Oct. 5, 1965 J. J. KENNEDY ETAL 3,209,909

DEVICE FOR SORTING ARTICLES

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FIG. 1

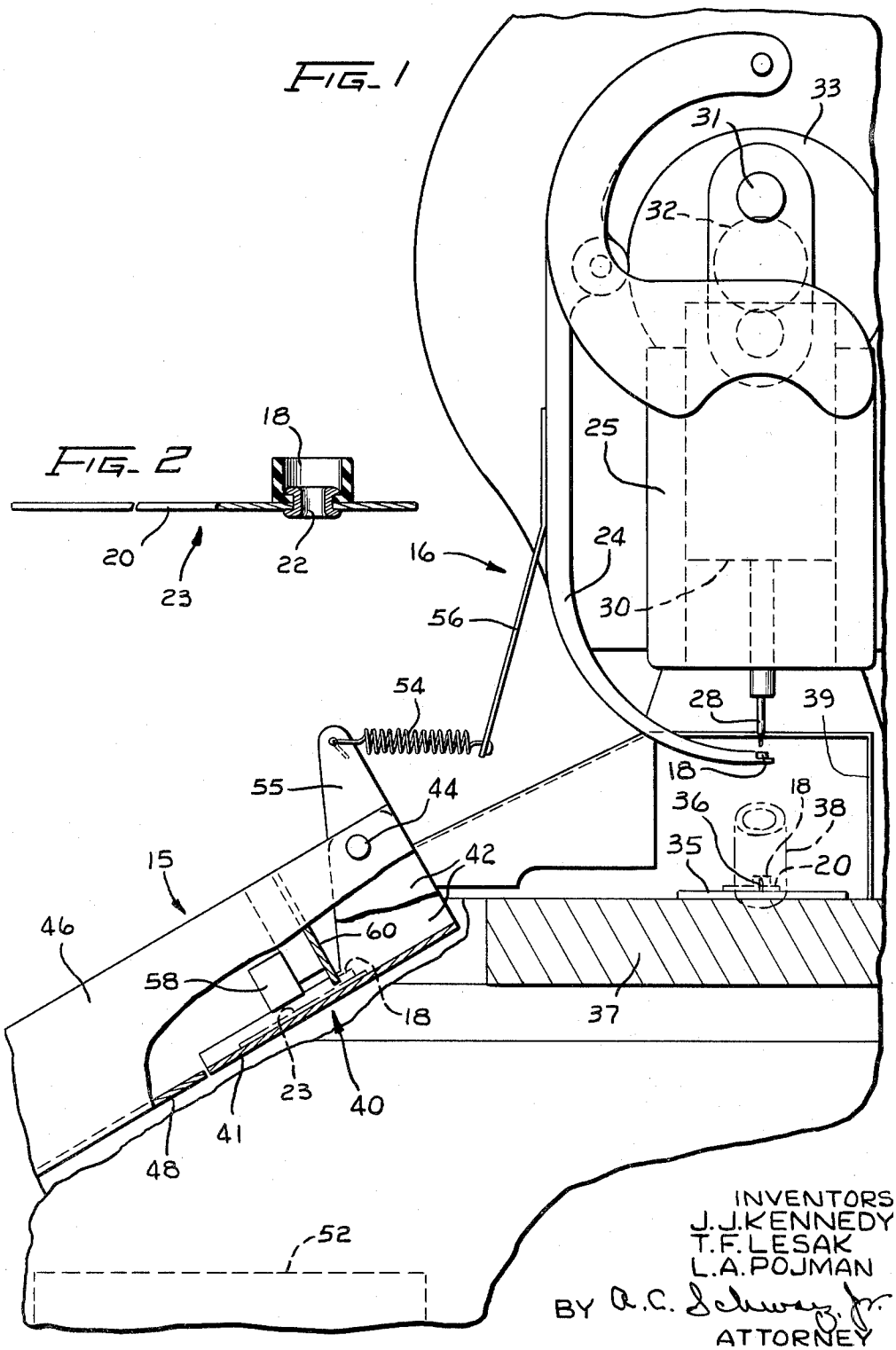


