May 9, 1961 R. O. WILSON 2,982,978

RIVET SHANK SLOTTING MACHINE WITH INDEXIBLE WORK HOLDING TURRET AND MEANS TO PREVENT ROTATION OF RIVET DURING INDEXING OF TURRET

Filed March 4, 1957 4 Sheets-Sheet 1

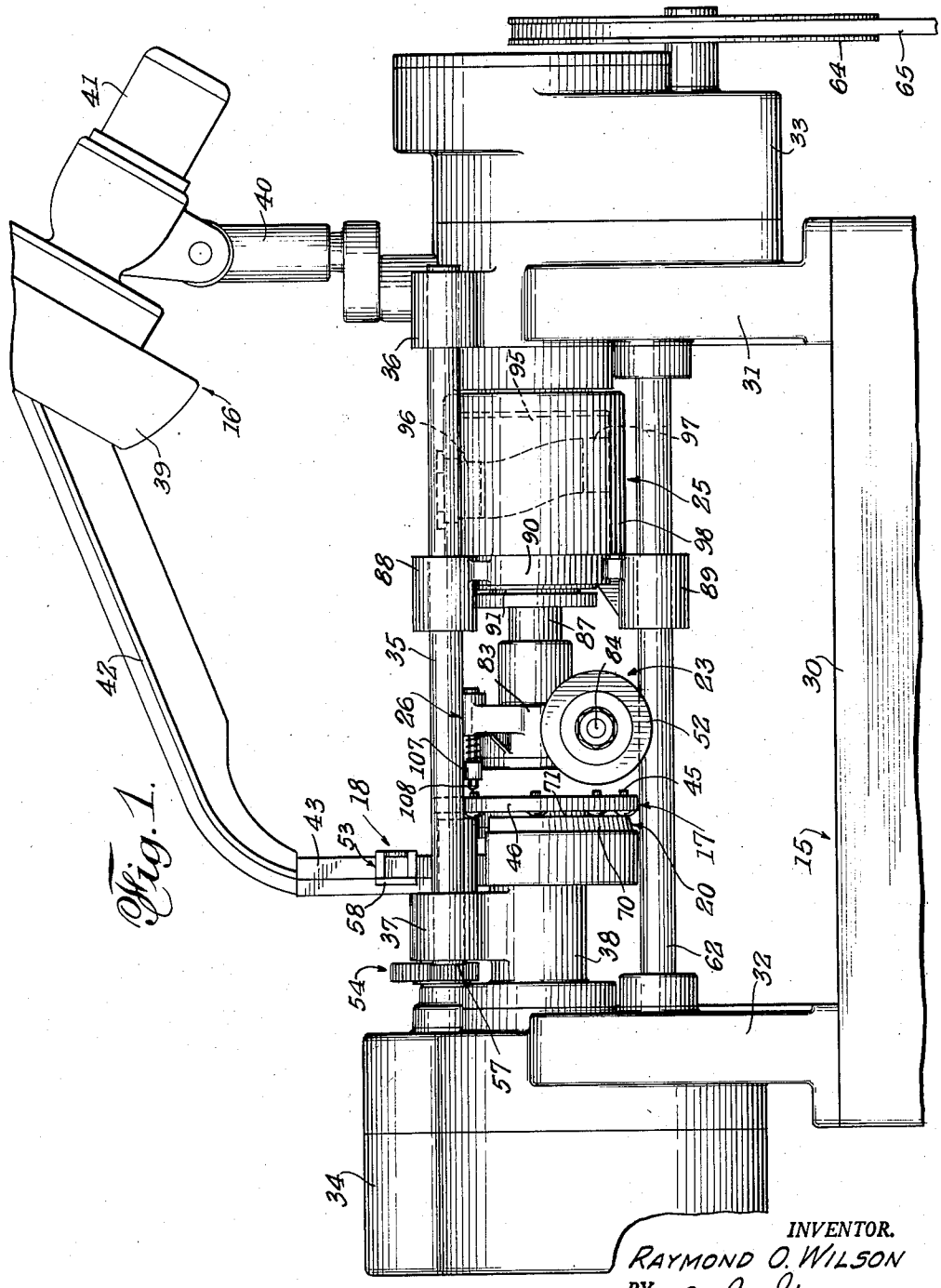

Fig. 1.

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Fig. 2.

