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M. KOSTENKO ET AL

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WIRE CONTROL FOR WIRE FEEDING MACHINE

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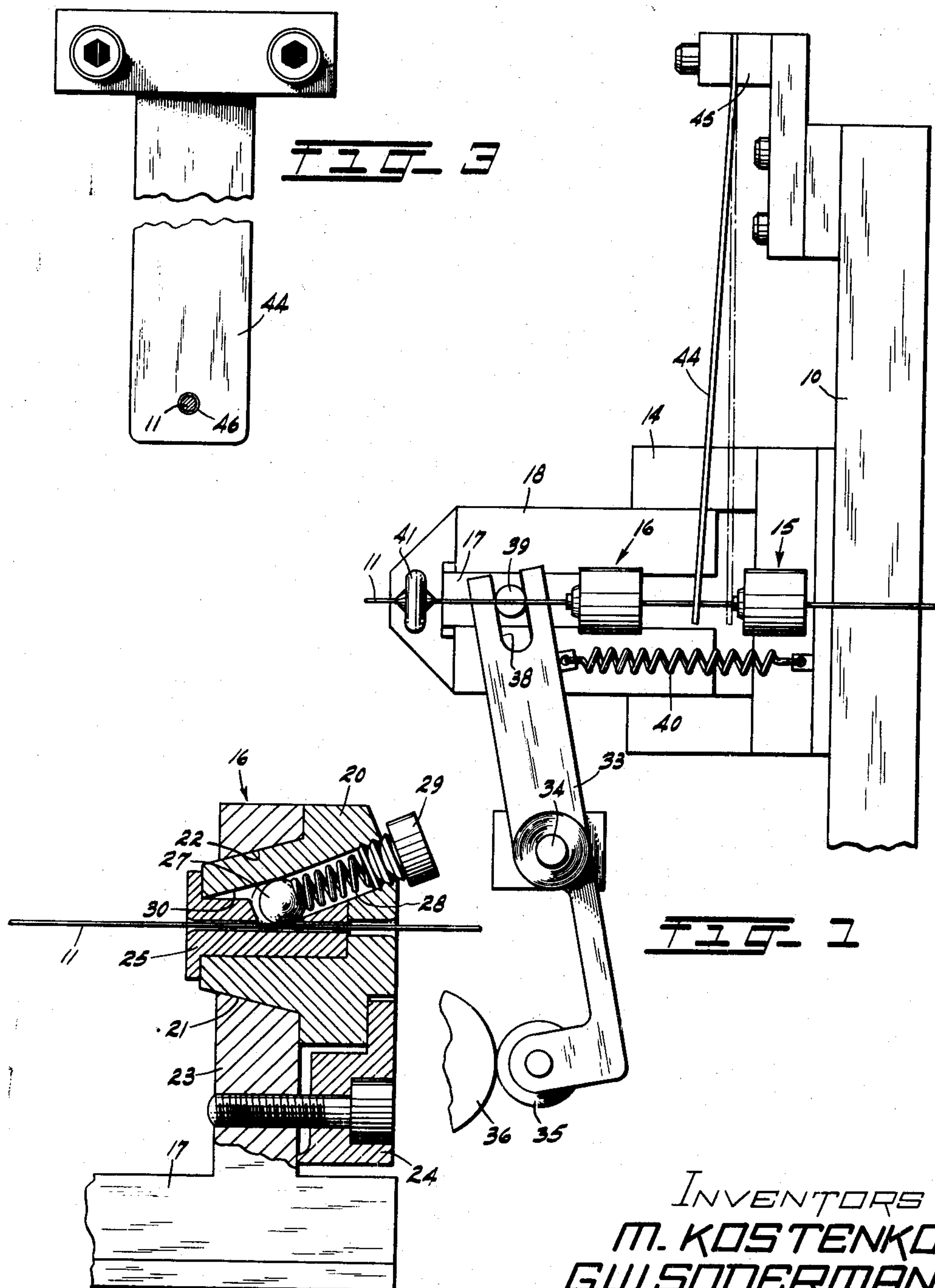


FIG. 2

INVENTORS
M. KOSTENKO
G.W. SODERMAN
By W. Johnson
ATTORNEY

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WIRE CONTROL FOR WIRE FEEDING MACHINE

Michael Kostenko, Little Falls, and George W. Soderman, Alpine, N.J., assignors to Western Electric Company, Incorporated, New York, N.Y., a corporation of New York

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1 Claim. (Cl. 226—151)

This invention relates to wire feeding apparatus and more particularly to guides for the wires fed in such apparatus.

