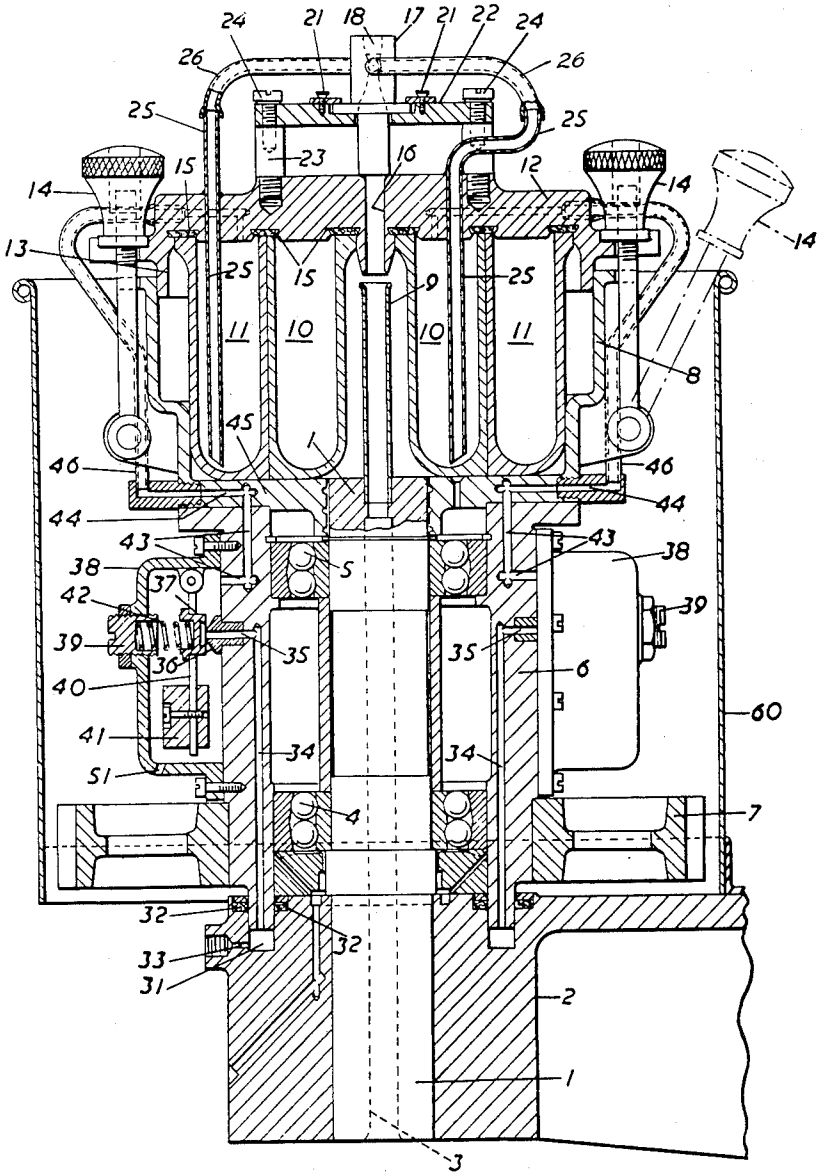
June 12, 1956 A. B. F. G. RICHARDSON ET AL 2,749,880

APPARATUS FOR MARKING WIRES AND CABLES AND THE LIKE

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FIG. 1.



Inventor
A. B. F. G. Richardson
R. Hinds
G. N. Ridings
By
Watt Mackay & Burden
Attorney

June 12, 1956 A. B. F. G. RICHARDSON ET AL 2,749,880

APPARATUS FOR MARKING WIRES AND CABLES AND THE LIKE

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FIG. 2.

