

(No Model.)

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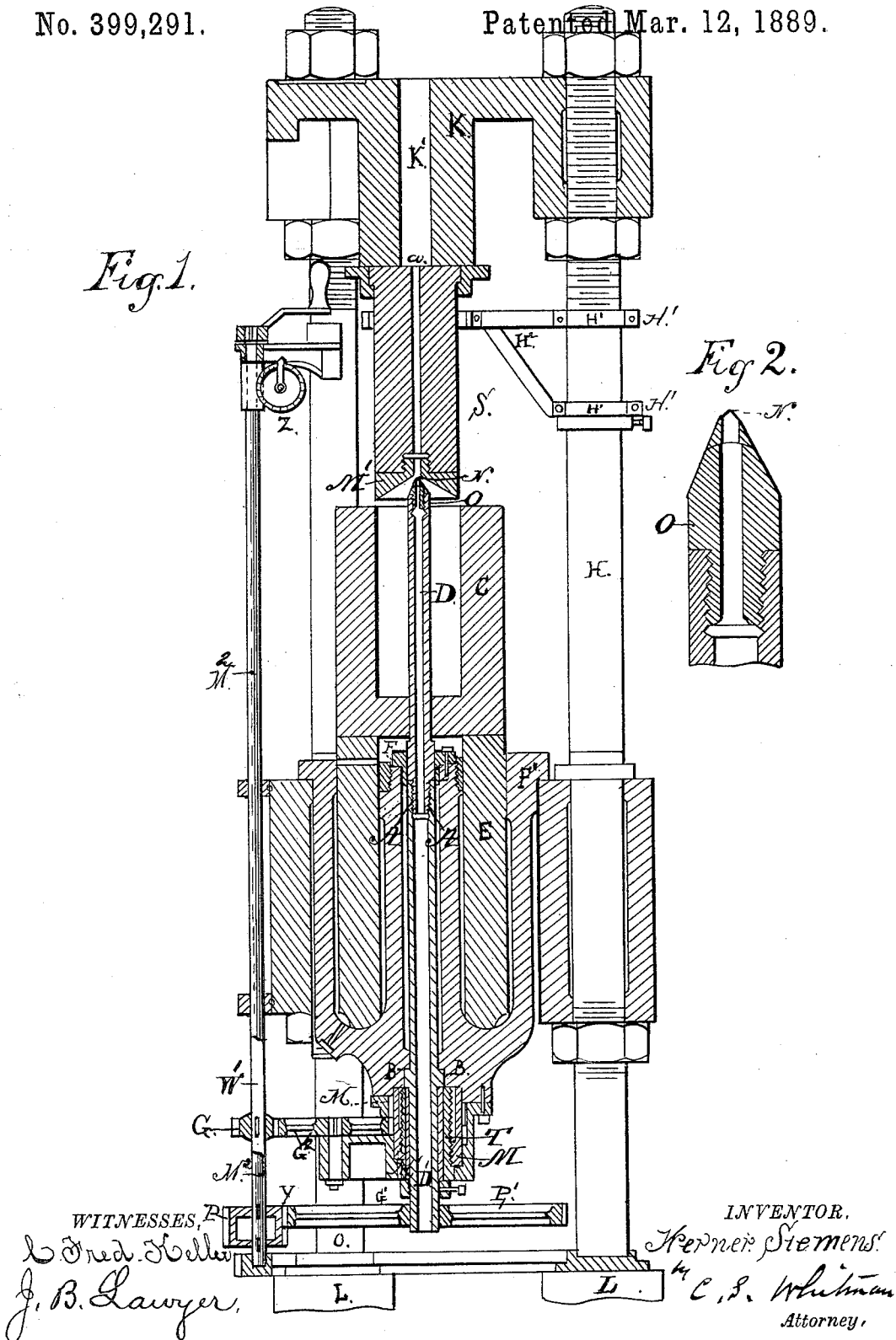
W. SIEMENS.
HYDRAULIC PRESS FOR COVERING ELECTRICAL CONDUCTORS WITH
SOFT METAL.

No. 399,291.

Patented Mar. 12, 1889.

Fig. 1.

