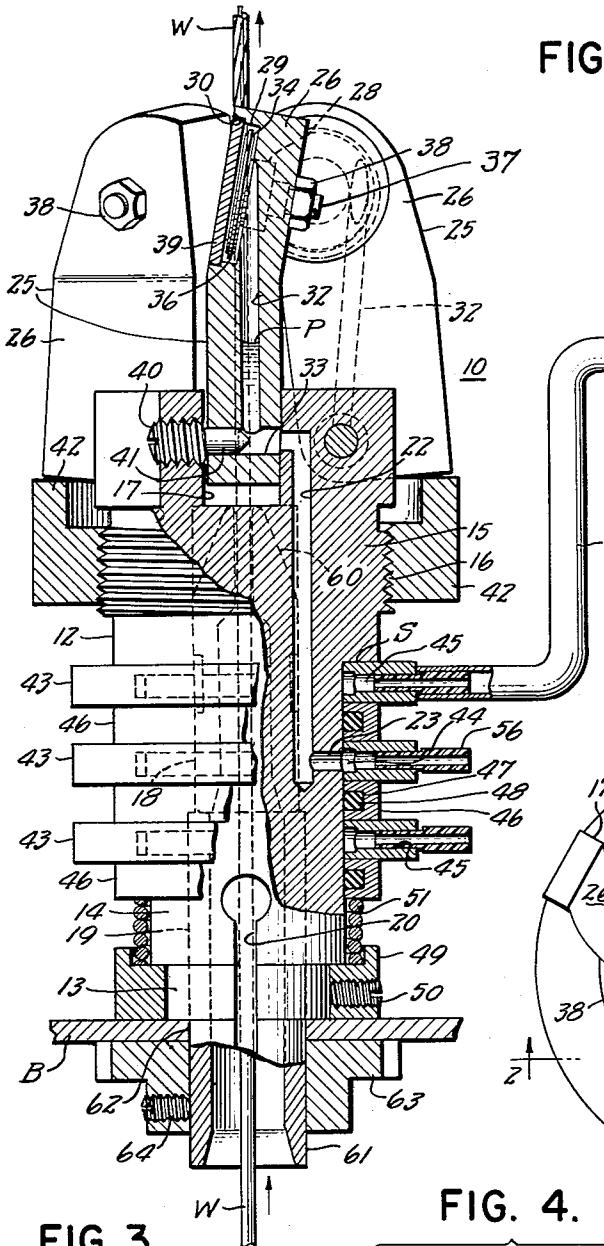
May 15, 1956 S. E. BORGESON 2,745,377

STRAND STRIPING MACHINE

Filed April 2, 1953

FIG. 2.



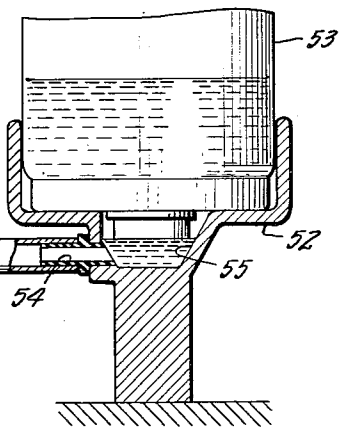


FIG. 1.

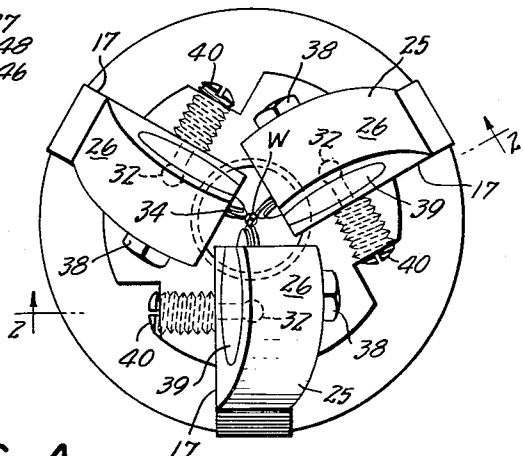


FIG. 4.