FIG. 2

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FIG. 3

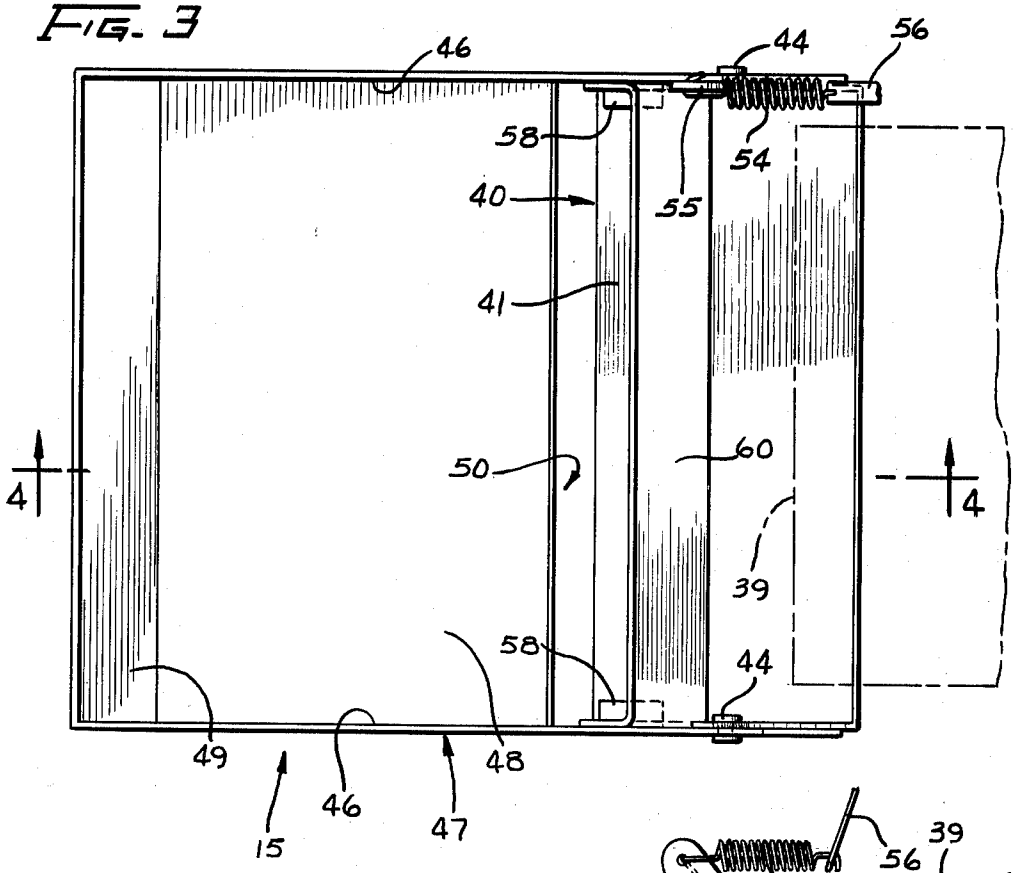
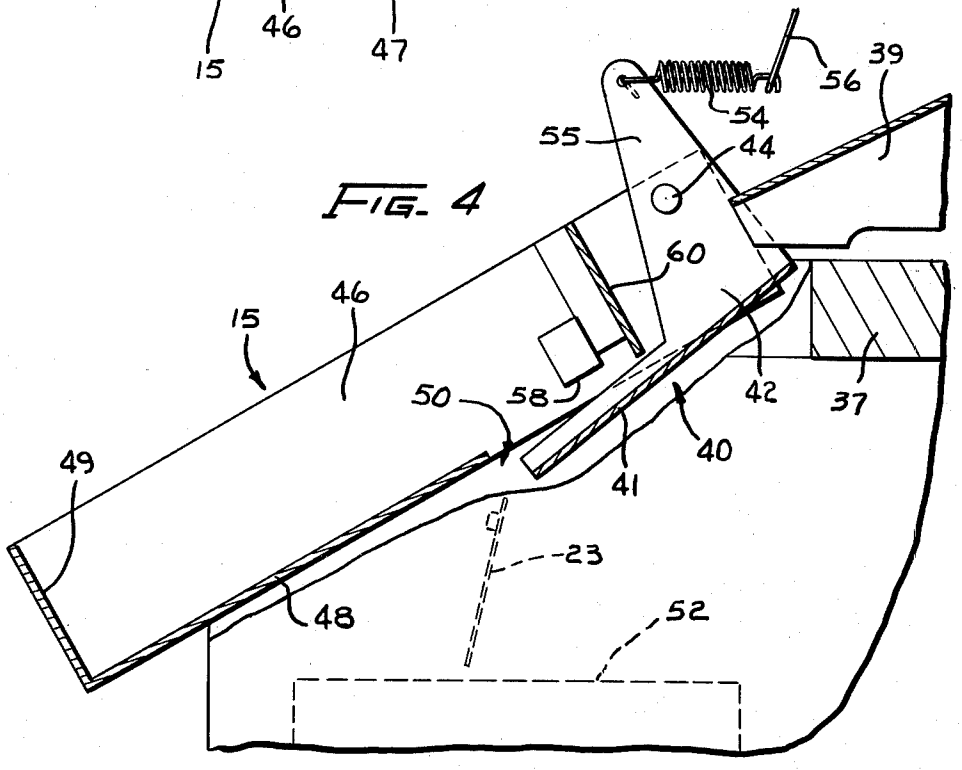