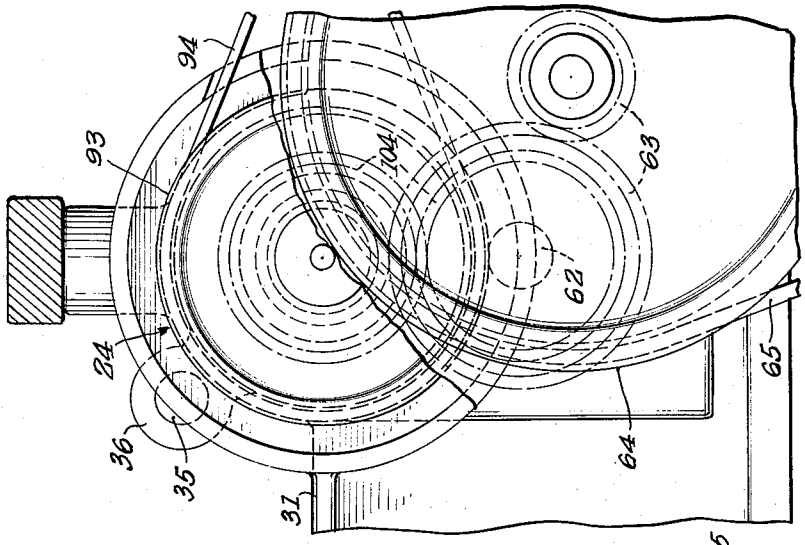
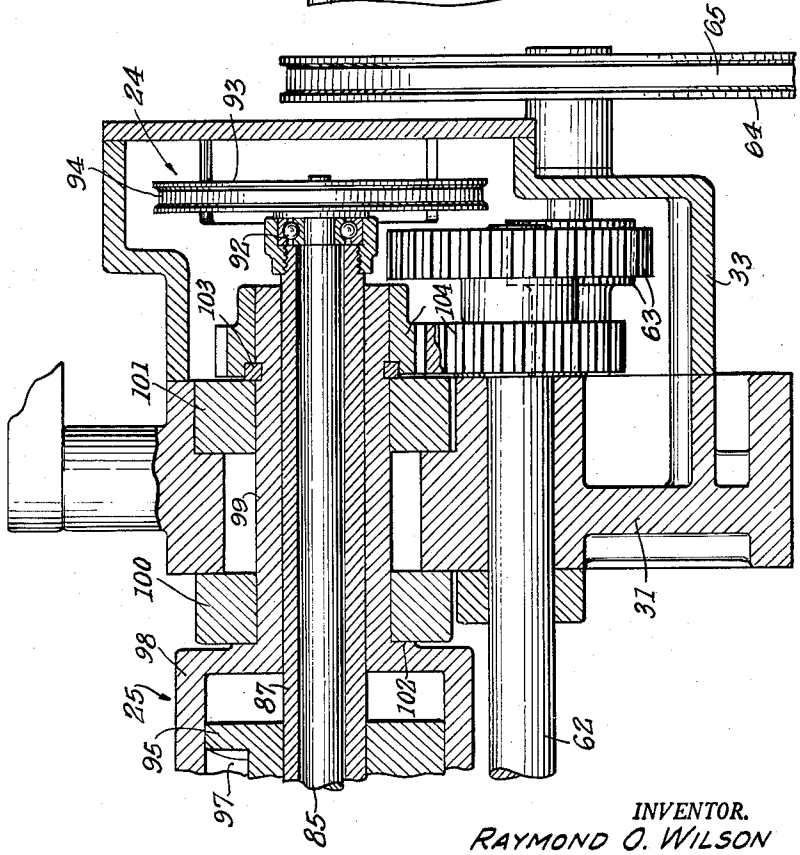


Fig. 3.



