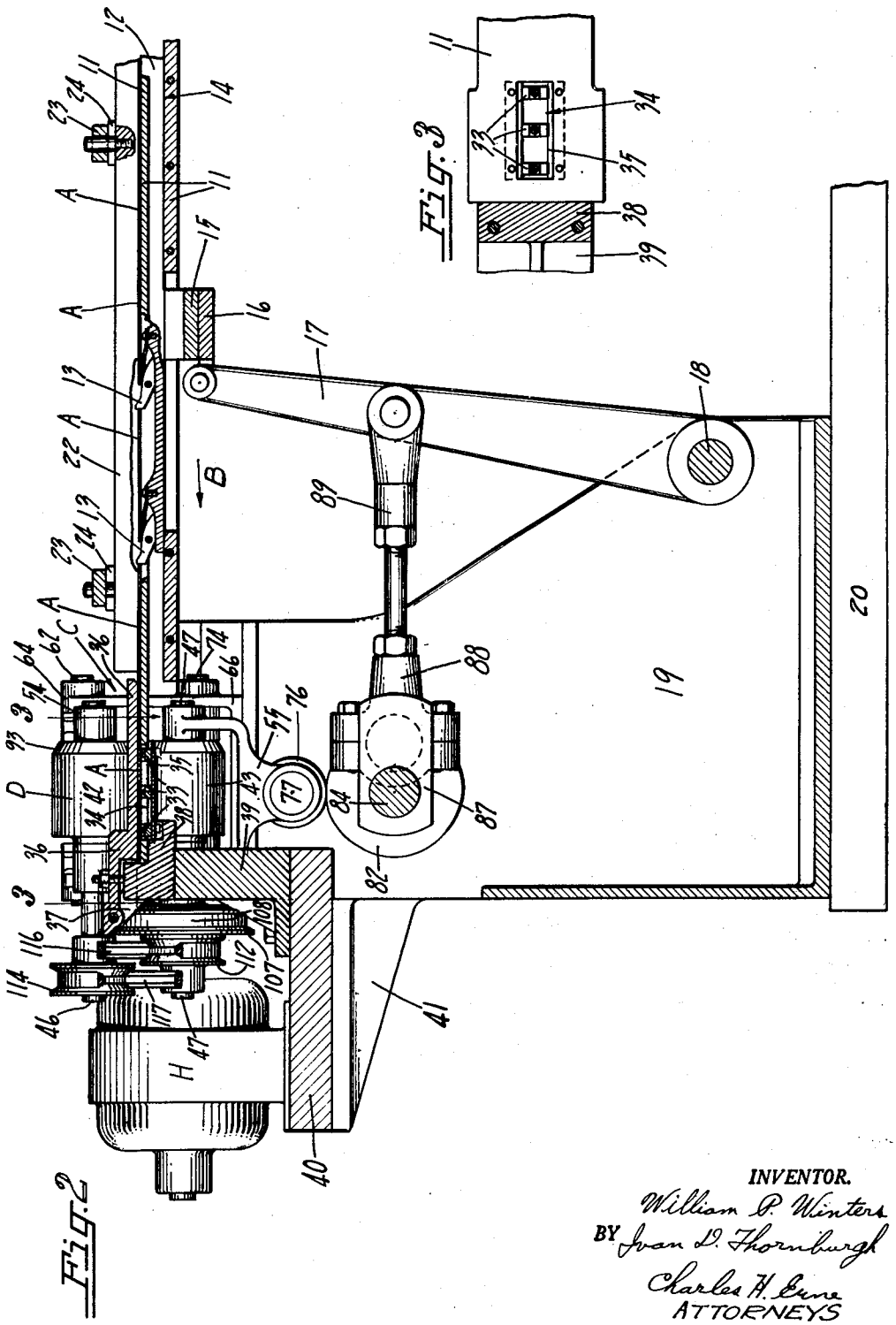


Fig. 2

Fig. 3

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SHEET FEEDING AND SEPARATING DEVICE