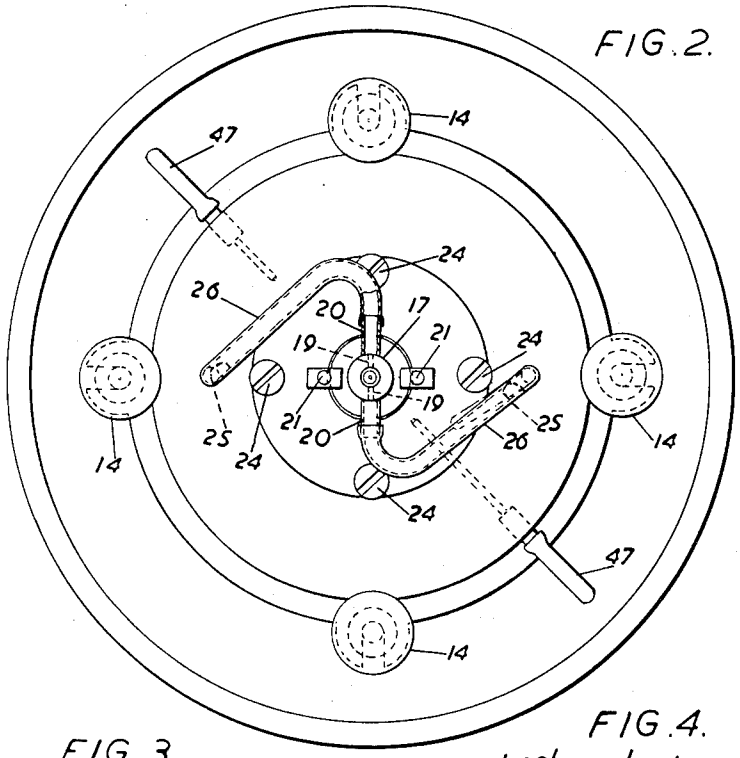


FIG. 3.

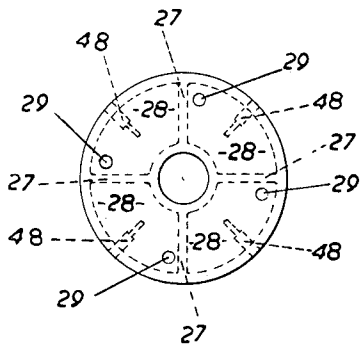
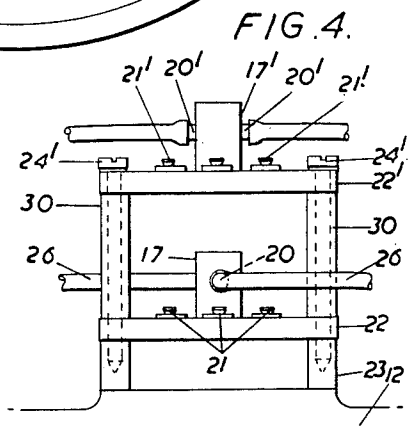


FIG. 4.



Inventor
A. B. F. G. Richardson
R. Hinde
G. N. Redings
By
Webb Mackey & Burden
Attorney

June 12, 1956 A. B. F. G. RICHARDSON ET AL 2,749,880

APPARATUS FOR MARKING WIRES AND CABLES AND THE LIKE

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FIG.5.

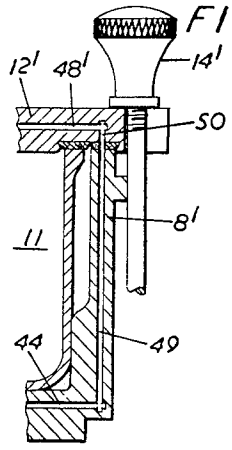


FIG.6.

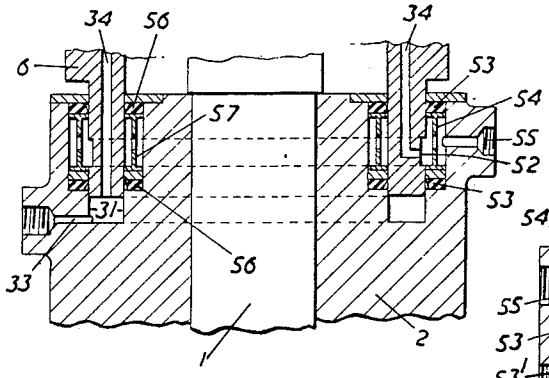


FIG.7.