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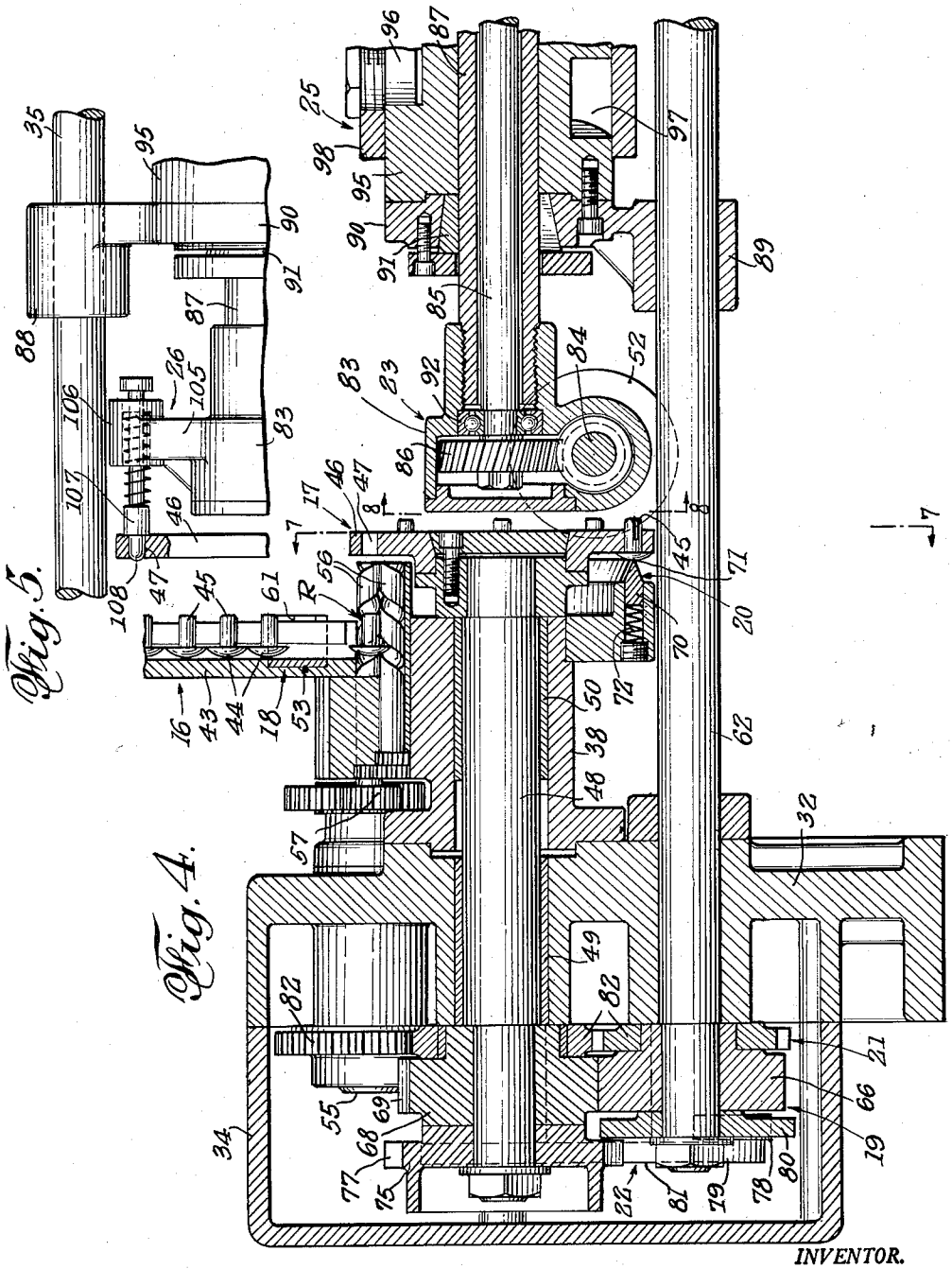

Fig. 4.

Fig. 5.

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Filed March 4, 1957 4 Sheets-Sheet 4