Filed Dec. 28, 1944 5 Sheets-Sheet 3

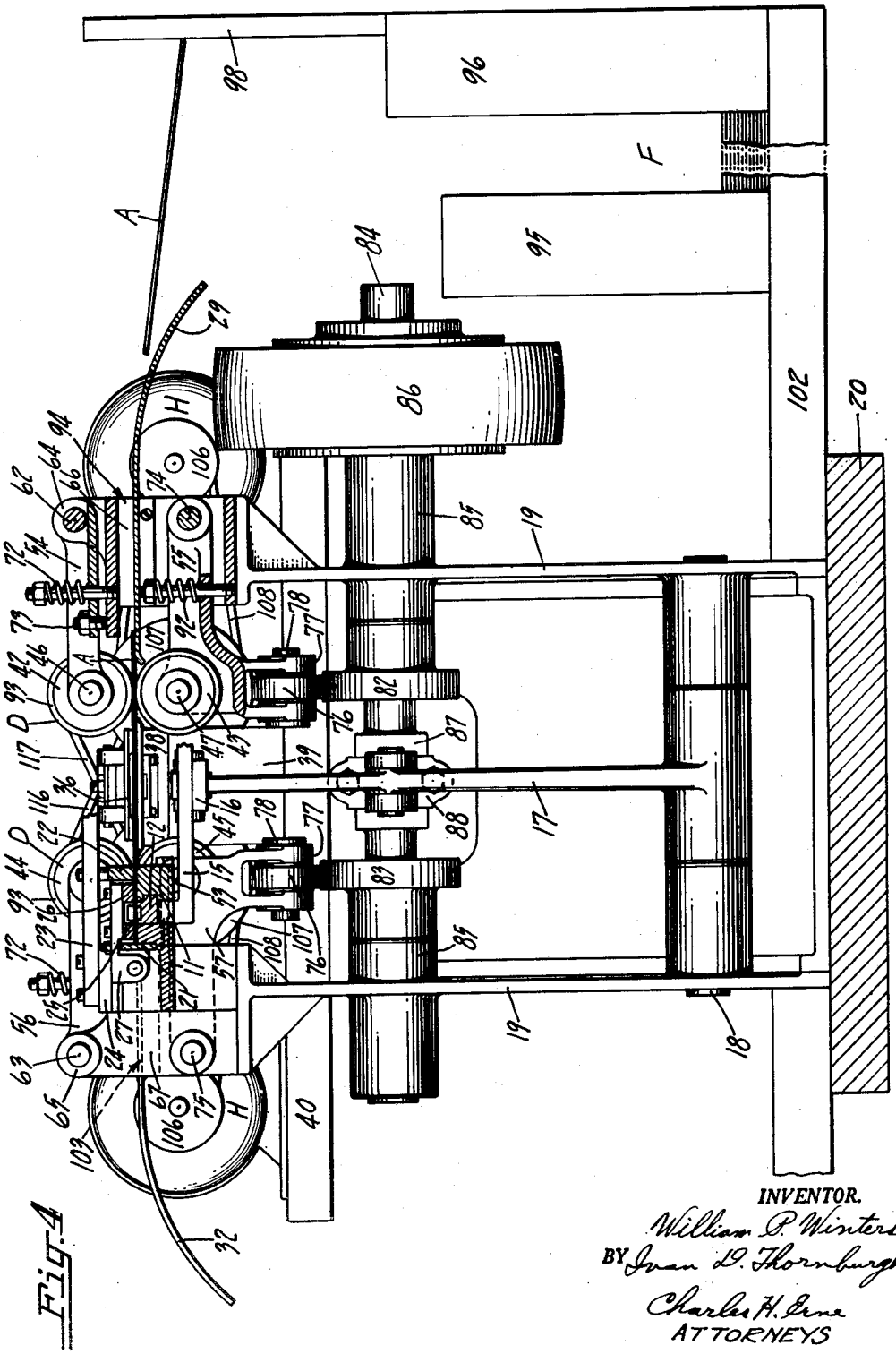


Fig. 4

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March 7, 1950 W. P. WINTERS 2,499,439

