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N. E. METHLIN

APPARATUS FOR PRODUCING HOOPING EFFECTS IN METAL TUBES OF GREAT STRENGTH

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Fig. 1.

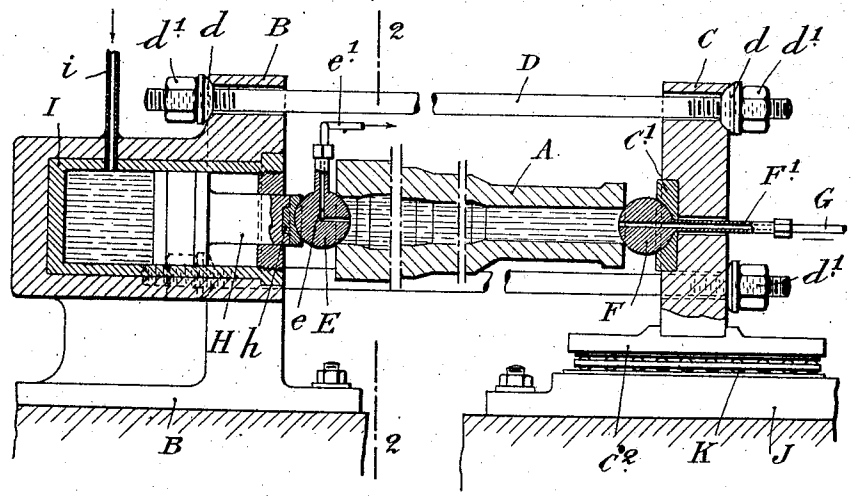
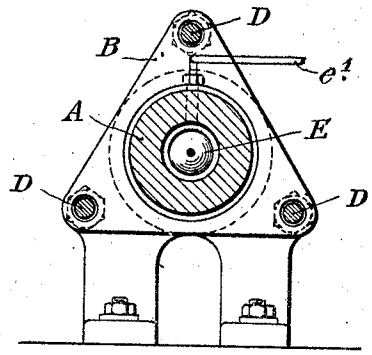


Fig. 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PRODUCING HOOPING EFFECTS IN METAL TUBES OF GREAT STRENGTH.

Application filed July 16, 1925. Serial No. 44,072.

To all whom it may concern:

Be it known that I, NICOLAS EMILIEN METHLIN, a citizen of the Republic of France, resident of Paris, France, have invented new and useful Improvements in or Relating to Apparatus for Producing Hooping Effects in Metal Tubes of Great Strength, which is fully set forth in the following specification.

This invention relates to improvements in apparatus for producing hooping effect, by means of an internal hydraulic pressure, in metal tubes of great strength such as tubes for gun barrels or the like, which apparatus comprises in the known manner, two cross heads connected together by tie rods, between which cross heads the tube to be "self-hooped" is held by a closing member provided at each end.

In the known devices of this type, the closing members consist most frequently of cylindrical or cylindro-conical plugs fitted in the tubes and pierced with an admission duct and an outlet duct for the liquid under pressure respectively. The whole of the length of the tubes corresponding to the length of the closing members is of necessity not acted upon by the liquid under pressure and is consequently discarded, that is to say it is cut off.

In my Patent No. 1,540,654, dated June 2, 1925, there is disclosed a device which avoids the above inconveniences by the use of conical obturators; but this apparatus requires the use of plastic joints in combination with the said obturators since a joint cannot be secured by the simple contact between the metallic obturator and the tube, the weight and the deformations of the latter not permitting a perfect and permanent centering of the said obturators.

In accordance with the present invention, the above mentioned inconveniences are overcome in a very simple manner. The obturators are formed in such a manner as to present a spherical contact surface having, practically, a simple circle of contact, which contact circle is with the inner surface of the tube situated in the plane of the corresponding extreme edge of the tube.

In a practical form of construction of the invention, the closing members consist of balls presenting a spherical bearing surface not only to the face of the tube to be "self-hooped" but also to the support taken upon the cross head which is correspondingly hollowed out.

Together with these spherical closing members, use is preferably made, according to the invention of assembling the rods, between the cross heads, placed at the vertices of equi-lateral triangles the centres of which are on the axis of the balls; these tie rods also bear against the cross heads through the medium of washers in the form of spherical caps, so that the whole of the closing members and the tie rods automatically center themselves.

The practical form of construction of the invention shown, by way of example, in the accompanying drawing presents further features which are hereinafter described.

In this drawing:

Figure 1 is a longitudinal sectional elevation.

Figure 2 is a cross sectional elevation taken along the line 2—2 in Figure 1.

In this drawing the application of the invention to the "self-hooping" of a gun barrel A is shown by way of example.

The apparatus comprises two cross heads B and C connected to each other by three tie rods D placed at the vertices of equilateral triangles the centres of which are on the longitudinal axis of the apparatus, which coincides with the axis of the tube to be "self-hooped" and the axis of the two spherical closing members E, F. Each of these closing members makes with the tube A a circle of contact formed by a circle in the interior of the corresponding mouth or end face of the tube.