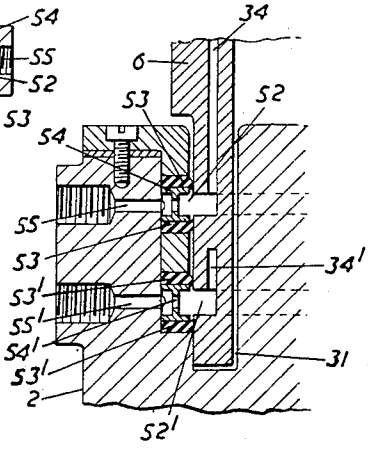
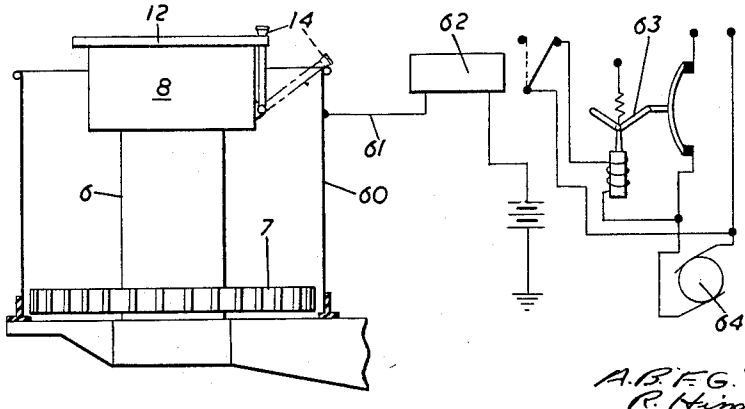


FIG.8.



Inventor
A. B. F. G. Richardson
P. Hinde
G. N. Rollings
By
Wilson Hackney & Burden
Attorney

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APPARATUS FOR MARKING WIRES AND CABLES AND THE LIKE

Arthur Bruce Fraser Gillespie Richardson, Leigh, Ronald Hinds, Stockton Heath, and Geoffrey Norton Ridings, Eccles, Manchester, England, assignors to British Insulated Callender's Cables Limited, London, England, a British company

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12 Claims. (Cl. 118—411)

This invention relates to apparatus for applying to the surface of a longitudinally travelling wire, cordor cable (all hereinafter included in the term "cable") one or more helical stripes of a marking fluid. In particular it concerns apparatus of the kind comprising a rotatably driven marking head by which striping of the cable is effected by marking fluid which flows from one or more reservoirs through one or more channels to one or more applicators each having one or more outlets for fluid that are directed towards the surface of the cable travelling axially through the head, so that a small stream of the fluid issues from each outlet and impinges on the surface of the cable and forms a helical stripe thereon as the head rotates and the cable travels axially through it. Such apparatus will hereinafter be termed a marking head of the type described.

The present invention provides for more accurate control of the flow of marking fluid on to the cable surface and eliminates flooding of the applicator and smearing of the cable in the event of the marking head ceasing to rotate.

In accordance with the invention in a marking head of the type described marking fluid is caused to flow from the reservoir or reservoirs to the applicator or applicators by the application of compressed gaseous fluid to the surface of the marking fluid in the reservoir. This gaseous fluid, hereinafter for convenience generally referred to as compressed air, may be any gas or mixture of gases under super-atmospheric pressure that is suitable for the purpose having regard to the nature of the marking fluid. The supply of compressed air to the reservoir or reservoirs is controlled by a centrifugally operated valve or valves which can be set to open at a given speed of rotation of the head to admit air to the reservoir or reservoirs and to close as the speed of the head falls below a given speed. By providing for a leak of air from the air supply line on the delivery side of this valve or of each valve, the pressure in the reservoir or reservoirs falls as the head comes to rest.