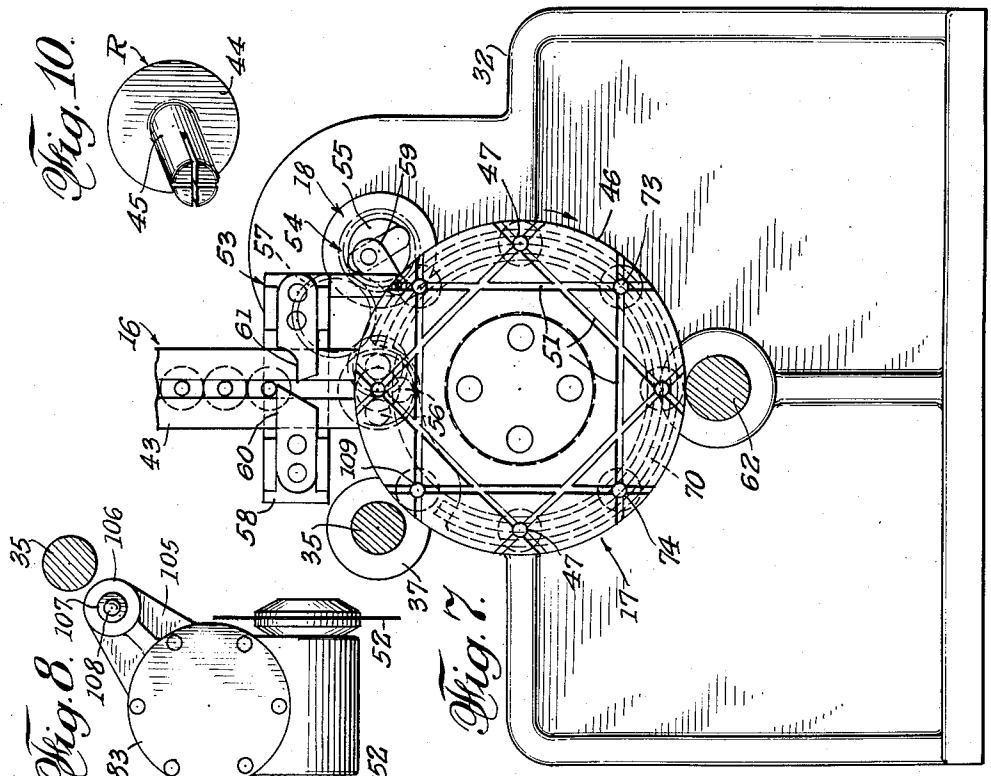

Fig. 7.

Fig. 8.

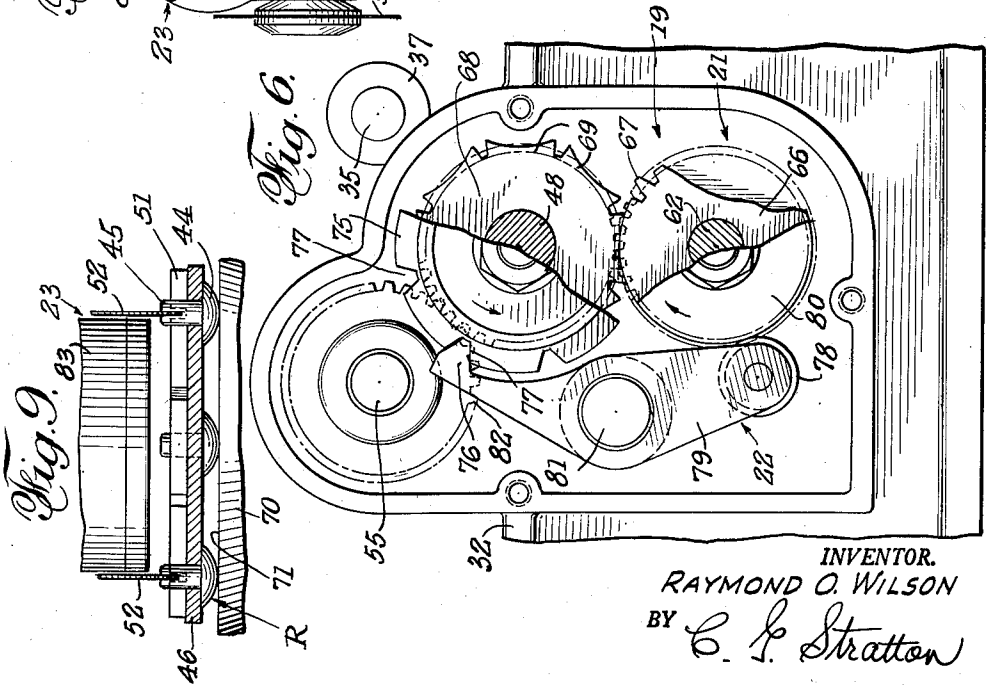

Fig. 6.

Fig. 9.

Fig. 10.

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2,982,978

RIVET SHANK SLOTTING MACHINE WITH INDEXIBLE WORK HOLDING TURRET AND MEANS TO PREVENT ROTATION OF RIVET DURING INDEXING OF TURRET

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8 Claims. (Cl. 10—20.5)

This invention relates to a machine for slotting the ends of rivets and similar items, and deals more particularly with a machine for cross-slotting the ends of rivets.

Certain rivets are expanded into plate-holding or -riveting condition, not by peening or swaging the ends thereof, but by spreading said ends. The present machine contemplates novel, improved and highly efficient means for cross-slotting the ends of rivets whereby the same may be spread.