One of the closing members F presses against a bearing plate C^1 provided on the cross head C, in which plate is formed a corresponding hollow of spherical form; the said closing member is rigidly attached to a duct F^1 connected to the pipe G through which is supplied the liquid under pressure which fills the tube during the "self-hooping" operation. The closing member E at the opposite end may press against a similar hollow formed in the cross head B.

In the practical form of construction

shown, the joint between the closing member E and the tube A is obtained by means of a counterpressure which is greater than the "self-hooping" pressure and for this purpose the ball E is carried in a lodgment formed in the end *h* of the rod of a piston H which moves in a pressure cylinder I supplied through a duct *i* with a liquid or a fluid under pressure. The ball E is pierced with a duct *e* communicating with a pipe e^1 which is connected to an apparatus for measuring and controlling the pressure during the operation.

The pressure cylinder I is preferably lodged in the cross head B, as shown in the drawing.

The tie rods D bear against the cross heads B and C through the medium of washers *d* in the form of spherical caps held in position by nuts d^1.

The use of spherical joints E and F and the tightening of the tie rods at three points on the bearing surface through the medium of spherical washers, renders the whole arrangement easily deformable.

The deformation may also be further assisted by mounting one of the cross heads C upon a platform C^2 supported on a bed plate J with the interposition of balls or rollers K. Apart from the advantages enumerated above, which the apparatus describes possesses, the latter also enables easier access to be obtained to the tubes while they are being treated, either for mounting operations, or for dismounting and replacing one tube by another.

Claims:

1. Apparatus for subjecting tubes to hydraulic pressure comprising a pair of crossheads, and spherical members engaging said crossheads and the opposite ends of a tube to be treated, said members being adapted to grip and close the ends of said tube and one of said members being provided with a duct for the introduction of a liquid into the tube.

2. Apparatus for subjecting tubes to hydraulic pressure comprising a pair of crossheads provided with spherical recesses, tie rods connecting said crossheads, spherical members extending into the recesses in said crossheads and into the opposite ends of a tube to be treated for closing the ends of said tube and supporting the same in operative position, and means for introducing a liquid through one of said members into said tube.

3. Apparatus of the class described comprising a pair of crossheads, spherical members for closing the opposite ends of a tube to be treated, said members being interposed between the ends of said tube and said crossheads, a piston in one of said crossheads, a piston rod for said piston, one end of said rod constituting a bearing for one of said members, and means for subjecting said piston to pressure whereby said tube is gripped between said spherical members.

4. Apparatus for subjecting a tube to hydraulic pressure comprising triangular-shaped crossheads, tie rods extending through the crossheads adjacent the vertices thereof, spherical bearing members interposed between the tie rods and said crossheads, and spherical members interposed between a tube to be treated and said crossheads for closing the ends of said tube, the axes of said spherical members lying in the plane of the centers of said crossheads.

5. Apparatus of the class described comprising a pair of crossheads, a piston in one of said crossheads, spherical members for closing the end of a tube to be treated, one of said spherical members having engagement with the rod of said piston, a bed-plate for one of said crossheads and friction reducing means interposed between said bed-plate and said last named crosshead.

6. Apparatus for subjecting a tube to hydraulic pressure comprising a fixedly mounted crosshead having an opening therein, a piston in said opening, a rod for said piston, means for introducing liquid under pressure into said opening to move said piston and rod, a second crosshead, means permitting movement of said second crosshead relative to said first named crosshead, tie rods extending through said crossheads, spherical bearing members interposed between said tie rods and crossheads, and spherical members for gripping and closing the ends of said tube, one of said members having engagement with said rod and another of said members having engagement with the second named crosshead.

7. Apparatus for subjecting a tube to hydraulic pressure comprising a pair of crossheads having openings therethrough, said openings in each crosshead being formed at the vertices of an equilateral triangle, means engaging said crossheads and closing the ends of said tube for maintaining the latter with its longitudinal axis in alignment with the centers of said triangles, tie rods extending through openings, and means engaging said rods and crossheads for maintaining said first named means in engagement with said tube.

8. Apparatus for subjecting a tube to hydraulic pressure comprising a pair of crossheads, means for maintaining said tube in a predetermined position relative to said crossheads including tie rods engaging said crossheads and spherical members closing the ends of said tube, and hydraulic means for pressing said members against the ends of said tubes.

9. Apparatus for subjecting a tube to hydraulic pressure comprising, in combination, a pair of crossheads, spherical mem-

bers interposed between said crossheads and the ends of said tube to close the latter, one of said members being provided with a duct for introducing a liquid into the tube and the other of said members being provided with a duct leading to apparatus for measuring and controlling the self-hooping pressure, and means for pressing said members against the ends of said tube including hydraulic means and a plurality of tie rods.

In testimony whereof I have signed this specification.

NICOLAS EMILIEN METHLIN.