Where the marking head is arranged to rotate about a vertical axis, it is preferred to locate the reservoir or reservoirs at a lower level than the applicator or applicators. This has the advantage that when the valve closes and as the pressure in the reservoir or reservoirs leaks away, marking fluid tends to drain from the applicator or applicators back to the reservoir or reservoirs, thus providing an additional safeguard against flooding of the applicator or applicators as a result of a temporary stoppage in the striping process.

It is preferred to make each reservoir in the form of a deep annular trough and to mount it co-axially on the head. Where two or more such reservoirs are used these are preferably mounted concentrically one within another. They may have separate detachably securable cover plates or all may have a common detachably securable cover plate which may serve as a support for one

or more applicators connected to the reservoirs by pipes passing through the cover plate.

To enable the invention to be more fully understood and readily put into practice a detailed description will now be given with the aid of the accompanying drawings of examples of vertical forms of marking head of the type described which have been constructed in accordance with the present invention.

In the drawings:

Figure 1 is a sectional elevation of one of the marking heads,

Figure 2 is a plan of the head shown in section in Figure 1,

Figure 3 is a diagrammatic plan drawn to smaller scale than Figures 1 and 2, showing an alternative arrangement of reservoirs,

Figure 4 is a fragmental elevation showing the upper part of a marking head similar to that shown in Figures 1 and 2 but fitted with two applicators,

Figure 5 is a fragmental sectional elevation showing an alternative form of reservoir for marking fluid, and

Figures 6 and 7 are fragmental sectional views, showing alternative arrangements for separately supplying compressed air to two or more reservoirs for marking fluid that may be used in place of the compressed air supply arrangements shown in Figures 1 and 2.

On referring first of all to Figures 1 and 2 only, it will be seen that the marking head shown comprises a fixed vertical spindle **1** held at its lower end in a support bracket **2** and having an axial through bore **3** for the passage of a cable to be striped. On the fixed spindle are mounted a pair of ball bearings **4** and **5** in axially spaced relationship. These bearings support a tubular member **6** at the lower end of which is mounted a gear wheel **7** or a pulley by which the tubular member **6** (hereinafter referred to as the driving tube) may be driven at high speed in rotation about the spindle **1**. Secured to the upper end of the driving tube is a cylindrical container **8** open at its upper end and apertured at its lower end to admit the end of the fixed spindle **1** and a fixed cable guide tube **9** forming an upward extension of the hollow spindle **1**. Surrounding the guide tube **9** and fitting in the container are a pair of concentrically arranged deep annular troughs forming marking fluid reservoirs **10** and **11**. The upper ends of these reservoirs are closed by a common closure plate **12** having a dependent circumferential flange **13** which is a sliding fit in the upper end of the cylindrical container **8** housing the two reservoirs. This cover plate **12** is detachably secured to the container by means of a number of swing bolts **14** and serves both to hold the reservoirs in place and, by means of joint rings **15** housed in its under surface, to seal off each of the two reservoirs **10** and **11**. The cover plate **12** has a central aperture **16** for the passage of the cable and forms a rotatably driven support for a striping applicator **17** of any suitable type. The particular applicator shown by way of example in Figures 1 and 2 comprises a flanged bush having an axially extending throated bore **18** with a bell-mouthed entrance and having a pair of diametrically opposed outlet passages **19** in its wall leading from nipples **20** to the throat of the bore. The bush is held by clamps **21** in a recess in the upper face of a support table **22** secured to pillars **23** on the cover plate **12** by screws **24**. In each of the two reservoirs **10** and **11** is a pipe **25** which extends upwards from a point near the bottom of the reservoir, passes through and projects beyond the upper surface of the cover plate to which it is secured. for instance as by soldering or brazing. From the upper ends of these pipes marking fluid is conveyed to the nipples **20** of the applicator **17** by flexible tubing **26**. In this way the need for a seal between relatively moving parts that is tight to the marking fluid is eliminated to-

gether with the generation of frictional heat produced by such a seal.