SHEET FEEDING AND SEPARATING DEVICE

Filed Dec. 28, 1944 5 Sheets-Sheet 4

Fig. 5

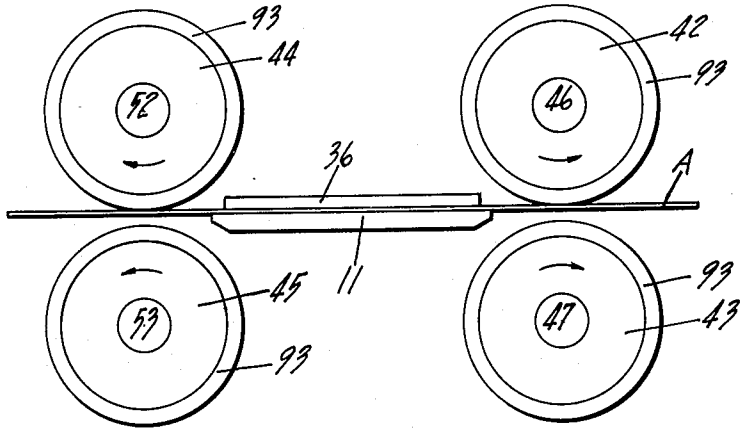


Fig. 6

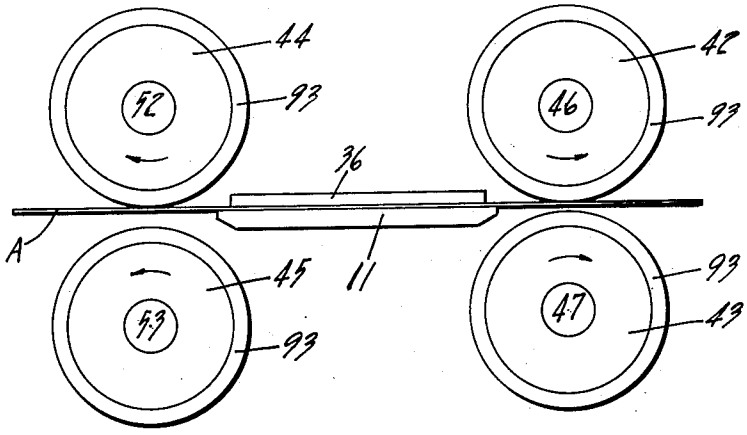
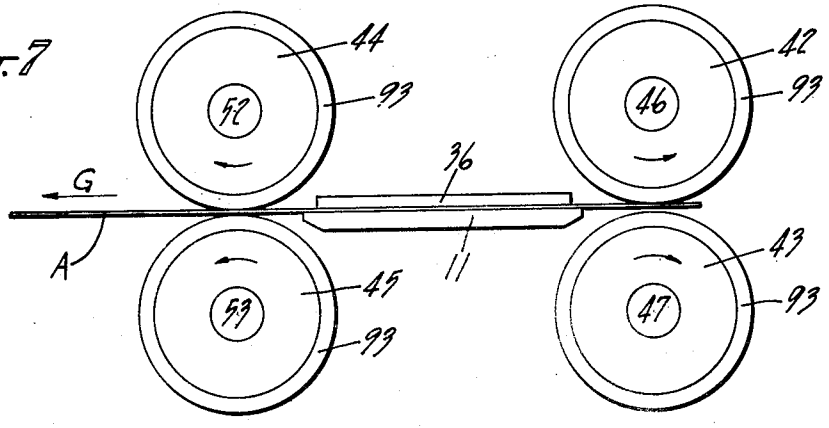


Fig. 7



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SHEET FEEDING AND SEPARATING DEVICE