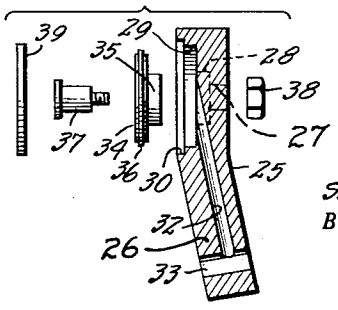
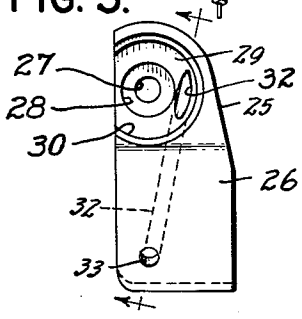


FIG. 3.



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STRAND STRIPING MACHINE

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7 Claims. (Cl. 118—221)

This invention relates to marking machines and more particularly to new and useful improvements in machines of the type disclosed in U. S. Patent 2,344,610 to E. S. Hargreaves et al., and U. S. Patent 2,581,180 to J. L. Entwistle et al., adapted for producing one or more spiral stripes of contrasting color on the covering of electrical conductors, or the like, whereby to distinguish between a plurality of such conductors in a cable, electrical circuit or for other purposes of identification.

In striping machines of the type above identified, ink or its equivalent is supplied to an applicator in the form of a roller disc mounted in a rotatable head which includes an ink reservoir, the head being rotated about the insulated wire, as the latter is pulled through the machine, with the roller disc in engagement therewith on the skew for carrying ink thereto from the reservoir. Such machines are also provided with a head mounting a plurality of applicators and ink reservoirs for producing a plurality of stripes, differing in color, on insulated electrical conductors.

While such striping machines constituted an important advance in the art of marking or coding insulated electrical conductors and the like, they were nevertheless subject to certain disadvantages in their commercial use and operation.

One of such disadvantages arose from the fact that it was necessary frequently to stop the machine to refill the ink reservoirs which are necessarily of small capacity in order to minimize the weight of the rotatable striping head.

Another disadvantage resulted by reason of the decomposition of the ink due to the centrifugal action set up by the rotative speed of the head when the capacity of the ink reservoir was increased. Thus, the speed and output of such prior machines was unnecessarily restricted.

In an attempt to overcome these and other disadvantages, it has been proposed to continuously supply ink from a stationary reservoir to each roller disc or applicator. However, in the arrangement heretofore employed, the mass of the rotatable head was not materially reduced and the ink was open to the atmosphere.

Accordingly, it is an object of the present invention to obviate the disadvantages above referred to by substantially reducing the mass of the striping head whereby striping operations may be carried out at much higher speeds than was practicable heretofore.

A further object of the present invention is to provide an improved stripping machine as described wherein the supply of ink or equivalent is not adversely affected or contaminated by the atmosphere as it courses toward one or more roller disc applicators or wheels.

Another object of the present invention is to provide an improved striping machine as described, wherein the construction is such as to permit of the quick and convenient cleaning of the striping head when it is desired to change the ink supply for the purpose of producing a different color stripe.

A further object of the present invention is to provide

an improved striping machine as described wherein one or more ink supply reservoirs and a rotatable striping head are adapted to have relative movement.

Another object of the present invention is to provide an improved striping machine as described wherein the quantity of ink within its rotatable striping head is relatively small whereby centrifuging is greatly reduced if not entirely obviated even at very high speeds.

A further object of the present invention is to provide an improved striping machine as described which is small in size, simple in construction, adapted to accommodate strands of varying diameter including strands having a relatively small diameter, and wherein an ink supply reservoir for each applicator is supported independently of its striping head for gravity feed of ink thereto and in such manner as to automatically control ink feed in accordance with its rate of use.

The above and other objects of the present invention are attained by the provision of an improved striping head having one or more ink supply reservoirs connected to a plurality of slip-rings journaled thereon, by means of suitable conduits therebetween, neither the reservoirs nor the slip-rings being rotatable with the striping head.

Other features and advantages of the present invention will become apparent from the following detailed description of one embodiment thereof when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a top plan view of a rotatable striping head constructed in accordance with the present invention;

Fig. 2 is a side elevational view partly in section illustrating the improved striping head with one of a plurality of stationary ink reservoirs therefor, and fluid transfer slip-rings including a conduit connecting said head and said reservoir for relative rotation therebetween;

Fig. 3 is a detail view in side elevation of one of the ported striping wheel carriers;

Fig. 4 is a vertical sectional view through one of the ported striping wheel carriers showing a striping wheel, a stud-screw for mounting the same therein and a closure plate for said carrier in detached relation thereto.