An object of the present invention is to provide a machine of the character referred to that embodies a novel combination of elements for feeding rivets and cross-slotting the ends thereof, said combination including simplified means to hold the rivet so oriented during feed thereof that the cross-slots formed are accurately normal to each other.

Another object of the invention is to provide a machine of the indicated character that is compact and does not require continual operator attendance, the present mechanism being positive operating to insure trouble-free operation.

A further object of the invention is to provide, in a machine of the above-indicated character, means that simultaneously performs a slotting operation on two rivet ends while the rivets are held properly coordinated rotationally.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a partly broken side elevational view of a slotting machine according to the present invention.

Fig. 2 is a broken end view as seen from the right or drive-connected end of the machine.

Fig. 3 is a vertical sectional view as taken through the longitudinal center of the machine, showing the driving end thereof.

Fig. 4 is a similar view of the left or operating end of the slotting machine, the same being shown in slotting position.

Fig. 5 is a fragmentary elevational view showing rivet-dislodging means used in the present invention.

Fig. 6 is a broken end view as seen from the left or operating end of the machine.

Fig. 7 is a vertical sectional view as taken on line 7—7 of Fig. 4.

Fig. 8 is an end view of slotting means, the view being a cross-section on line 8—8 of Fig. 4.

Fig. 9 is an enlarged and fragmentary plan sectional view showing the slotting means in operative association with rivets and in the process of slotting the same.

Fig. 10 is a further enlarged perspective view of a cross-slotted rivet.

The slotting machine that is illustrated comprises, generally, a frame **15**, rivet-feeding means **16** preferably carried by the frame, a rivet-receiving turret **17**, means **18** to control feed of rivets to said turret, means **19** to intermittently index the turret **17** to successively advance rivets carried thereby, means **20** to hold the rivets non-rotationally in their slots, means **21** to drive the feed control means **18**, locking means **22** to hold the control means stationary between successive feeding steps, a slotting head **23**, means **24** to drive said head, means **25** to advance and retract the head relative to the turret **17** in synchrony with the turret-indexing movement, and means **26** to dislodge the slotted rivets from the turret during each advancing movement of the slotting head.

The frame **15** is shown as comprising a base **30** to which is affixed respective end brackets **31** and **32**, the former to mount the driving means of the machine and the latter the operative means. As shown best in Figs. 1, 2 and 3, bracket **31** carries the feeding means **16**, and the same is provided with a housing cover **33** that encloses portions of the drive means. Somewhat similarly, the bracket **32** is provided with a housing cover **34** to enclose the means **19** and **20** as well as the locking means **21** of the operating end of the machine.

The brackets **31** and **32** are shown as being upright and the same are longitudinally spaced. As best seen in Fig. 1, said brackets are connected by a bar **35** that extends between a boss **36** on bracket **31** and a boss **37** formed on a hub **38** affixed to bracket **32** and extending in a direction toward the bracket **31**.

The rivet-feeding means **16** is generally conventional and, per se, forms no part of this invention. The same is here shown as a circular hopper **39** that is mounted on an adjustable bracket **40** and includes means driven by a motor **41** to discharge rivets R from said hopper along a slideway or chute **42**. Said rivets are all oriented alike when they leave said chute and enter a vertical guide **43**. Thus, as seen in Figs. 4 and 7, the rivets are stacked, being spaced by their larger heads **44**, and the shanks **45** all extend in the same direction, in this case, toward the drive end of the machine.

The turret **17** comprises a head **46** that is provided with a set of seats **47** that are symmetrically arranged in circular form, as best seen in Fig. 7. In the present instance, eight seats are provided in right octagonal arrangement. While eight seats are preferred, four may be used or any multiple of four, thereby, at all times providing two seats at right angles to each other with respect to the axis of said head. Said axis coincides with the longitudinal center of a shaft **48** on which the turret head is mounted and which has bearing in the bracket **32** and the hub **38**,

sleeve bushings 49 and 50 being provided as bearings for said shaft.

As can be seen from Figs. 7 and 9, clearance slots 51 are formed in the face of turret head 46 that is directed toward the slotting head, said slots being so disposed as to receive the slotting saws or discs 52 that are carried by slotting head 22.