Filed Dec. 28, 1944 5 Sheets-Sheet 5

Fig. 9

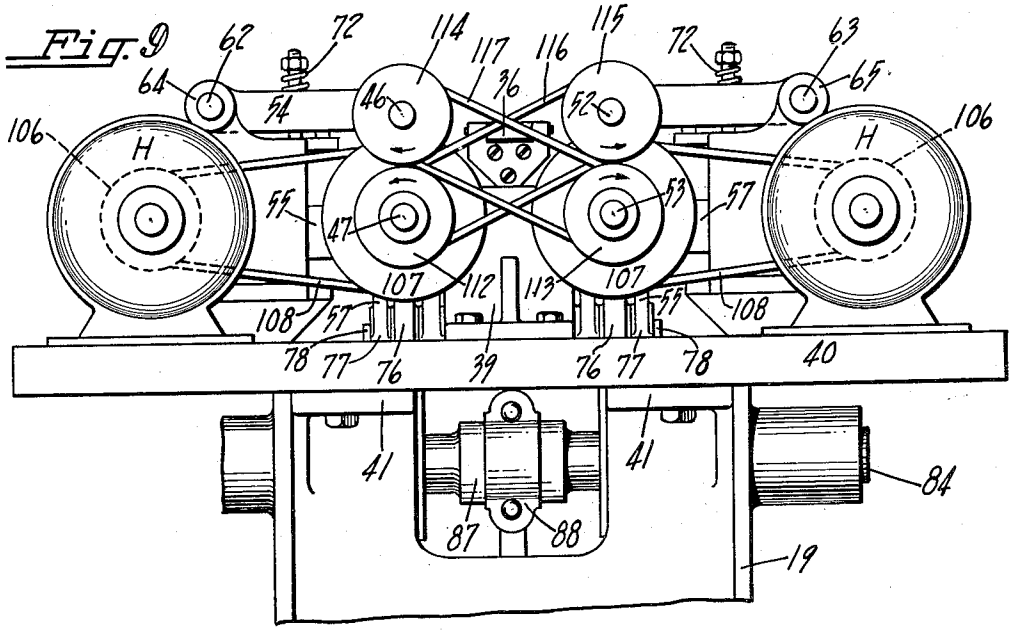
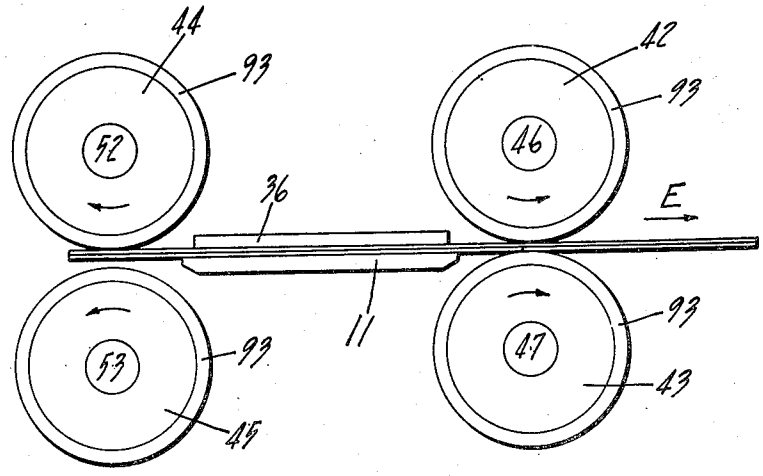


Fig. 8



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UNITED STATES PATENT OFFICE

2,499,439

SHEET FEEDING AND SEPARATING DEVICE

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Application December 28, 1944, Serial No. 570,174

6 Claims. (Cl. 209—88)

1

This invention relates to high speed sheet or blank feeding and separating mechanism and has particular reference to devices for ejecting double or abnormal thickness blanks along an abnormal path of travel to separate them from normal or single blanks which are fed along a normal path.