The terminals for certain types of electrical units are formed from wire cut into lengths and enlarged at one end in a heading operation. A conventional wire feeding apparatus for this purpose includes a fixed head through which the wire is fed to a processing unit having gripping means to hold the wire against return movement but releasable by the feeding force applied to the wire to permit movement of the wire in the feeding direction. Associated with the fixed positioning unit is a similar movable unit reciprocating toward and away from the fixed unit so that its gripping means will feed a predetermined length of wire, during each reciprocation, to and through the fixed unit. The gripping means of the feeding units usually includes hardened spring-pressed ball members to minimize the releasing force required particularly for the fixed unit. In most instances the wire is sufficiently rigid to release this device and also to eject a completed lead from the associated heading mechanism. In some cases, however, the gripping means may not release immediately or the lead may bend to stick in the header, or both, thereby imposing an abnormal load on the section of wire being fed. When this happens the wire may be slightly bowed and then the force which must be applied to the wire to release the gripping means is correspondingly increased which, in turn, causes further bending of the wire until, in some cases buckling occurs.

When the wire buckles it is, of course, necessary to stop the apparatus, remove the damaged section of wire and rethread the wire through the unit with consequent loss in production particularly if the condition is not promptly detected.

The object of the present invention is a wire fed apparatus wherein buckling the wire during feeding actions of the apparatus is eliminated.

In accordance with the object of the invention the present embodiment thereof may be a part of or may be used in combination with a wire feeding apparatus and may include an element surrounding the wire between the feeding units of the apparatus to hold the wire against buckling in any direction.

More specifically the element may be an elongate resilient member apertured at one end for the wire and mounted at a position spaced laterally from the feeding units of the apparatus so that the wall of the aperture in the element will surround the wire and hold it against buckling in any direction. Normally the apertured end of the element is spaced from the fixed unit toward the movable unit in an area where the buckling might tend to take place to hold the wire against buckling until the element is reached by the movable unit at which time it will move toward the fixed unit.

Other objects and advantages will be apparent from

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the following detailed description when considered in conjunction with the accompanying drawing, wherein:

Fig. 1 is a fragmentary top plan view of a wire feeding apparatus embodying the invention;

Fig. 2 is an enlarged vertical sectional view of one of the feeding units, and

Fig. 3 is an enlarged front elevational view of the element.

The apparatus selected to illustrate the invention includes a main frame 10 mounted adjacent a processing unit, not shown, to receive portions of predetermined lengths of a wire 11, and to cut the portions from the wire and process them. A bracket 14, mounted on the frame 10 has a fixed unit 15 mounted thereon and a movable unit 16 supported on a slide 17 disposed in a guide 18 and positioned in alignment with the fixed unit 15. The units 15 and 16 are identical in structure and a description of the unit 16 as shown in Fig. 2 will apply to both units. The unit 16 as shown in Fig. 2 includes the hollow head 20 with a conical portion 21 held in a tapered aperture 22 in a vertical portion 23 of the slide 17 by a clamp 24. The hollow portion of the head 20 is adapted to receive a member 25, longitudinally apertured for the wire 11 and provided with a groove of the contour shown so that a ball member 27 under the variable force of a spring 28, backed by an adjustable screw 29, may move inwardly (to the left) in a path controlled by a tapered surface 30 to grip and firmly hold the wire against return movement to the left, Fig. 2, but will permit motion of the wire to the right tending to roll the ball 27 away from the wire to free the wire for feeding movement.