Naturally where more than two differently coloured stripes are required to be applied to a cable there will be more than two reservoirs. As previously indicated, these may all be of annular form and co-axially arranged Alternatively each of two annular troughs or a single such trough may be divided by radial or other suitably disposed partitions **27** as shown in Figure 3 to form several separate compartments **28**, each of which forms a reservoir from which a pipe **29** extends upwards to convey marking fluid to an applicator.

Where only a single helical stripe is required to be applied only one of the two outlet passages will be used. Alternatively an applicator having a single outlet for marking fluid may be fitted. Where more than two stripes are required an applicator may be fitted having more than two outlets each of which is fed from one of a group of reservoirs which may be of annular form and concentrically arranged or from a compartment of a compartmented annular trough such as is shown in Figure 3. Alternatively, as shown in Figure 4, we may use several applicators **17**, **17'** mounted one above the other on support tables **22**, **22'**, respectively, in the same way as described with reference to Figures 1 and 2, the upper table **22'** being detachably secured in spaced relationship to the lower table **22** by screws **24'** and tubular spacers **30**. Each of these applicators **17**, **17'** may have one or more outlets for marking fluid connected to reservoirs containing differently coloured marking fluids, in any desired manner, preferably by means of flexible tubing. The superposed applicators are angularly adjustable relative to one another about the axis of the marking head, and are so adjusted that the stripe or stripes applied to the cable by one applicator do not overlie the stripe or stripes applied to the remainder. Adjustment in an axial direction may be obtained by using tubular spacers **30** of different lengths.

Compressed air for controlling the flow of marking fluid between each reservoir and the applicator or applicators fed therefrom may be led to the rotating part of the head through one or more rotary seals. A convenient arrangement when there is only one reservoir or where there are several reservoirs all of which are to be operated at the same air pressure is shown in Figures 1 and 2, in which an annular recess **31** is provided in the upper face of the support **2** for the fixed spindle **1** and the lower end of the driving tube **6** is arranged to run in the upper part of this recess, rubber or neoprene sealing rings **32** being fitted between the inside and outside walls of the recess and the driving tube. A radial port **33** in the wall of the support **2** allows compressed air to be fed to the lower part of the recess. From the lower edge of the driving tube one or more ports **34** extend upwards in the wall of the tube to meet radial ports **35** leading to nozzles **36** each of which is closed by a spring loaded cap valve **37** housed within a valve casing **38** secured to the outer wall of the driving tube. Provision is made, as by a screw **39** passing through the wall of the casing, for adjusting the spring loading of the valve. The valve is supported by lever **40** pivoted at its upper end about a horizontal axis so as to swing in a plane radial to the axis of rotation of the head. The lower end of the lever carries a weight **41** so that when the speed of the head reaches a critical value (which can be adjusted by varying the position of the weight **41** and/or the setting of the valve spring **42**) the lever swings out and opens the valve, admitting compressed air to the interior of the casing from the recess **31** in the spindle support to which it is supplied through the supply port **33**. From the valve casing, air is led via additional ports **43** in the wall of the driving tube and ports **44** (shown off-centre in Figure 1) in the base wall **45** of the reservoir container **8** to a pipe **46** which passes upwards outside the wall of the container. From this pipe **46** it is led via a readily detachable flexible connection **47** to ports **48** in the wall of the cover plate **12** which open one into each reservoir. Alternatively as shown in Figure 5, the cylindrical wall of the container **8'** may be furnished with ports **49** which open into its upper face and register with ports **50** opening into the lower face of its cover plate **12'** thus eliminating flexible connections in the air supply. In both cases each valve casing **38** is vented as at **51** so that the air pressure within it quickly falls to atmospheric pressure when the valve closes.

It will be understood that it will be preferable for mechanical reasons and to increase the utility of the head to provide at least two centrifugally operated spring loaded valves and preferably separate valve casings therefor, distributed uniformly around the periphery of the driving tube, as shown in Figures 1 and 2, each valve controlling the flow from one of a corresponding number of reservoirs.