An object of the invention is the provision of a high speed sheet or blank feeding and separating mechanism which operates first to eject and segregate the blanks having abnormal thickness as when two blanks stick together following which normal single blanks are advanced along a different or normal path.

Another object of the invention is the provision of a feeding and separating device which utilizes two sets of spaced continuously rotating rollers arranged on opposite sides of a feed line, one set of rollers being brought into spaced position so as to engage double or abnormal blanks and to eject them transversely, such rollers having no effect on normal single blanks which are thereafter fed in an opposite direction by the other set of rollers.

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

Referring to the drawings:

Figure 1 is a top plan view of a blank feeding device embodying the present invention, with parts broken away;

Fig. 2 is a longitudinal sectional view of the device taken substantially along the line 2—2 in Fig. 1;

Fig. 3 is a detail of blank holding elements as viewed substantially along the lines 3—3 of Fig. 2;

Fig. 4 is a transverse sectional view of the device taken substantially along the line 4—4 in Fig. 1;

Figs. 5 to 8, inclusive, are schematic views showing relative positions of the rotatable separating and feeding rollers for single and double blanks; and

Fig. 9 is a rear view of the device showing electric motors and belt driving means for rotating the separating and feeding rollers.

As a preferred embodiment of the invention the drawings illustrate the principal parts of a blank feeding mechanism wherein rectangular blanks A, herein shown as can body blanks, are brought into a testing position where devices operate to move abnormal blanks or to select only single thickness blanks so that the latter may be

2

fed in a continuous normal procession along a predetermined path of travel to a suitable place of deposit which may be directly to an adjoining machine. The blanks A are fed longitudinally along a table or support 11 (Figs. 1, 2 and 4) by a pair of spaced, parallel feed bars 12 having spring pressed feed dogs 13 equally spaced along the bars. The feed bars reciprocate in slideways 14 cut in the table 11. These feed bars are moved in unison by a cross bar 15 which is secured by a connecting link 16 to a rocker arm 17, the latter being pivoted at its lower end on a cross shaft 18 carried in a machine frame 19. This frame is mounted on a machine base 20. The rocker arm 17 is operated in time with other moving parts of the device. This will be described hereinafter.

As the feed bars 12 move through a forward stroke, a blank A is advanced one step and as the bars return the blank remains stationary until the next forward stroke, this being a common feeding operation. The blank in its step-by-step advancement passes along the table in the direction of arrow B in Figs. 1 and 2. The blanks A are maintained in a straight line of travel by a pair of side guide rails 21 which are secured to the table adjacent its outer edges (Figs. 1 and 4).

Upper guide rails 22 are supported by a transverse bar 23 mounted on blocks 24 secured to the table and these rails serve to hold the moving blanks on the table. Associated guide rails 25, 26 located on each side of the feed bars 12 also assist in the proper rapid feeding of the blanks and insure the proper engagement of each blank A by the feed dogs 13. These associate guide rails are secured to hinge brackets 27 which are carried on the table 11 (Figs. 1 and 4). The table 11 is supported by and secured to the machine frame 19.

The blanks A are introduced into a testing station C, by the feed bars 12 at which station opposite ends of each blank or blanks pass onto discharge platforms 29, 32. These will be described later. While at the testing station the blank or blanks engage a plurality of magnets 33. These hold the blanks in the desired position for testing.

The magnets 33, of which there are or may be three, preferably are of the permanent variety (Figs. 2 and 3) being disposed in an opening 34 in the table 11. The magnets are mounted on a non-magnetic plate 35 which is secured to the table. The upper face of each magnet 33 is substantially flush with the upper surface of the table so that the blanks are delivered into the testing station C without interruption where

they come to rest directly on the magnets. An upper plate 36 centrally located at the testing station also holds the blanks down on the table. This upper plate is carried on a hinge connection 37 of a stop block 38 secured to a transverse support 39. The latter support is carried on a cross member 40 which is mounted on brackets 41 of the frame 19.