Fig 2.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

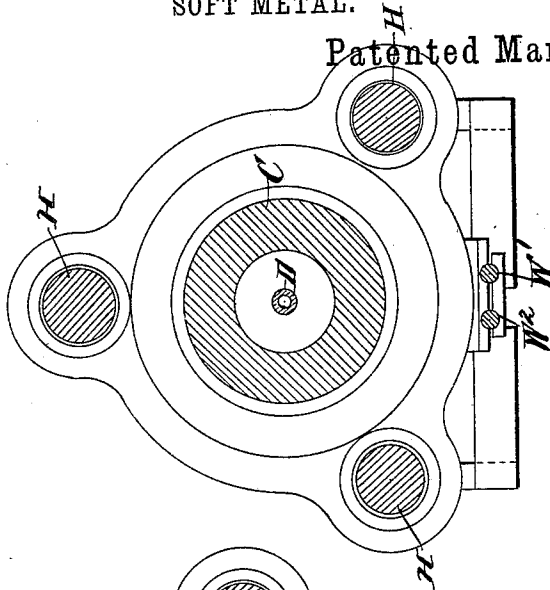


Fig. 4.

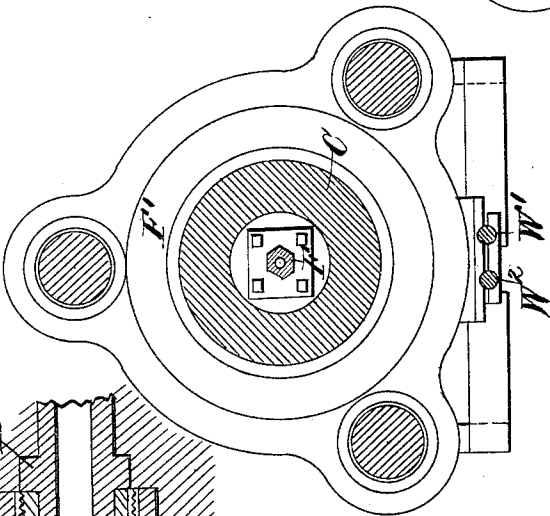


Fig. 6.

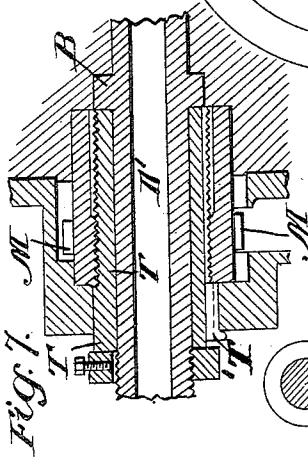
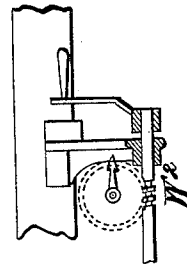
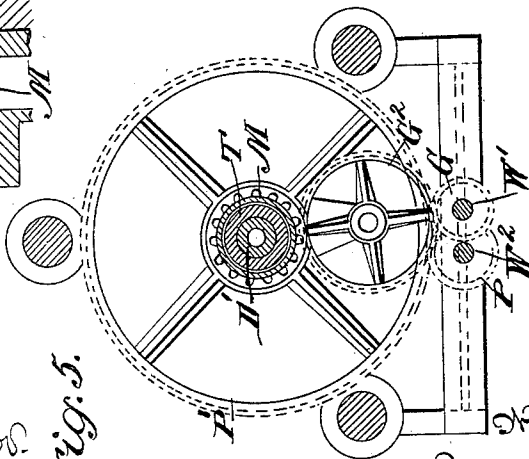


Fig. 5.



Witnesses
O. Fred. Heller.
F. M. H. Roney.

Inventor
Wm. Siemens.
By: Chas. S. Whitman
Attorney.

UNITED STATES PATENT OFFICE.

WERNER SIEMENS, OF BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE,
OF SAME PLACE.

HYDRAULIC PRESS FOR COVERING ELECTRICAL CONDUCTORS WITH SOFT METAL.

SPECIFICATION forming part of Letters Patent No. 399,291, dated March 12, 1889.

Application filed August 30, 1884. Serial No. 141,880. (No model.) Patented in Germany November 23, 1882, No. 23,176; in Belgium November 28, 1882, No. 59,686, and in France November 28, 1882, No. 152,343.

To all whom it may concern:

Be it known that I, WERNER SIEMENS, a subject of the King of Prussia, German Emperor, and a resident of the city of Berlin, Prussia, Germany, have invented a new and useful Hydraulic Press for Covering Electrical Conductors with Soft Metal, (for which I have obtained a patent in the German Empire, No. 23,176, dated November 23, 1882; in Belgium, No. 59,686, dated November 28, 1882, and in France, No. 152,343, dated November 28, 1882,) of which the following is a specification.