The pressure required to feed the marking fluid from a reservoir to an applicator will depend on the viscosity and specific gravity of the fluid and on the height of the applicator above the reservoir and is readily ascertainable experimentally. It will generally be of the order of two or three pounds per square inch. Where the pressure required to feed the marking fluid from one reservoir to an applicator differs from that required to feed a different marking fluid from another reservoir to an applicator, it may be an advantage to feed compressed air to the two (or more) reservoirs at different pressures. This can readily be done by using two (or more) separate channels for supplying the ports **34** in the wall of the driving tube leading to the valves. For instance, as shown in Figure 6, one of the ports **34** may open into a circumferential air-feed channel **52** surrounding the driving tube **6** instead of into the channel **31** below the lower end of the driving tube. The channel **52** is sealed from the atmosphere and from the channel **31** by two sealing rings **53** separated by a lantern ring **54** through the openings in which air may flow from the inlet **55** to the circumferential channel **52**. The internal surface of the driving tube may be sealed to the radially inner wall of the annular recess in the support **2**, by a similar sealing device comprising a pair of sealing rings **56** separated by a ring **57**. In another example of air feeding arrangement, shown in Figure 7, each of the ports **34**, **34'** in the wall of the driving tube (one of which ports is shown off-centre) opens into a separate one of two circumferential channels **52**, **52'** surrounding the lower end of the driving tube **6**. Each of these channels is sealed from the other and from the atmosphere by a pair of sealing rings **53** or **53'** separated from one another by a lantern ring **54** or **54'** through which compressed air can flow from the inlet **55** or **55'** to the circumferential channels **52** and **52'**, respectively.

A machine guard **60** having a circular rim is preferably provided. This may be attached at its lower end to the spindle support and surround the driving wheel **7** and driving tube **6**, extending upwardly to the level of the upper edge of the reservoir container **8**. Its diameter is such that the swing bolts **14** securing the container cover plate **12** can be released and swung clear of the cover plate to rest on the rim of the guard as shown in broken lines in Figure 1. The guard or at least the upper part thereof may be insulated from the machine to form part of an electric circuit which is completed through the open swing bolts to operate a relay serving to open a low-voltage responsive circuit breaker controlling the driving motor of the marking machine and so prevent risk of the head being started up when the cover plate is not secured.

Where the speed of rotation of the marking head varies with the speed of travel of the cable being marked (as where the head is driven by movement of the cable) the centrifugally operated air control valves may be designed to regulate the air pressure acting on the liquid in the reservoirs in accordance with the linear speed of travel of the cables. When this is done the take-up reel on

which the marked cable is wound may serve as capstan and may be driven at constant angular speed.

To permit of the high rotational speeds of which the head is capable by virtue of its concentric construction being used, it is preferable to provide for lateral adjustment of the applicator so that it may be accurately centered with respect to the head and for the applicator to be of a spring loaded type so that at the point of application of the marking fluid, vibration in the tensioned cable is a minimum.

What we claim as our invention is:

1. In a rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination with at least one reservoir for marking fluid, of means comprising a centrifugally operated valve for controlling the flow of a gaseous fluid under superatmospheric pressure to a supply line to said reservoir.

2. In a rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination with at least one reservoir for marking fluid, of at least one centrifugally operated valve for controlling the flow of a gaseous fluid under superatmospheric pressure to a leaky supply line to said reservoir.

3. In a marking head rotatable about a vertical axis for applying at least one helical stripe of marking fluid to a vertically travelling cable, comprising at least one reservoir for marking fluid, at least one applicator mounted in the head at a higher level than said reservoir, means including a leaky supply line for supplying gaseous fluid under super-atmospheric pressure to the surface of marking fluid in said reservoir and at least one centrifugally operated valve for controlling the supply of gaseous fluid to said leaky supply line to said reservoir, said valve being capable of being set to open at a given speed of the head to admit gaseous fluid to said reservoir and to close as the speed of the head falls below a given speed and thereby allow marking fluid to drain back from said applicator towards said reservoir.