The feed controlling means 18 comprises an escapement 53 that is driven by the means 54 from a rotary shaft 55, and feeds screws 56 that receive rivets released by escapement 53 and which are driven by a gear train 57 from said shaft 55.

The escapement 53 may take many different forms. As shown, the same comprises a transverse slide 58 that is reciprocated as by a crank and link 59 by said shaft 55. Said slide 58 is provided with upper and lower rivet-releasing blades 60 and 61, respectively, the same, during each full reciprocative movement of the slide, intermittently releasing a rivet in chute 43 to fall, first on the lower blade 61 and then onto the feed screws 56.

Three feed screws 56 are shown, the same forming a rivet-receiving channel or trough, as can be seen in Fig. 4. Each screw is formed to have a helical groove to receive the heads 44 of the rivets with the shanks 45 thereof directed toward the turret head and in line with a seat 47 in said head. The pitch of screws 56 and their respective rotations are such that a rivet is advanced, shank first toward the aligned seat 47. It will be clear that such advance will push a rivet into the turret head so that its shank 45 will project from the opposite face of said head, as shown in Figs. 1, 4 and 9, and that the head 44 of said rivet will be brought into flush engagement with the near face of the turret head and clear of the ends of the feed screws 56.

The turret-indexing means 19 is best seen in Figs. 4 and 6. The same comprises a drive shaft 62 continuously rotated, through a gear train 63, by a pulley 64 which is driven by a motor (not shown) through the medium of a belt 65. Said drive shaft 62 spans between brackets 31 and 32 and has bearing in said brackets. A wheel 66 is provided on said shaft within housing cover 34, the same having a toothed portion 67 that, for each revolution of shaft 62, advances the shaft 48 a fractional part of a revolution. A star wheel 68 on shaft 48 cooperates with wheel 66, according to the number of wings 69 thereon, and advances such fractional part of a revolution. Since the turret head has eight rivet-receiving seats 47, wheel 68 has eight wings 69 and is advanced one-eighth of a revolution for each full revolution of shaft 62.

The means 19 that is illustrated is typical of intermittent gearing and the same, of course, may be varied.

During such intermittent rotation of the turret head 46, a rivet carried thereby is intermittently advanced in 45° increments around the axis of shaft 48. Thus, theoretically, such rivet goes through a lunar rotation around said axis. In practice, however, the rivet may be rotationally moved on its own axis, particularly as a result of a slotting operation or if the shank thereof has some looseness of fit in its seat 47. To obviate such inadvertent rotational movement of the rivets on their own axes, the means 20 is provided. Said means comprises a shoe 70, concentric with the circle on which seats 47 are arranged, and provided with a sharpened edge 71 that frictionally engages the heads 44 of the rivets and lightly bites thereinto under the bias of one or more springs 72 that press the shoe 70 outwardly. Thus, the rivets ride along the otherwise fixed shoe and are held against axial rotation. Since any diameter of the shank of a rivet is thus moved around the axis of shaft 38 in intermittent 45° increments, such diameter will move through two increments, or 90° between points or stations 73 and 74. Hence, if a diameter at station 73 is vertical, the same diameter at station 74 is horizontal and a normally transverse diameter would be vertical at the latter station.

While the means 19 is preferably self locking to hold shaft 48 stationary during continued rotation of shaft 62, it is preferred to provide positive locking that would offset wear and/or play. To this end the locking means 22 is provided, the same comprising a notched wheel 75 affixed with the star wheel 68 to shaft 48, a dog 76 adapted to engage in notches 77 of wheel 75, a follower 78 carried by an arm 79 of said dog, and a cam 80 affixed with wheel 66 to shaft 62. It will be realized that the dog and its arm pivots at 81 and that cam 80 are designed to bias said dog into locking engagement with wheel 75 during the stationary period of the turret head, thereby holding said head firmly locked and stationary during said continued rotation of shaft 62.

The means 21 to drive the feed control means 18 is also operated from shaft 62. The means 21 comprises a gear train 82 that connects shaft 62 and the mentioned shaft 55. The latter shaft extends from bracket 32 and connects with gear train 57 to continuously drive the same and the escapement-reciprocating means 54.

The slotting head 23 is shown as comprising a housing 83 that mounts a transverse shaft 84 on the outer ends of which is carried a pair of similar saws or discs 52, above mentioned. Said saws are transversely spaced according to the transverse spacing of stations 73 and 74 of the turret head, and the axis of shaft 84 and of said saws is on the level of said stations. Thus, when the saws are rotated at high speed and are moved so their edges cut into the ends of rivets at stations 73 and 74, said rivet ends or shanks will be slotted. It will be clear that the rivet at station 73 will receive its first slot and the one at station 74 its second or cross slot.