FIG. 4



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DEVICE FOR SORTING ARTICLES

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1 Claim. (Cl. 209—85)

This invention relates to a sorting device, and more particularly to a device applicable to an apparatus for fabricating assemblies to sort incomplete assemblies from completed assemblies.

In the machine fabrication of a particular type of spring assembly a hollow member of dielectric material is united to a leaf spring. Due to breakage or absence of a component of the assembly during the fabrication thereof, the machine will produce occassional defective or incomplete assemblies. It is desirable to provide mechanism for automatically sorting the deffective spring assemblies from the others and particularly to sort them as the spring assemblies are ejected from the machine.

An object of the invention is to provide a simple and effective device for sorting articles.

A further object of the invention is to provide a sorting device applicable to a machine for fabricating composite articles to sort the incomplete or undersize articles from the complete or full size articles as they are ejected from the machine.

A device illustrating certain features of the invention as applied to a machine for fabricating spring assemblies may include an obliquely disposed chute which forms a receptacle for receiving incomplete assemblies, and a trap door pivotally supported adjacent the upper end of the chute for receiving the assemblies as they are successively ejected from the machine. The trap door is yieldably held in a normal first position for guiding an incomplete assembly into the chute and is movable to a second position for directing a completed assembly into a second receptacle. A gate member is fixedly mounted above the trap door in spaced relation thereto when the trap door is in its first position to provide clearance for the movement of an incomplete assembly under the gate onto the chute, and for engaging a projection on the completed assembly to arrest such assembly on the trap door. In timed relation to the fabrication of the following assembly the trap door is moved momentarily to the second position resulting in the release of an arrested assembly from the gate and the movement of the assembly from the trap door into the second receptacle.

Other objects, advantages and novel aspects of the invention will become apparent upon consideration of the following detailed description, in conjunction with the accompanying drawings, in which:

FIG. 1 is a fragmentary front view of an apparatus for fabricating spring assemblies and showing associated therewith a sorting device embodying the present invention;

FIG. 2 is a sectional view of the spring assembly of the type fabricated by the apparatus and sorted by the present sorting device;

FIG. 3 is a fragmentary plan view of the sorting device; and

FIG. 4 is a vertical sectional view of the sorting device showing a trap door thereof in an open position.

