United States Patent

[11] **3,633,634**

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[54] **LEAD STRAIGHTENING MACHINE**
8 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **140/147,**
72/93, 72/94, 72/DIG. 4
[51] **Int. Cl.** **B21f 1/02**
[50] **Field of Search** 140/147;
72/92, 93, 94, DIG. 1

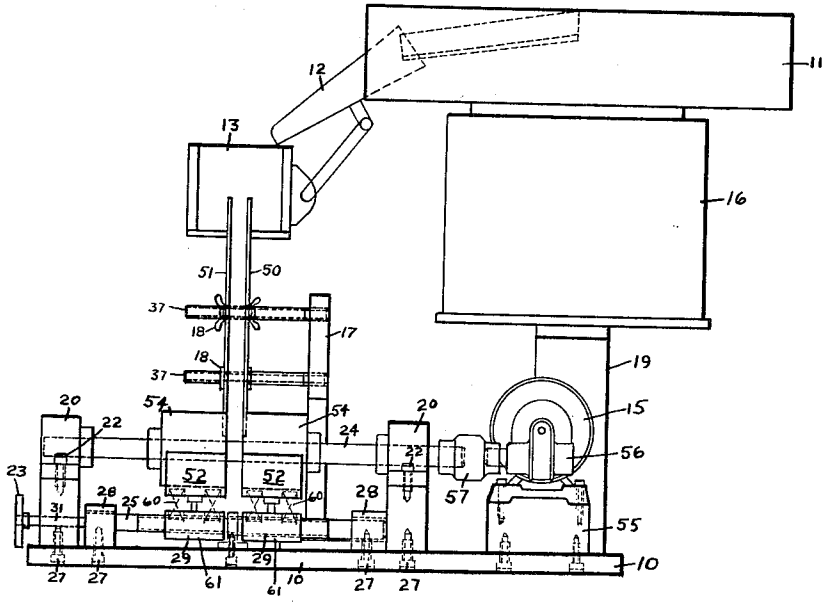
[56] **References Cited**

UNITED STATES PATENTS

2,860,686	11/1958	Frank et al.	72/94
2,867,262	1/1959	Ainsworth et al.	140/147
3,146,805	9/1964	Bryner et al.	140/147
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ABSTRACT: The disclosure describes a straightening machine for lead wires. The machine has concave straightening shoes with complementary shaped straightening rollers supported in closely spaced relation to the concavity of the shoes. The straightening shoes are supported by tension spring which apply a uniform pressure to the bottom of the shoes as the lead wires of the components pass between the rollers and the shoes. A limited travel adjusting screw is disposed in the bottom of the shoes thus providing fine adjustment between the shoes and the rollers. The shoes are made of a dielectric material which will not contaminate the work and is resistant to wear. The straightening surface of the shoes is progressively sloped and this, combined with the variable pressure and clearance adjustment, gives advantages not found in prior machines. No separate means is required for driving the components through the machine since the straightening action also drives the components through the machine. Jamming of the parts in the machine is practically eliminated.