The blank separating and feed device or mechanism, indicated by the letter D, comprises two pairs of vertically disposed rollers, one of the pairs being located on each side of the path of travel of the incoming blanks. As clearly shown in Fig. 4, the rollers on each side are vertically aligned one above and one below the blank. These two pairs of rollers are rotated continuously in opposite directions, as indicated by arrows in Figs. 5 to 8, inclusive.

The pair of rotating rollers on the right, as viewed in Figs. 1, 4, 5, 6, 7 and 8 function as a double blank separating and feeding roller unit. The pair on the left are for single blank feeding. The double blank unit includes an upper rotatable roller 42 and a lower rotatable roller 43. The single blank feeding unit includes an upper rotatable roller 44 and a lower rotatable roller 45.

Rollers 42, 43 are mounted on horizontal shafts 46, 47. In a similar manner rollers 44, 45 are mounted on horizontal shafts 52, 53. Shaft 46 is journaled in suitable bearings at the the inner end of a pair of spaced upper yoke arms 54. Shaft 47 is journaled in suitable bearings at the inner end of a pair of spaced yoke cam arms 55. In like manner shaft 52 is journaled in suitable bearings at the inner end of a pair of upper yoke arms 56. Shaft 53 is journaled in suitable bearings at the inner end of a pair of yoke cam arms 57.

The upper yoke arms 54, 56 are mounted to float on shafts 62, 63 carried in lugs 64, 65 of brackets 66, 67. The brackets 66, 67 are secured to opposite sides of the main frame 19. These upper yoke arms are yieldably held by springs 72 in a normally lowered position where an adjustable screw stop 73 on each arm rests on the bracket 66 or 67. Springs 72 are carried on rods extending up through the yoke arms 54, 56 and anchored in the brackets 66, 67. This yieldably holds the rollers 42, 44 in a predetermined position relative to the line of feed of the blanks. The stops 73 are adjusted to provide for various settings of the rollers 42, 44 to compensate for different thicknesses of blanks handled by the machine.

The lower yoke cam arms 55, 57 are pivoted on shafts 74, 75 carried in the brackets 66, 67. These arms are cam actuated in time with the travel of the blanks along the feed table. Each cam arm carries a cam roller 76 (Figs. 2 and 4), a lower forked bearing 77 formed in the arm supporting a stud 78 on which the roller is mounted loosely. Rollers 76 engage against respective edge cams 82, 83. The edge cams are mounted on a main drive shaft 84 which is journaled in bearings 85 formed in the frame 19. This shaft may be rotated by a pulley 86 mounted at one end of the shaft (to the right as viewed in Fig. 4), the pulley being driven by suitable belt connection from a convenient source of power (not shown).

The drive shaft 84 has a central crank 87 (Figs. 2 and 4) which carries a pitman 88 joined by suitable linkage 89 to the rocker arm 17. In this way the cam actuated lower rotatable rollers 43, 45 are raised and lowered in proper time with

the feeding of blanks A into the testing station C.

The normal position of the lower rotatable rollers 43, 45 is shown in Fig. 5 in which position they are spaced apart from the upper rotatable rollers 42, 44. Springs 92 are mounted on rods extending up through the yoke arms 55, 57, said rods being anchored in the brackets 66, 67. These springs press against the cam arms and keep the cam rollers 76 in engagement with the edge cams 82, 83 (Fig. 4). The lower rotatable rollers are in separated position when the advancing blanks move into the testing station C (see also Fig. 5). In order to facilitate the passage of the blanks A between the rollers, the entrance or front end of each of the rollers is beveled, as at 93.

With a blank or blanks A in position at the testing station the lower rotatable roller 43 first moves up into the position illustrated in Fig. 6. If the passage of blanks is normal there is a single blank between the rollers 42 and 43. The thickness of this blank is less than the clearance space between the rollers 42, 43 and hence the lower roller does not engage the blank.