Referring to the drawings, the present sorting device **15** is shown applied to an apparatus **16** which operates to attach a hollow cylindrical stud **18** of dielectric material to an apertured spring **20** by means of an eyelet **22** to form a composite article or spring assembly **23**. The eyelets **22** are guided in a track **24** of an eyeletting machine

25, the track **24** being pivotally mounted at its upper end for oscillatory movement and spring urged to a first position in which the endmost eyelet is disposed in vertical alignment with a vertically reciprocable spindle **28** of the machine. The spindle is mounted in a vertically reciprocable head **30** which is actuated by means of a crank **31** on a drive shaft **32** of the eyeletting machine. A cam **33** on the shaft pivots the track **24** laterally in timed relation to the downward movement of the spindle **28** so that the spindle **28** engages the eyelet **22** as the track withdraws therefrom and moves the eyelet downwardly into the aligned recesses of the stud **18** and the flat spring **20** supported on a holder **35** therebeneath. The spindle **28** cooperates with an anvil pin **36** on the holder **35** to effect the clinching of the eyelet **22** and the attachment of the stud **18** to the spring **20**.

The flat springs **20** and the hollow studs **18** are sequentially placed on successive holders of an indexible feed table at loading stations of the apparatus and are indexed successively to the eyeletting machine in timed relation to the operation of the latter. An air nozzle **38** indicated in dotted lines in FIG. 1, is fixedly mounted at the eyeletting station and a jet of compressed air is directed therethrough in time relation to the eyeletting operation to lift the complete or incomplete article from the anvil pin **36** and move it through a curved guideway formed by a guide member **39** and cause the articles to be directed onto a trap door **40** of the sorting device **15** while the trap door is in a closed position.

The trap door **40** has a flat bottom wall **41** and upwardly directed side wall portions **42** supported at one end for pivotal movement about pivot pins **44**. The pins **44** are secured to the side walls **46** of a chute **47** for receiving the incomplete or defective articles. The chute has a bottom wall **48** and is provided with an end wall **49** and forms a receptacle or container for the defective or incomplete articles. The trap door **40** is supported by the chute **47** adjacent the upper end of the bottom wall **48** and serves as a closure for an aperture or an opening **50** formed at the upper end of the chute **47**, the trap door being movable to a normal first position (FIG. 1) in substantial alignment with the bottom wall **48** to direct an incomplete or defective article over the opening **50** onto the bottom wall of the chute and being movable to a second position (FIG. 4) under the influence of gravity to direct a complete article **23** through the opening **50** along a different path onto a second receptacle **52**.

The sorting device **15** is disposed obliquely to insure the free movement of the articles **23** by gravity along the upper surface of the trap door **40** and of the bottom wall **48** of the chute **47**. A spring **54** which is connected at one end to an arm **55** on one of the side walls of the trap door **40** and at the other end to a member **56** on the track **24**, moves the trap door to the normal first or closed position against a stop **58** on the side wall **46** of the chute **47** and maintains it there in response to movement of the track **24** to its normal position (FIG. 1). The spring **54** operates under compression and tension and serves as a yieldable link between the trap door **40** and the track **24** so that as the track **24** moves to the left from the position shown in FIG. 1 for a relatively short period of time during the eyeletting operation, the trap door is moved to its second or open position (FIG. 4) under the influence of gravity and the spring **54**, in which position an article **23** may pass through the opening **50** of the chute and be directed by the trap door **40** into the receptacle **52**.