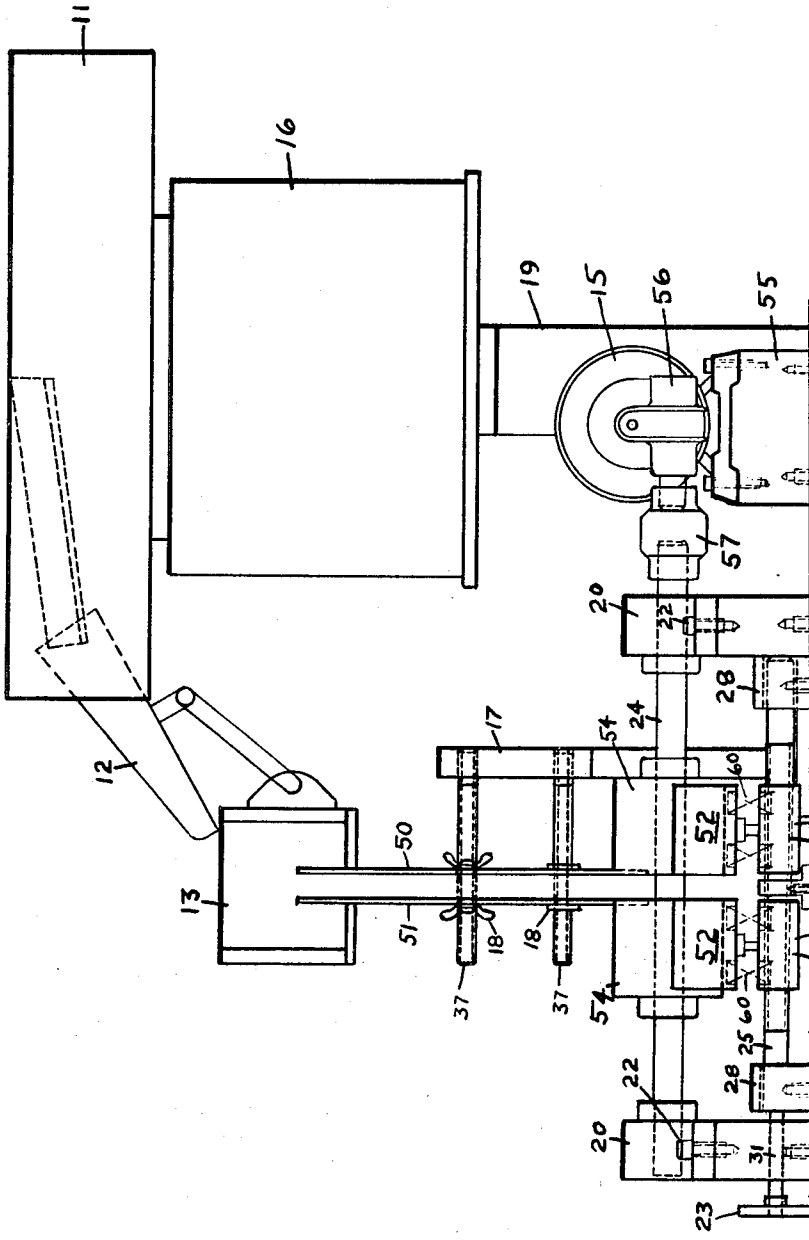


Fig. 1

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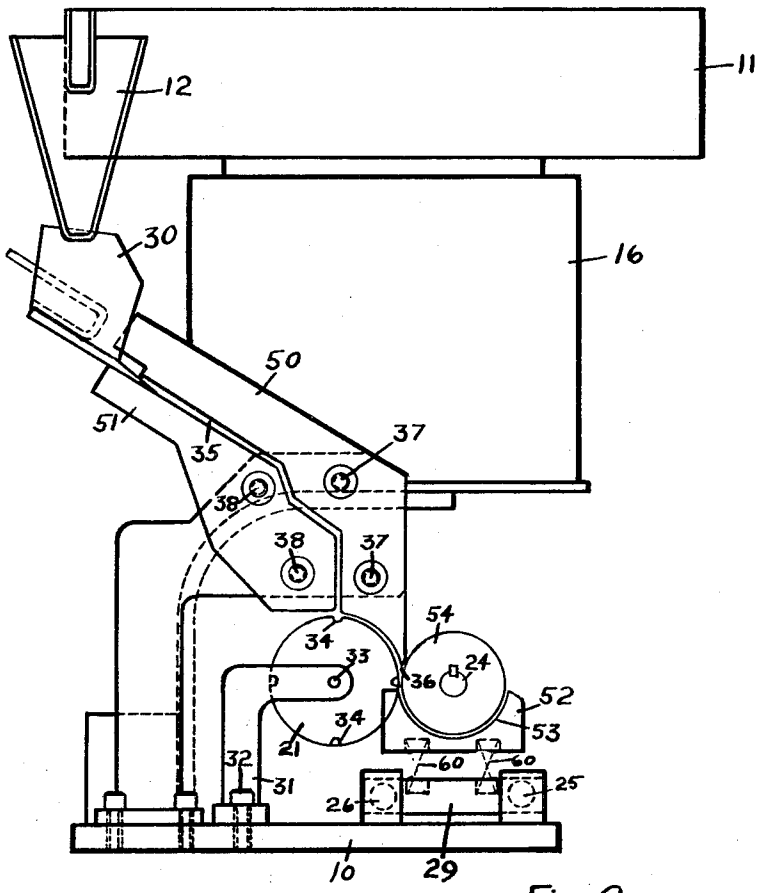