My invention relates to machines made use of for covering electric-circuit wires with a body of soft metal; and the nature thereof consists in constructing the hydraulic cylinder of annular form or circular cross-section, for the purpose of arranging working parts of the machine in a central space and enabling a strong and stiff cable-cover to pass through the press.

It also consists in so combining the plunger with the other parts of the machine that it can be moved laterally in order to allow the metal cylinder to be filled with metal.

It also consists of mechanism for raising and lowering and for shortening and lengthening the protecting tube or mandrel.

It also consists in combining, with a protecting tube or mandrel, an adjustable nipple or point, in order to produce a precisely concentric covering of the electric conductors with soft metal; and, finally, it consists in certain novel combinations of parts, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of a hydraulic press having my improvements applied thereto, and in which shaft W' is represented as being broken away in order to show the shaft W^2 beyond. Fig. 2 illustrates the adjustable point or nipple of the protecting tube or mandrel. Fig. 3 represents a horizontal section through the chamber C. Fig. 4 represents a horizontal section through the six-edged guide-piece. Fig. 5 represents a horizontal section through the gear-wheels $G G''$ and internally-threaded nut M. Fig. 6 represents a detail of the registering apparatus, and Fig. 7 is an

enlarged sectional view of the base or bottom of the lower mandrel, D' .

The cylindrical chamber C, for the reception of the metal, is open at the top and rests upon the piston E of the hydraulic cylinder F' , which is of annular form or of circular cross-section, in order to form a cylindrical space for working parts of the machine. To one of the columns H of the frame a plunger, S, provided with a longitudinal central perforation, a , is hinged in such a manner that it can be rotated out of the way when a fresh supply of metal is to be placed in the metal-chamber C, or when the annular shoulder attached to the bottom of the plunger S is removed or replaced.

In the drawings the column H is shown as forming a pintle on which the bearings H' , connected by braces H^2 to the plunger, rotate; but it is obvious that other equivalent devices may be used.

The soft metal is placed in the chamber C and the wire or cable is passed through the tube or mandrel D. If a fluid is forced into the press in the usual manner, the piston will raise the chamber C and cause the bottom or annular shoulder M' , attached to the bottom of the plunger, to press against the top of the soft metal in the chamber C and force it to escape in the shape of a tube, the outer diameter of which is equal to the diameter of the aperture of the annular shoulder, and the inside diameter of which is equal to the diameter of the upper edge of the nipple N. When the soft metal has been entirely formed into a tube, the piston of the hydraulic press is forced downward and the plunger S is swung on its hinges, so that a fresh supply of metal may be introduced into the chamber C.

The hydraulic cylinder is secured to the cross-head K, which is provided with a perforation, K' , forming an extension of the perforation a in the plunger S, and is also secured to the cross-head K by columns or bolts H, which constitute the frame-work forming the remaining parts of the machine.

By constructing the hydraulic cylinder F' of annular form very strong and stiff cables may be introduced into the press, and such

construction also provides a central space for the parts which regulate the movements of the mandrel D. The upper part of the latter projects into the conically-formed bottom of the plunger S and forms therewith an outlet for the soft metal.

As an explanation of the movements of the mandrel D, it may be said that to fill the chamber C it is at first necessary to free its upper end for the reception of the lead. This is done by swinging the plunger S to one side; but before this can be performed the mandrel D must be lowered to such a length that it clears the lowest part of the plunger. This requires a somewhat extensive movement, and is done by means of the shaft W' and pinion G thereon, the said pinion gearing with the wheel G'', which in turn gears with the wheel M. The wheel M is of a cylindrical shape, with a female screw-thread upon the inner surface of its periphery, and is screwed over the tube T, on which is a male screw-thread, and which surrounds the lower part of the lower mandrel, D'. Upon the upper edge of the said tube T rests the rim B, formed upon the mandrel D', the said tube T being prevented from turning by a key, T', resting in a keyway cut in the lower part of the press. Therefore, if the shaft W' is turned, the gear-wheels G, G'', and M turn therewith, and the tube T screws up or down within the wheel M, thus imparting a corresponding motion to the mandrel. Consequently for charging the chamber the whole mandrel must at first be lowered by means of the shaft W', and after the chamber is charged raised again until the rim B is pressed against the bearings, as shown in Fig. 7.

It is sometimes necessary during the manufacture of a cable to change at will the thickness of the metallic outside protection thereof, which is effected by shortening or lengthening the protecting tube or mandrel during the working of the press, the thickness of the metal being increased by shortening the mandrel and decreased by lengthening it.