Shaft 84 is driven by a longitudinal shaft 85 by means of angle-tooth gearing 86, a sleeve 87 is disposed around shaft 85 and the same carries the housing 83. In order that said housing be held non-rotational to hold the saws in their vertical disposition shown, the head 23 is provided with means to engage both rod 35 and shaft 62, the same being shown as respective sleeves 88 and 89 on a fitting 90 coaxially engaged around sleeve 87. A tapered collet 91 within fitting 90 locks the latter to sleeve 87 after said sleeve has been longitudinally adjusted, as desired, so that the reciprocative stroke or movement of the slotting head may start and finish in proper relationship to the turret head 46. Because shaft 85 is driven at high speed to impart high cutting speed to the saws 52, the same is mounted in bearings 92 at each end of sleeve 87. The means 24 to drive shaft 85 is provided by a pulley 93 on the end of said shaft, the belt 94 of said pulley being driven by a motor (not shown) and extending rearwardly through an opening in housing cover 33.

In the above manner, the saw blades are continuously driven at high speed and the axes of the same retained on a transverse horizontal line relative to the shank ends of two rivets being simultaneously slotted.

The means 25 to reciprocate the slotter head into and out of slotting position is shown as a cam 95 around sleeve 87 and affixed to fitting 90 and, through collets 91, to sleeve 87, a cam follower 96 in the groove 97 of said cam, and a rotary drum 98 that mounts said follower and is provided with a sleeve extension 99 around the sleeve 87. Said sleeve extension is carried by bracket 31 as by means of bearings 100 and 101 which, although not shown in detail, may combine radial and thrust features that reduce the end and rotational loads on said bracket 31, as imparted by the means 24. The drum is retained against endwise movement by its face 102 that engages bearing 100 and thrust ring 103 on extension 99 that engages bearing 101.

Rotation of the drum 98 and of its cam follower 96 to effect reciprocation of the slotting head is effected by a pair of gears 104 that connect shafts 62 and sleeve extension 99. These are one-to-one gears that cause one revolution of the drum 98 for each one revolution of the wheel 66. Thus, for each full reciprocation of the

slotting head 23, the turret head is indexed one-eighth revolution.

The rivet-dislodging means 26 is shown in Figs. 1, 5 and 8. The same comprises a radial arm 105 on the housing 83 of the slotting head, a bearing 106 on the end of said arm, and a spring-biased plunger 107 carried by said bearing and having an end 108 directed toward a station 109 of the turret head 46. Said station is the one immediately in advance of the loading station at the top of the turret but may be any station between station 74 and the loading station.

Since the plunger end 108 easily fits the seats 47, it will be clear that each time the slotting head moves towards slotting position, said end 108 pushes against the projecting shank of a cross-slotted rivet to dislodge the same from its seat to fall into a chute that may be provided between the turret head and bracket 32.

While the foregoing has illustrated and described what is now contemplated to be the best mode of carrying out my invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A cross-slotting machine comprising, in combination, an intermittently moving turret having a plurality of seats for receiving headed articles to be slotted, means to feed an article into one of said seats during a period of rest of the turret with the head of the article on the feed side of the turret, means to simultaneously dislodge an article from another of said seats, spring-biased backing means having a fixed position relative to the turret and on the feed side of the turret and slidingly engaged with the tops of the heads of articles in each of the other turret seats to press the heads against the feed side of the turret and to hold said article axially non-rotational during movement of the turret, and means to slot the articles while so engaged and held.

2. A cross-slotting machine comprising, in combination, an intermittently moving turret having a plurality of seats for receiving headed articles to be slotted, means to feed an article into one of said seats during a period of rest of the turret with the head of the article on the feed side of the turret, means to simultaneously dislodge an article from another of said seats, spring-biased backing means having a fixed position relative to the turret and on the feed side of the turret and slidingly engaged with the tops of the heads of articles in each of the other turret seats to press the heads against the feed side of the turret and to hold said article axially non-rotational during movement of the turret, and means disposed on the opposite side of the turret to simultaneously slot one article and cross-slot another while said articles are thus resiliently engaged and held.