Fig. 2

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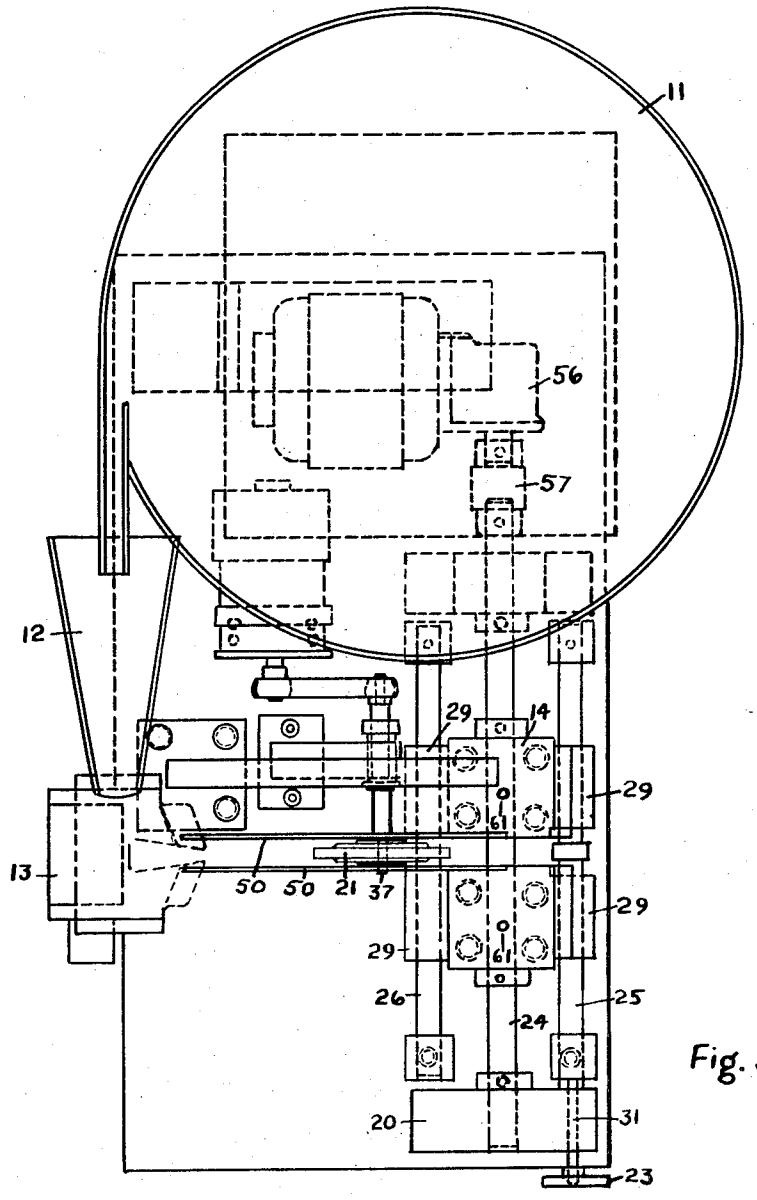


Fig. 3

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LEAD STRAIGHTENING MACHINE

BACKGROUND OF INVENTION

This invention relates to straightening machines and, more particularly, to machines for straightening lead wires on electrical components.

DESCRIPTION OF PRIOR ART

This machine constitutes an improvement over prior machines and over U.S. Pat. No. 3,146,805 which shows a lead straightening device which does not have all of the advantages and improvements of the machine disclosed herein.