Should a double blank be in position between the rollers 42, 43 during this raising of the lower roller, the double blank thickness exceeds that of the clearance space between the rollers. The double blanks under such conditions are engaged by both rotating rollers and quickly withdrawn and ejected following the path indicated by the arrow E in Fig. 8.

The ejected blanks pass along the platform 29 through an opening 94 in the bracket 66. Platform 29 is secured to the walls of the opening 94 (Fig. 4) and preferably extends outward and downward in an arc. This directs the blanks into a bin F or other suitable place of deposit. Such a bin comprises side walls 95, 96 and end walls 97, 98 (Fig. 1). Wall 98 extends up above the others and acts as a back stop for the discharged blanks. The bin F is or may be supported on a transverse frame member 102 which is mounted on the base 20.

Following this action, the lower rotatable roller 45 next moves up into the position shown in Fig. 7. The clearance between roller 45 and the upper roller 44 when in this position is less than a single blank thickness. Accordingly, if a normal single blank A is in position in station C it is engaged and ejected by the rotating rollers 44, 45 in the opposite direction. The single blank moves along a path indicated by the arrow G, and out of the station. Obviously where double blanks have just been ejected as described above, the raising of the roller 45 has no blank feeding effect.

The discharge of the single blank A passes it over the platform 32 (Fig. 4) to the left where it may be fed directly to an adjoining machine. The platform 32 extends through an opening 103 in the bracket 67. The platform is secured in the walls of the opening and projects outward and downward preferably terminating in a curved section as shown.

The upper and lower rotatable rollers 42, 43, 44 and 45 are preferably continuously rotated uniformly by synchronized electric motors H (Figs. 1, 2, 4 and 9). These motors are supported on the cross member 40. Each of the motors H has a sheave 106 secured to an end of the motor shaft and there are driving sheaves 107 mounted one on each of the horizontal shafts 47, 53. Suitable continuous or endless belts 108 are used for driving purposes, these operating over each set

of sheaves 106, 107, as indicated by the arrows in Fig. 9.

The upper rotatable rollers 42, 44 are operated directly from the rotating shafts 47, 53 of the lower rollers by suitable belt drives. For this purpose drive sheaves 112, 113 are mounted on the shafts 47, 53 each being disposed adjacent its corresponding sheave 107. In similar manner the horizontal shafts 46, 52 each carry driven sheaves 114, 115.

A continuous belt 116 passes over the drive and driven sheaves 112, 115 and this rotates the shaft 52 in the direction of the arrow. A continuous belt 117 passes over the drive and driven sheaves 113, 114 and this rotates the shaft 46 in the direction of the arrow. In this manner proper and preferably high speed rotation is imparted to the respective rollers for performing the operations described.

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

I claim:

1. In a metallic blank feeding and separating mechanism, the combination of a support for the blanks, feeding devices for advancing blanks along said support to a testing station disposed thereon, magnetic blank holding means located at said testing station for holding blanks during testing thereof, and a plurality of cooperating continuously rotatable rollers arranged some above and others below said support, the lower rollers being movable toward and away from the upper rollers and on opposite sides of a blank when on said support, one of said lower rollers being movable relative to its corresponding upper roller where there is an intervening space therebetween in excess of the thickness of a single blank and less than a double blank thickness to eject all double blanks from said intervening space and out of the testing station, another of said lower rollers being movable to a position relative to its corresponding upper roller where there is an intervening space less than the thickness of a single blank to feed all single blanks from said space and out of said testing station along a different path from the path of said double blanks thereby separating the single and double blanks.

2. In a feeding and separating mechanism for metallic blanks and the like, the combination of a support, a feed for advancing blanks along a predetermined path of travel to a testing station on said support, upper rotatable rollers carried on said support and located above said path of travel of the blanks into said testing station, lower rotatable rollers disposed beneath said blank path of travel for cooperating with said upper rotatable rollers, said lower rollers being rotatable in opposite directions to said upper rollers and opposite to each other ond being movable downwardly with respect to the upper rollers for the entry of blanks therebetween, and means for moving one of said lower rollers toward its upper roller to provide a space for the free passage of single blanks but not for double blanks to eject the double blanks transversely from the testing station, said means subsequently moving another of said lower rollers toward its upper roller to provide a space insufficient for single blanks to discharge all remaining single blanks in a different direction from said double blanks to separate the single blanks from the double blanks.