Referring to the drawings and Fig. 2 in particular, the improved striping or marking head, generally indicated at **10**, is adapted to be supported by and driven through a capstan of the type generally indicated at **4** in Patent 2,581,180, assigned to the same assignee as the present invention. Thus, illustration of the improved head per se, is deemed sufficient for an understanding of the present invention.

In accordance with the invention, the improved marking head **10** comprises a ported, upstanding, cylindrical body member **12** defining a reduced bottom end portion **13** and an intermediate shank portion **14** terminating in an enlarged head portion **15** provided with an external screw-thread **16**, and a plurality of angularly spaced, radially extending slots **17** in the top face thereof for pivotally mounting thereon a plurality of marking element carriers presently to be described.

As best shown in Fig. 2, the cylindrical body member **12** is provided with a central bore **18** including a counterbore **19** extending therethrough, and an open ended slot **20** extending endwise inwardly of its reduced bottom end **13** whereby a member, also presently to be described, may be clamped in the counterbored end thereof.

The body member **12** is ported by means of a plurality of relatively small bores or passages **22** which extend lengthwise thereof from the slots **17** to spaced points along the shank portion **14** where they each communicate with a transverse bore or passage **23** whereby to provide independent fluid paths leading from the outer periphery of the shank **14** to the aforesaid slots **17** for communication with a plurality of ported striping element carriers or applicators **25** now to be described.

As best shown in Figs. 3 and 4, each of the striping element carriers **25** comprises a flat, elongated member **26** having one end portion bent out of the plane thereof and provided with a transverse bore **27** terminating in a plurality of shallow counterbores **28**, **29** and **30** concentric therewith. Each of the members **26** is further provided with a bore **32** formed lengthwise thereof and extending from the counterbore **29** to a transverse bore **33** adjacent its opposite end.

A striping roller or wheel **34**, having a reduced shouldered portion **35** and a relatively thin peripheral marking or striping edge **36** including a central bore axially thereof, is journaled on a suitable stud screw **37** secured in the transverse bore **27** of each body member **26** by means of a nut **38** whereby the striping wheel is disposed on the skew, with respect to the axial center of the body member **12**, for rotation within the counterbores **28** and **29**, a suitable closure plate **39** being press fitted into the counterbore **30** for substantially enclosing each of the striping wheels **34** to prevent ink loss during operation.

As shown in Figs. 1 and 2, each of the aforesaid carriers or applicators **25** is pivotally mounted in one of the slots **17** provided therefor in the uppermost end of the cylindrical body member **12**, by means of a pivot screw **40** presenting a reduced shank portion **41** only partway through the transverse bore **33** in each member **26** whereby its vertically disposed bore **32** is in fluid communication with one of the bores or passages **22** opening into each of the slots **17**.

The striping wheel carriers **25** are adjusted radially of the axial center of the body member **12**, about their pivot screws **40**, by means of a flanged collar **42** internally threaded for up and down adjustment on the screw threads **16**, provided therefor on the upper end **15** of the body member **12**, with its flanged end in supporting engagement with the outer bottom corner portion of each of the body members **26** whereby the striping rollers or wheels **34** are radially adjustable relative to the diameter of an insulated wire W to be drawn through the improved striping head **10**.

Further in accordance with the present invention, a plurality of ported slip-rings **43**, formed of an ink resistant metal or the like with each ring provided with an annular groove **44** in the inner periphery thereof and an inlet opening **45** extending radially therefrom to its outer periphery, are journaled on the shank portion **14** of the body member **12** with their annular grooves **44** in register respectively with the transverse openings **23** provided therefor in the said shank portion **14**, said slip-rings being maintained in spaced relation by a corresponding number of spacer rings **46**, formed of similar material and each provided with an internal annular groove **47** seating a suitable annular gasket **48** therein, also journaled on said shank portion **14**.