OBJECTS OF THE INVENTION

It is an object of the invention to provide an improved lead straightening machine.

Another object of the invention is to provide a lead straightening machine that is simple in construction, economical to manufacture, and simple and efficient to use.

Another object is to provide a lead straightening machine that is fully automatic and in which leaded components are fed from a rotary bowl-type feeder controlled by a small compact all solid-state circuit disposed in a panel box which provides the necessary power, rectifiers and photoelectric sensors in a unique arrangement shown to assure the proper feeding of components.

Another object is to provide an improved feeder hopper designed to orient and align components as they are discharged from the bowl feeder and which is adjustable to any length component.

Another object is to provide a parts chute which will not readily jam and is easily adjustable to varying different part sizes.

Another object is to provide a rotary wheel which serves as an escapement in removing components from the bottom of the chute without abrasion to the part leaving the bent wires free to turn as the component advances to the straightening assembly.

Another object is to provide a novel shape of he body wheel providing a resilient fingerlike scallop which imparts a spin to he component body as it enters the V-notch formed by the straightening shoes and the roller.

Another object is to provide floating straightening shoes in which four tension springs apply uniform pressure to the shoes. The bottom of the shoes are drilled and tapped to receive adjusting screws, anchored to traveling blocks, thus permitting fine pressure adjustment.

Another object is to provide an improved material in combination with a straightening machine which material will resist wear and will not contaminate the leads or other parts.

DESCRIPTION OF DRAWINGS

FIG. 1 is a side view of the invention.

FIG. 2 is an end view of the invention.

FIG. 3 is a top view of the invention.

Now with more particular reference to the drawings, the machine according to the invention is supported on a base **10** and the ways **25** and **26** support the bearings **28**. The support blocks **20** are fixed to the base **10** by means of studs **27** which pass through the bottom of the base frame **10**.

The bearings **28** likewise are fixed to the base **10** by means of studs **27** and these bearings **28** support the ways **25** and **26**. The blocks **29** are also slidably supported on ways **25** and **26** and blocks **29** may be moved axially along the ways **25** and **26** by adjusting the handwheel **23** which is connected to a threaded screw **31** which enters the ways.

The straightening shoes **52** are supported on the blocks **29** by means of tension springs **60** which are attached at one end to the blocks **29** and by the other end to the straightening shoes. The straightening shoes are made of a dielectric material such as micarta. The straightening shoes have a concave top surface **53** which is disposed in close spaced relation to the outer periphery of the straightening rolls **54**. Straightening rolls **54** are supported on shaft **24** which is journaled in support blocks **20**. The shaft **24** is driven by the motor **15** which is supported on a base **55** on the support base **10**. The motor **15** has a gear reduction unit **56** which drives the shaft **24** through a coupling **57**.

The straightening rolls **54** are designed in two pieces providing roller hubs and an easily removable sleeve made of a dielectric resilient long wearing material such as polyurethane. The dielectric material will not contaminate the axial leads, the resiliency is critical to "grabbing" or starting the wires through the straightening assembly and the long wearing characteristic is necessary for economical operation. The ends of the rolls remote from each other are smaller in diameter than the ends adjacent each other so that a sloping, straightening surface is provided for gradually increasing the working surface of the shoes. The sloped surface, when combined with variable pressure and clearance adjustment, is critical to the successful straightening of axial leaded components.

The shoes **52** float in four adjusting tension springs **60** which apply uniform pressure to the bottom of the shoes as components pass between the shoes and the rollers **54**. The bottom of the shoes are drilled and tapped to permit insertion of a limiting travel adjustment screw **61**.