3. A cross-slotting machine comprising, in combination, an intermittently moving turret having a plurality of seats for receiving headed articles to be slotted, means to feed an article into one of said seats during a period of rest of the turret with the head of the article on the feed side of the turret, means to simultaneously dislodge an article from another of said seats, spring-biased backing means on the feed side of the turret and engaged with the tops of the heads of articles in each of the other turret seats to press the heads against the feed side of the turret and to hold said article axially non-rotational during movement of the turret, and a slotting unit including two parallel slotting saws and disposed on the opposite side of the turret, said saws being transversely spaced according to and aligned with two of the articles carried by the turret, and means to reciprocate said unit between a projected slotting position and a retracted position, during said period of rest of the turret to slot one of said saw-aligned articles and cross-slot the other while the same are engaged by the resilient means and held.

4. In a cross-slotting machine, a turret having a set of circumferentially arranged seats for receiving the shanks of headed rivets with the heads of said rivets against one face of the turret and the shanks partly projecting beyond the opposite face, the seats being centered on the axis of the turret, means to cross-slot the projecting ends of said rivets and portions of the shanks thereof within the seats, a shoe member having a fixed position relative to the rotating turret and concentrically arranged with the rivet seats and axially displaced therefrom on the head side of the turret, means to bias said shoe member in a direction toward the turret to impinge slidingly the rivet heads and hold the same non-rotationally in their seats.

5. In a cross-slotting machine according to claim 4, the shoe member being provided with a sharpened head-impinging edge that bites into and indents the rivet heads to obviate the mentioned rotation of the rivets.

6. In a rivet-slotting machine, a turret having a set of circumferentially arranged rivet-receiving apertures, means to intermittently index the turret to intermittently advance the apertures around the axis of the turret, said apertures consittuting intermittently moving stations of which there is provided a rivet receiving station, a rivet-discharging station, two rivet-shank slitting stations and at least one other station, the three latter stations being disposed around the circumference of the turret between the receiving and discharging stations, an arcuate shoe disposed concentrically with the turret and axially offset therefrom, and means to resiliently bias said shoe in a direction toward the turret to impinge against the ends of the rivets only at the slotting and the one other station and therebetween to hold the rivets at said stations and during movement from one to the other of the latter stations non-rotationally.

7. A cross-slotting machine comprising, in combination, an intermittently moving turret having a plurality of seats for receiving the shanks of headed articles to be slotted, means to feed an article into one of said seats during a period of rest of the turret with the head of the article on one side of the turret and the shank thereof extending partly from the opposite side, means to simultaneously dislodge an article from another of said seats, fixed means on the side of the turret that has the article heads and relative to which the turret turns and including resilient means biased in a direction toward the turret and into endwise and sliding engagement with the top of the head of an article in each of the other seats of the turret to press the heads of the articles against the side of the turret and to resiliently hold the articles non-rotationally in their seats during turning movement of the turret, and means disposed on the side of the turret from which the article shanks extend to simultaneously slot the extending end of the shank of one of said articles and cross-slot the shank of another while the turret is at rest and the articles are resiliently held aginst both endwise retraction and rotation in their seats by the mentioned resilient means.

8. A cross-slotting machine comprising, in combination, an intermittently moving turret having a plurality of seats for receiving the shanks of headed articles to be slotted, means to feed an article into one of said seats during a period of rest of the turret with the head of the article on one side of the turret and the shank thereof extending partly from the opposite side, means to simultaneously dislodge an article from another of said seats, fixed means on the side of the turret that has the article heads and relative to which the turret turns and including resilient means biased in a direction toward the turret and into endwise and sliding engagement with the top of the head of an article in each of the other seats of the turret to press the

heads of the articles against the side of the turret and to resiliently hold the articles non-rotationally in their seats during turning movement of the turret, and a slotting unit including two parallel slotting saws and disposed on the opposite side of the turret, said saws being transversely spaced according to and aligned with two of the articles carried by the turret, and means to reciprocate said unit between a projected slotting position and a retracted position during said period of rest of the turret to slot one of said saw-aligned articles and cross-slot the other while the same are engaged and held by the resilient means.

References Cited in the file of this patent

UNITED STATES PATENTS

547,561	Morrissey	Oct. 8, 1895
1,615,538	Ehrman	Jan. 25, 1927
1,938,939	Smith	Dec. 12, 1933
2,540,058	Stern	Jan. 30, 1951
2,674,754	Hale	Apr. 13, 1954