As shown in Fig. 2, the slip-rings **43** together with the interposed spacer rings **46**, journaled on the shank portion **14**, are pre-loaded against the shoulder S in ink sealing relation by means of a counterbored collar **49**, secured on its reduced end portion **13** with a set-screw **50**, and a suitable coil spring **51** disposed between the collar **49** and the bottom spacer ring **46**, whereby a fluid transfer path from the inlet opening **45** in each slip-ring **43** to each striping wheel **34** is established.

The slip-rings **43** are individually or collectively connected to a stationary ink supply, mounted independently of the striping head **10**, comprising a suitable upstanding base member **52**, of metal or non-metallic material adapted for supporting an ink container **53** in an inverted ink feeding position laterally of the striping head **10**, the base member **52** being provided with a suitable outlet nipple **54** in fluid communication with a suitable ink well **55** therein adapted to provide a fluid seal for the open end of the inverted container **53** in known manner.

The outlet nipple **54**, preferably of brass, leading from the well or trough **55** in the base member **52**, is connected to at least one similar nipple **56**, having one end thereof inserted in the inlet opening **45** formed in each of the slip-rings **43**, by means of a rigid or flexible conduit **58** whereby ink will flow through the slip-rings **43**, transverse bores **23** and vertical bores **22** in the body member **12** and finally into the bore **32** formed lengthwise of each of the pivotally mounted body members **26**.

The inverted ink container **53** aforesaid, is supported at such elevation relative to the striping wheels **34** that the ink will seek its own level in the bore **32** in each body member **26** at a point P from which the ink will rise, upon rotation of the striping head, into the counterbores **29** and onto the respective striping wheels **34**, in response to the centrifugal syphon effect resulting from the location of the outlet end of the passages **32**, opening into the counterbores **29**, a greater distance radially of the axis of the body member **12** than the inlet openings **23** therein at the slip-rings.

The upper portion of the central bore **18** in the cylindrical body member **12** is provided with a slidably insertable collet sleeve **60** having a reduced bore at its upper end corresponding substantially to the diameter of the insulated wire W to be drawn through the striping head **10** whereby to maintain the wire W axially central of the upper end portion of the body member **12** as it passes between the striping wheels **34**. Thus, for insulated wire of varying diameters, a corresponding collet sleeve **60** is inserted in the aforesaid bore **18**.

As clearly shown in Fig. 2, a shaft mounting and driving the improved striping head **10** comprises a tubular sleeve **61** disposed in the counterbore **19**, provided therefor in the cylindrical body member **12**, and firmly secured therein by the contracting action of the collar **49** on its reduced, slotted end portion **13**.

The striping head is vertically disposed on a bracket B carried by a suitable capstan, by the extension of the lowermost free end portion of the tubular sleeve **61** through a bearing aperture **62** therein, a pinion **63** being secured on the depending end portion of the sleeve **61**, against the underside of the bracket B, by a suitable set-screw **64** in the hub of the pinion. Thus, the striping head **10** is adapted to be driven, through the pinion **63** relative to the slip-rings **43** and the ink container **53** and the wire W drawn through the sleeve **61**, collet sleeve **60** and striping wheels **34**.

From the foregoing, it will be apparent that the present invention provides a rotatable striping head including a stationary ink supply, wherein the flow of ink to the striping head is automatically regulated in accordance with the rate of ink flow, in response to centrifugal force, from its normal level P in the bore **32** in each of the striping wheel carriers **25**, to the striping wheels **34** by way of the counterbores **29** in which the wheels **34** rotate. Moreover, ink feed through the striping head **10** by way of a plurality of ported slip-rings **43** in fluid communication with a plurality of relatively small intersecting bores or passages opening into the counterbores **29** in which the striping wheels **34** rotate, permits of the construction of a relatively small striping head having a minimum mass whereby its operation at high rotational speeds is made practicable.

Throughout the specification wherever it occurs, the term "ported" is to be understood to refer to a member which is provided with one or more inlet and outlet ports or openings in the form of relatively small bores or passages extending lengthwise and/or transversely thereof for internal or external registration with similar bores or passages in a correlated member whereby such members may be coupled for relative rotation in fluid transfer relation.