In the present instance, the means to cause reciprocation of the unit 16 includes a cam lever 33 pivotally mounted at 34 and having a follower 35 to ride upon a cam 36, the contour of which is not shown but is adapted to cause reciprocation of the unit 16 between predetermined limits during desired intervals of time. The end of the lever 33 adjacent the unit 16 is bifurcated at 38 to receive a pin 39 mounted on the slide 17, a spring 40 normally holding a follower 35 in engagement with the cam 36 and providing the feeding force to move the unit 16 toward the unit 15. A suitable guide 41 is provided for the wire 11 in advance of the unit 16.

The means to prevent buckling of the wire 11 between the units 15 and 16 includes an elongate resilient element 44 fixed at one end to a bracket 45 and shaped normally to position an aperture 46, disposed adjacent its free end, between the units 15 and 16, a little to one side to the center of this position. The wall of the aperture 46 completely surrounds the wire normally without touching the wire or in any way disturbing its usual advancement by the units 15 and 16.

During the normal operation of the feeding apparatus the unit 16 will be reciprocated from the position shown in Fig. 1 to a position closely adjacent to the unit 15 and back to its normal position. The action of the gripping means, centered on the ball member 27 in Fig. 2 in the movable unit 16 during the feeding motion, is to grip the wire and pull it from a supply reel, not shown. Therefore, immediately upon movement of the unit 16 to the right, the gripping means through the ball 27 will grip the wire and force it to the right. Although the gripping means in the units 15 and 16 may be identical to the forcing of the wire to the right by the unit 16 will cause the gripping means in the unit 15 to release the wire and permit its motion to the right. The return movement of the unit 16 produces reverse action of the gripping means in the unit 15 in that any force tending to move the wire to the left will cause the gripping means of the unit 15 to grip the wire and lock it against such return motion. This gripping action of the unit 15 causes

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the gripping means in the unit 16 to release the wire during the return movement of the unit 16.

Considering again the feeding motion of the unit 16, it will be observed that the aperture 46 of the element 44 completely surrounds the wire 11 between the units 15 and 16 to stop buckling of the wire in any direction and hold the wire against buckling until the major portion or half the portion of the wire has been fed to and through the unit 15, at which time the length of this portion between the units has been reduced to less than half at which time the unit 16 will engage the end of the element 44 and move the element with it to the unit 15. The prevention of the initial buckling action and the starting of the movement of the wire past the gripping means in the unit 15 or the starting of the ejection of the headed wire from the processing unit, will remove the cause of the wire buckling or tending to buckle and the wire will continue its feeding motion undisturbed. It is the passing of these initial causes or conditions, which tend to prevent feeding motion of the wire, that eliminate buckling of the wire. By supporting the wire against buckling and adding thereto the additional holding force to maintain the necessary rigidity of the wire there will assure continued advancement of the predetermined length of the wire free of buckling. This is accomplished by the wall of the aperture 46 in the element 45, the automatic positioning of this wall without disturbing the normal advancement of the wire, the movement out of the way when not needed and its ever ready presence when needed to prevent buckling.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art

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which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

The combination with an apparatus for repeatedly feeding a wire a known distance in a longitudinal path by reciprocation of a movable unit said distance to a position closely adjacent to a fixed unit and away from the fixed unit said distance, the wire extending through the units relative to gripping means therein operable under known pressures alternately to grip adjacent portions of the wire against movement relative to their units and alternately actuable by the wire to release the wire for movement through their units, of a thin elongate resilient element having an aperture disposed near one end thereof for the wire to pass therethrough, and fixed position means to support the other end of the element to normally position the apertured end transversely of the path substantially midway between the units so that the wall of the aperture will surround the path and hold the wire against buckling in any direction during feeding movements of the wire, the resilient nature of the element conditioning the apertured end of the element for movement from its normal position to a position closely adjacent to the fixed unit during the final portion of the feeding movement of the wire, and return movement to its normal position with movement of the movable unit.

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