3. In a blank feeding and separating mechanism, the combination of a support for normal and abnormal thickness blanks to be separated, a plurality of pairs of cooperating rollers respectively disposed on opposite sides of said support, means for advancing blanks on said support in a direction longitudinally of the roller axes with the opposite edges of the blanks disposed between the spaced rollers of the roller pairs, a pair of rollers on one side of said support being bodily movable toward and away from a pair of rollers on the other side thereof, the rollers of each pair being disposed on opposite sides of a blank carried by said support, means for rotating corresponding rollers of said roller pairs in opposite directions, means for bodily moving one roller of said movable pair of rollers relative to its adjacent cooperating roller to provide an intervening space in excess of the thickness of a normal blank but less than an abnormal blank thickness so that said cooperating rollers engage and eject all abnormal blanks therebetween laterally to one side of said support, and means for bodily moving the remaining roller of said movable pair of rollers relative to its adjacent cooperating roller to provide an intervening space less than the thickness of a normal blank, whereby all normal thickness blanks are engaged and fed from between said last mentioned cooperating rollers to the opposite side of said support, thereby separating the normal from the abnormal thickness blanks.

4. In a blank feeding and separating mechanism, the combination of a support along which normal and abnormal thickness blanks are advanced to be separated, a plurality of cooperating rollers arranged vertically in pairs with the upper roller of each pair disposed above and the lower roller of each pair disposed below said support, the lower rollers being movable toward and away from the upper rollers and the upper and lower rollers being respectively disposed on opposite sides of a blank on said support, means for bodily moving a lower roller of a said pair relative to its associated cooperating upper roller to a position where there is an intervening space in excess of a normal blank thickness and less than an abnormal blank thickness, and means for bodily moving a lower roller of another of said pairs relative to its associated cooperating upper roller to a position where there is an intervening space less than the thickness of a normal blank, whereby said pairs of rollers respectively feed all normal and abnormal thickness blanks in opposite directions laterally of said support, and means for continuously rotating said pairs of blank ejecting rollers in opposite directions for the purposes set forth.

5. A blank feeding and separating mechanism, comprising a blank support having a testing station, spaced pairs of cooperating spaced rollers respectively disposed on parallel axes on opposite sides of said station, means for successively advancing blanks on said support to said station in a direction longitudinally of the roller axes and with the opposite edges of the blanks disposed between the spaced rollers of the roller pairs, means for rotating said rollers with corresponding rollers of said roller pairs rotating in opposite directions, and means apart from the advancing blanks for variably moving one roller of each pair bodily relative to the other so as to periodically provide a space between such rollers to engage

and discharge laterally of such rollers only normal blanks of single thickness, and means to periodically provide a greater space between the rollers of another pair to engage and discharge laterally of such latter rollers only abnormal blanks of double thickness.

6. A blank feeding and separating mechanism, comprising a horizontal blank support having a testing station, spaced vertical pairs of cooperating spaced upper and lower rotatable rollers respectively disposed on parallel axes on opposite sides of said station, means for successively advancing blanks on said support to said station in a direction longitudinally of the roller axes and with the opposite edges of the blanks disposed between the spaced rollers of the roller pairs, means for temporarily arresting the advancing movement of the blanks at said station, means for continuously rotating the rollers of each pair in opposite directions, and means independent of the advancing blanks for variably bodily moving the lower roller of each pair relative to the upper

roller so as to intermittently provide a space between such rollers to engage and discharge laterally of the rollers only normal blanks of single thickness, and to intermittently provide a greater space between the rollers of another pair to engage and discharge laterally of such latter rollers only abnormal blanks of double thickness.

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