While one practical embodiment of the present invention has been illustrated and described, it is to be expressly understood that various other embodiments thereof are possible. For example, the ink supply **53** and the ink transfer means **43** including the conduits **58** therebetween

may be rotated about the striping head **10** at a much slower speed than that at which the said head is driven. Therefore, the present invention is not to be limited except insofar as is necessitated by the prior art and the scope of the appended claims.

We claim:

1. A rotatable striping head in which a marking fluid is supplied thereto from a stationary reservoir, comprising a pivotally mounted tubular body member provided with fluid passages therethrough, an applicator provided with fluid passages therethrough pivotally mounted on said body member on the skew for rotation therewith about a strand passing through said body member, a collar adjustably mounted on said body member in cooperative engagement with said applicator whereby said applicator is adjustable relative to said strand, an annular valve journaled on said body member in fluid transfer relation with said applicator, and a conduit connected to and between said reservoir and annular valve.

2. A rotatable striping head in which a marking fluid is supplied thereto from a stationary reservoir, comprising a pivotally mounted tubular body member provided with fluid passages therethrough, an applicator provided with fluid passages therethrough pivotally mounted on said body member on the skew for rotation therewith about a strand passing through said body member, a guide sleeve within said body member for maintaining said strand axially thereof, a collar adjustably mounted on said body member in cooperative engagement with said applicator whereby said applicator is adjustable relative to said strand, an annular valve journaled on said body member in fluid transfer relation with said applicator, and a conduit connected to and between said reservoir and annular valve.

3. A rotatable striping head comprising a ported tubular body member, a rotary striping element including a ported housing therefor pivotally mounted on said body member with said element on the skew relative to the axial center of said body member for rotation therewith about a strand passing through said body member, means within said body member for maintaining said strand axially thereof in advance of said striping element, adjustable means carried by said body member in coactable relation with said ported housing whereby said element is adjustable radially of said strand, a ported slip-ring journaled on said body member in fluid communication with said ported housing, a reservoir for supplying a marking fluid to said element, and conduit means secured to and between said slip-ring and reservoir.

4. A rotatable striping head in which a marking fluid is supplied thereto from a separate fluid reservoir, comprising a pivotally mounted tubular body member provided with fluid passages therethrough, a rotary striping element including a housing therefor provided with fluid passages therethrough in communication with said element, said housing being pivotally mounted on said body member with said element on the skew relative to the axial center thereof for rotation with said body member about a strand passing therethrough, a guide sleeve within said body member for maintaining said strand axially thereof,

a collar threaded on said body member in cooperative engagement with said pivoted housing whereby said striping element is adjustable relative to said strand, a ported slip-ring journaled on said body member in fluid communication with said housing, and a conduit connected to and between said reservoir and slip-ring.

5. A rotatable striping head comprising a ported cylindrical body member through which an elongated article is passed in the vertical direction, a ported carrier member pivotally mounted in the upper end of said body member, a rotary striping element pivotally mounted on said carrier member, a collar adjustably secured on said body member in supporting engagement with said carrier member whereby said striping element is radially adjustable relative to the axial center of said body member, a ported slip-ring including a spacer ring journaled on said body member in fluid transfer relation with said carrier member, an inverted ink container supported independently of said body member, and a conduit connected to and between said slip-ring and said ink container, said ink container being supported on a level relative to said striping element corresponding to a point intermediate said carrier member whereby ink is supplied to said striping element by centrifugal action in response to rotation of said body member.

6. A rotatable striping head according to claim 5, and in which said slip-ring and said spacer ring are pre-loaded in ink sealing relation by spring means including a collar secured on said body member.

7. A rotatable striping head comprising a cylindrical body member provided with a plurality of separate passages terminating in inlet and outlet openings, a plurality of rotary striping elements including a ported carrier for each of said elements pivotally mounted on said body member with said elements on the skew relative to the axial center of said body member for rotation therewith about a strand passing vertically through said body member, means within said body member for maintaining said strand axially thereof in advance of said striping elements, adjustable means carried by said body member in coactable relation with said carriers whereby said striping elements are adjustable relative to said strand, a plurality of ported slip-rings including spacer rings journaled on said body member in fluid communication with said carriers through said separate passages, a reservoir for supplying a marking fluid to said striping elements, and conduit means secured to and between said slip rings and reservoir.

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