In order to effect a change in the length of the mandrel, a shaft, W'', is provided with a wheel, P, which gears with the wheel P' upon the lower part of the mandrel D', the upper part of the said mandrel being prevented from turning by the six-edged guide-piece F, and being screwed into the lower part at A. If the shaft W'', and with it the lower part of the mandrel, is turned, the upper part of the latter screws itself in a direction corresponding to the direction of rotation into the lower part, thus shortening itself, or screws itself outward, and thus lengthens itself, and thus the width of the outlet for soft metal, which is formed by the plunger and mandrel, may be accurately adjusted. By a registering apparatus connected with the shaft W'' the thickness of the metal, which changes according to the number of rotations of the shaft, may be ascertained. The said registering apparatus may consist of any of the many well-

known forms for recording the rotations of a shaft.

That part of the mandrel D on which during the working of the hydraulic press the pressure of the metal acts is, in consequence of the different densities of the soft metal, liable to be moved out of the true axis of the metal-chamber and pressed against the bottom of the plunger, in which case the metal covering is no longer concentric with the cable. In order to avoid this, the top of the mandrel D has a cap, O, thereon, the said cap having a spherical head, which forms a seat for the nipple N; the bottom of which is made to correspond thereto, thus permitting the nipple to have a certain freedom of movement. In consequence of this construction, the nipple is always precisely in a position corresponding to the axis of the piston, and the lateral dislocation of the mandrel can have no effect on the concentric form of the outlet for the metal. The form of the sides, as well as of the base of the nipple, is so chosen that in working, the pressure of the metal on it is always greater than the friction, and thus a rising of the nipple is prevented and a perfectly-tight contact between the cap and the nipple secured.

Having now described my invention, I claim and desire to secure by Letters Patent—

1. In a hydraulic press for covering electrical conductors with soft metal, an annular cylinder having a central space for the reception of the mandrel, and the mandrel having an upper part, D, which screws into the lower part, D', as and for the purpose described.

2. In a hydraulic press for covering electrical conductors with soft metal, the combination of a plunger, rotated in a plane perpendicular to the direction of the mandrel, with a mandrel capable of being raised and lowered, as and for the purpose described.

3. The combination of the nipple movable in relation to the mandrel, the mandrel, and the perforated plunger, as and for the purpose described.

4. In an apparatus for making insulated telegraph cables and wires, the combination of the hinged plunger S, capable of horizontal movement, and the chamber C, as and for the purpose described.

5. The combination of the mandrel D, the chamber C, and the hinged plunger S, capable of horizontal rotation, as and for the purpose described.

6. The combination of the annular cylinder F', the chamber C, the annular piston E, and the mandrel passing axially through the chamber, as and for the purpose described.

7. The combination of the annular cylinder F' and the tube for the reception of the cable or wire passing axially through the cylindrical space in the center of cylinder, as and for the purpose described.

8. The combination of the plunger, having a central passage or opening therein corresponding in form to the desired exterior form

of the cable or conductor, with a vertically-adjustable mandrel provided with an adjustable point, as and for the purpose described.

9. The combination of the plunger S, capable of being rotated about the column II, the cross-head K, provided with a perforation, K', and the lead-chamber C, as and for the purpose described.

10. The combination of the mandrel, the perforated plunger, and the nipple N, as and for the purpose described.

11. The combination of the chamber C, provided with a hole for the passage of the mandrel, the piston E, supporting the cylindrical chamber, and the cylinder F', as and for the purpose described.

12. In a hydraulic press for covering electrical conductors with soft metal, the combination of the upright column II, the rotatable plunger S, the bearings H' H', and the braces II', as and for the purpose described.

13. In a hydraulic press for covering electrical conductors with soft metal, the combination

of the shaft W', provided with a gear, G, the wheel G'', and the toothed nut M, the tube T, and the lower part of the mandrel having a shoulder, B, as and for the purpose described.

14. In a hydraulic press for covering electrical conductors with soft metal, the combination of the shaft W', provided with a gear, P, the wheel P', the lower section of the mandrel D', and the upper section of the mandrel D, which is received into the lower section, as and for the purpose described.

15. The combination of the six-edged guide-piece F and the mandrel constructed in two sections, one of which screws into the other, as and for the purpose described.

In testimony that I claim this as my own I have hereunto set my name in the presence of two subscribing witnesses.

WERNER SIEMENS.

Witnesses:

B. ROY,

JOHN R. ROSLYN.