The body wheel **21** is supported on the frame on a bracket **31** which is fixed to the frame by studs **32**. The body wheel **21** rotates about an axis **33** and it has notches **34** which receive leads of components that slide down the slot **35** between the upper plate **50** and the lower plate **51** of the waterfall feeding chute. The waterfall feeding chute has spaced plate **50** and spaced plate **51** between which the bodies pass from the feed hopper **30** so that the bodies pass between the plates **51** and the leads extending out through the groove **35** and when each component drops down to the bottom of the chute, its lead wires are picked up by the notches **34** and it is carried onto the V-shaped notch **36** formed by the straightening roller **54** and the shoe **52**. The bowl-type feeder **11** is supported on top of the base **16** and a suitable control panel is provided for housing the electrical controls for the machine. The plates **50** and **51** may be held in suitable spaced relation to each other by the adjusting bolts **37** and **38**. Thus, it will be seen that when articles having lead wires to be straightened, such as resistors and other electrical components, are placed in the bowl feeder **11**. They are fed down a chute **12** into the straightening **30** from which they move into the waterfall chute made up of the plates **50** and **51**. They move down the waterfall chute to the body wheel **21** where they are picked up at the lower end of the groove **35** in the chute and are carried to the V-shaped notch **36**, best shown in FIG. 2.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A device for straightened thin deformable end members projecting from the ends of body members of articles of manufacture comprising

a frame,

a pair of spaced straightening shoes having smooth concave surfaces,

means supporting said straightening shoes,

said means supporting said shoes comprising a tension spring having one end attached to each said shoe and the other end of each said spring attached to a block on said frame,

spaced straightening rollers rotatably supported on said frame,

means rotating said rollers,

said rollers peripheral surface generally conforming to the said concave surface,

an adjustment screw fixed to each said block and engaging each said block whereby the force of said spring on said block and the clearance between said rollers and said shoes may be adjusted,

means to feed articles having deformable wirelike end members projecting from their ends,

said means comprising a feeding chute,

said feeding chute comprising two upper plates spaced form each other and two lower plates spaced from each other and spaced from said upper plates and defining a groove between said upper plates ans said lower plates through which said wirelike end members may pass,

a body wheel disposed at the lower end of said upper plates and said lower plates,

said upper plate having a lower end with a surface overlying said body wheel, said lower end surface of said upper plates having a radius of curvature substantially equal to the radius of said body wheel,

the outer periphery of said body wheel being disposed adjacent the outer periphery of said straightening rollers and between said straightening shoes,

spaced notches in the outer periphery of said body wheel adapted to receive the bodies of said articles and to carry said articles from said space between said upper plates and said lower plates to said straightening rolls and to deposit said articles in the space between said straightening rolls and said straightening shoes.

2. The device recited in claim 1 wherein said rollers have a sloping straightening surface made up by each said roller having a smaller diameter at the end remote from the other said roller.

3. The device recited in claim 1 wherein said shoes are made of a dielectric material.

4. The device recited in claim 1 wherein said rollers are each made of a cylindrical hub and a sleeve made of dielectric material.

5. The machine recited in claim 2 wherein said rollers are adjustable axially along their axis of rotation and said shoes are supported on axially extending rods,

said shoes are adjustable axially along said rods.

6. A device as defined in claim 1 wherein the concave surfaces of said shoes encircle said rollers for substantially more than 90°.

7. A device as defined in claim 1 wherein said shoes are disposed vertically below said rollers.

8. A device for axially straightening elongated articles of the type having a large body portion and thin deformable end members projecting from each end comprising, in combination,

a frame,

a guiding track mounted thereon,

a shaft journaled in said frame and spaced from and parallel to said track,

a pair of rollers constituting the only means of moving the articles through the device,

means mounting said rollers for angular movement with said shaft and relatively axial adjustment therealong,

a shoe mount associated with each roller and movable on said track,

a pressure shoe for each shoe mount,

means universally mounting each pressure shoe on a respective shoe mount for small rectilinear and angular movements in all directions with respect thereto,

said pressure shoe having a concave surface spaced slightly from, and conforming substantially to the curvature of the surface of its associated roller, whereby said shoes and rollers may be adjusted to the length of said body portion and substantially the entire end members may be subjected to straightening action between said rollers and said shoes,

a body wheel supported to rotate on an axis disposed parallel to the axis of rotation of said rollers,

said body wheel having spaced notches therein,

means to feed said articles bodies into said notches,

said body wheel having means to rotate to deposit said bodies between said rollers and said shoes.

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