4. In a rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination of a marking fluid reservoir in the form of a deep annular trough mounted co-axially in the head, with a centrifugally operable valve for controlling the flow of a gaseous fluid under super-atmospheric pressure to a leaky supply line to said reservoir, and thereby controlling the pressure exerted on the surface of marking fluid in said reservoir to force feed it to an applicator.

5. In a rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination of at least two marking fluid reservoirs formed by deep annular troughs mounted concentrically one within another and co-axially in the head, with at least two centrifugally operated valves, each controlling the flow of a gaseous fluid under super-atmospheric pressure to a leaky supply line to one of said reservoirs and thereby controlling the pressure exerted on the surface of marking fluid therein to force feed marking fluid to an applicator.

6. In a rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination of at least two marking fluid reservoirs constituted by a covered compartmented annular trough mounted co-axially in the head with at least two centrifugally operable valves, each controlling the flow of a gaseous fluid under super-atmospheric pressure to a leaky supply line to one of said reservoirs and thereby controlling the pressure exerted on the surface of marking fluid therein to force-feed it to an applicator.

7. In a rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination of at least one marking fluid reservoir formed by an annular trough mounted co-axially in the head, a detachable cover plate for said reservoir, at least one applicator mounted co-axially on said cover plate and means for conveying marking fluid from said reservoir to said applicator, with at least one centrifugally operated valve controlling the flow of gaseous fluid under superatmospheric pressure to a leaky supply line to said reservoir and thereby controlling the pressure exerted on the surface of marking fluid therein to force feed it to said applicator.

8. A rotary marking head for applying one or more helical stripes of marking fluid to a cable passing through the head, comprising a fixed vertical hollow spindle, a driving tube rotatably mounted on said spindle, a container mounted co-axially on the upper end of said driving tube, at least one covered reservoir for marking fluid positioned in said container, means for detachably mounting an applicator above said reservoir container, at least one vented casing mounted on the peripheral surface of said driving tube, a centrifugally operated valve in said casing for controlling the supply of compressed gaseous fluid to the interior of said casing, means for feeding compressed gaseous fluid to said valve through ports in the wall of said driving tube during rotation of the head, said casing being adapted to supply to the interior of said reservoir, and said reservoir being adapted to receive from the interior of said casing, compressed gaseous fluid.

9. A rotary marking head as specified in claim 8, wherein the centrifugally operated valve comprises a nozzle for admitting compressed gaseous fluid to said casing, a lever pivoted at one end about a horizontal axis so as to swing in a plane radial to the axis of the head, a valve cap mounted on said pivoted lever, means for spring loading said lever in a direction to cause said valve cap to close said nozzle, means for weighting the free end of said pivoted lever whereby when the speed of the head reaches a critical value the lever swings outwardly and opens the valve.

10. A rotary marking head as specified in claim 8, wherein the interior of said valve casing is coupled to the interior of said reservoir through ports in the wall of the driving tube and the base wall of said reservoir container and thence by flexible connection to a port in the reservoir cover plate which leads to the interior of the reservoir.

11. A rotary marking head as specified in claim 8, wherein the interior of said valve casing is coupled to the interior of said reservoir through ports in the wall of said driving tube and in the base wall of the reservoir container and thence by ports in the circumferential wall of said container which register with ports in the under face of the cover plate which lead to the interior of the reservoir.

12. In a motor driven rotary marking head for applying at least one helical stripe of marking fluid to a cable passing through the head, the combination with at least one reservoir for marking fluid, a detachable cover for said reservoir and swing bolts for detachably securing said cover in position, and a centrifugally operated valve for controlling the flow of marking fluid from said reservoir to an applicator, a machine guard having a circular rim which is insulated from the head and on which said swing bolts are adapted to rest when released and an electric circuit of which said rim forms a part and which is completed through at least one of said swing bolts when released, whereby to operate a relay serving to open-circuit the driving motor of the marking head.

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