A gate **60** in the form of a plate extends transversely between the side walls **46** of the chute **47** and is secured thereto above the trap door **40** and in a position intermediate the ends thereof. The lower edge of the gate **60** is located a predetermined distance from the trap door

when the trap door is in its first position (FIG. 1) to provide clearance for the movement beneath the gate of an incomplete article such as the spring **20** without the stud **18**, or a spring **20** without the stud **18** and the eyelet **22**. As a composite article **23** slides along the trap door **40** the lower portion of the gate plate **60** serves to engage the stud **18** thereof and stop the article on the trap door in spaced relation to the bottom wall **48** of the chute **47**. A composite article **23** thus arrested is released from the gate **60** in response to movement of the trap door **40** to the second position (FIG. 4) and slide off of the trap door and drops into the receptacle **52**.

In the operation of the sorting device the trap door **40** is held in its normal closed position when the article **23** is fed thereonto. In the event that the article is incomplete and contains, for example, only a flat spring **20**, or the flat spring **20** with the eyelet **22** thereon, the article rides freely on the trap door beneath the gate **60** and is guided by the trap door **40** onto the bottom wall **48** of the chute **47** and is retained in the receptacle formed thereby.

In response to the feeding of a complete composite article **23**, the article rides along the trap door **40** in its closed position until the projecting stud **18** engages the gate **60** and is arrested thereby to stop the article on the trap door **40**. During a portion of the following cycle of operation of eyeletting a stud **18** to a flat spring **20**, the track **24** of the eyeletting machine is oscillated to its outer position and quickly returned to its normal position, thereby causing the trap door **40** to move from its closed position to its open position and return to its closed position. During the movement of the trap door to its open position the stud **18** of the composite article is released from the gate **60** and slides down the trap door and drops from the end thereof into the receptacle **52**.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

In an apparatus having means for cyclically moving a spindle against an anvil pin to deform one end of an eyelet about the edge of an aperture formed in a flat spring and to deform the other end of the eyelet about the edge of another aperture formed in a stud to thereby attach said stud to said spring, and a source of compressed air rendered effective after the movement of the spindle against the anvil pin for producing a blast of air to eject said spring, the combination of means for sorting springs with complete studs from springs with broken studs and springs absent studs, which means comprises:

an obliquely disposed chute having the top end thereof mounted to receive gravitationally all of said springs, and having a bottom end thereof mounted to form a first receptacle for receiving gravitationally only those springs with broken studs and those springs absent studs, and having a bottom wall with an aperture for the passage of only those springs with complete studs;

a curved guideway having a hooded configuration located adjacent said anvil pin to receive said springs ejected by said blasts of air, and having an outlet to guide said received springs into said chute;

a second receptacle positioned beneath the aperture of said chute for receiving gravitationally those springs with complete studs passing through said aperature;

a trap door pivotally mounted to said chute and having a flat bottom wall movable into a first position in the plane of the chute to close the aperture of said chute to convey gravitationally the springs with broken studs and the springs absent studs over said opening, and movable into a second position to open said aperture to convey gravitationally the springs with complete studs into said second receptacle;

a stationary gate fixed to said chute and having a bottom edge spaced a distance from and perpendicular to the upper surface of the flat bottom wall of said trap door when said trap door is in said first position, which distance is less than the combined total axial distance of a complete stud attached to a spring and the deformed attaching eyelet to engage said complete studs attached to said springs with said edge to retain said springs with said complete studs on said flat bottom wall and to permit said springs with incomplete studs and said springs absent studs to slide gravitationally over said flat bottom wall of said trap door and down to said first receptacle; and

an arm having one end thereof connected to said trap door and having the other end thereof connected to said spindle moving means for moving at a predetermined time after ejection of each spring by said air blast said flat bottom wall of said trap door into said second position to open the aperture of said chute to permit said springs with complete studs to slide gravitationally beyond said other end of said trap door and through the opening of said chute into said second receptacle, whereby springs with broken studs and springs absent studs are sorted into the first receptacle and springs with complete studs are sorted into the second receptacle.

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