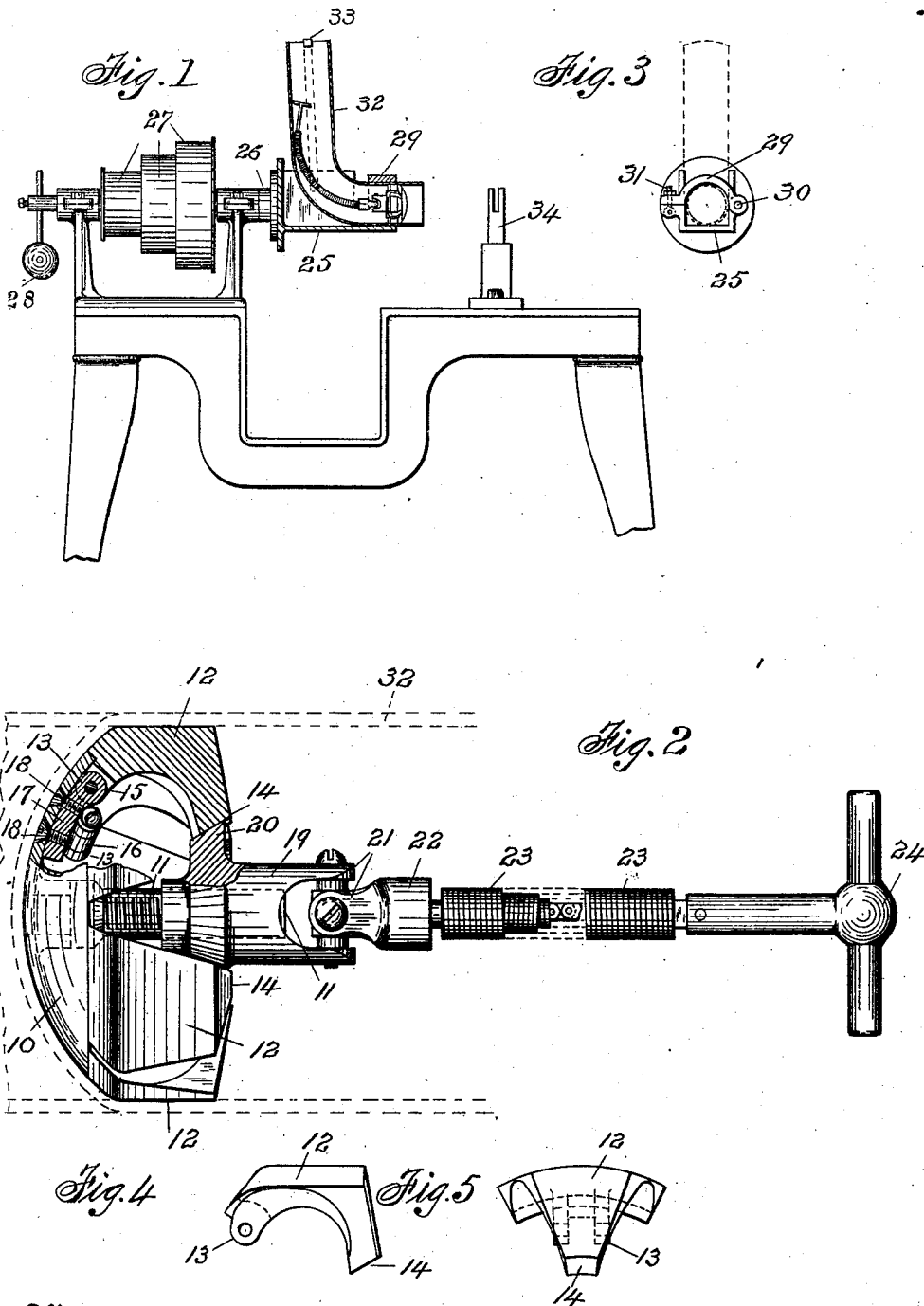


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 MEANS EMPLOYED IN CLOSING THE ENDS OF LEAD L'S BY SPINNING.
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978,863.

Patented Dec. 20, 1910.



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UNITED STATES PATENT OFFICE.

FREDERICK N. DU BOIS, OF NEW YORK, N. Y.

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Specification of Letters Patent.

Patented Dec. 20, 1910.

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To all whom it may concern:

Be it known that I, FREDERICK N. DU BOIS, a citizen of the United States, and a resident of the borough of Manhattan, in the county, city, and State of New York, have invented certain new and useful Improvements in Means Employed in Closing the Ends of Lead L's by Spinning, of which the following is a specification.

In Letters Patent 918,137, granted April 13, 1909, to W. A. Fleming, there is disclosed and claimed a pipe of ductile metal, such as lead, which is of an angular shape in longitudinal section with an over-spun closed end. Prior to that invention it was customary to make such angular pipes, called in practice, "lead ells," with both ends open. The reason for, and advantages resulting from, making the ells with closed ends, are fully disclosed in the said patent and need not be described herein. These ells can best be given their angular form while both ends are open, but it has not been easy thereafter to spin one end to close it, because of difficulty in providing a mandrel or forming surface that can be inserted to the proper position and then removed from the ell after the end has been spun over.

In carrying out my invention I provide an improved mandrel which can be readily inserted to position from either end of an ell both ends of which are open, and then the head expanded to cause it to fit tightly in the ell with the face of the head a short distance back from the open end. Preferably an external clamp binds the pipe around the mandrel head to prevent expansion of that portion of the pipe. And preferably also, the end face of the head is convex so that when the portions of the pipe projecting beyond the head are spun over said face, the resulting closed end of the ell will be somewhat dome-shaped. For producing the best results, the external clamp referred to is formed to be attached to a lathe, as a chuck, so that the ell, mandrel, and clamp can be rotated about an axis coincident with the longitudinal center of the portion of the ell containing the mandrel head, the lathe having a tool rest for supporting a spinning tool which may be brought to bear on the projecting end of the pipe and spin it over on the face of the mandrel head.

The invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Referring to the accompanying drawing, which forms a part of this specification, Figure 1, illustrates the mandrel mounted in an ell, the latter being shown in section, and supported in position for spinning the end; Fig. 2, is a side view of the mandrel on a larger scale, the head being partly in section, and the operating shaft being broken to reduce its length; Fig. 3, is a detail elevation of the external clamp or chuck, looking from the right of Fig. 1; Fig. 4, is a detail side view of one of the segments of the mandrel head, and Fig. 5, is an end view of the same.

In the several figures, like letters of reference are employed to designate corresponding parts.

The mandrel comprises a head the face member of which consists of a plate 10, the outer surface of which is convex or dome-shaped. The inner surface may have any form, but is shown as concave merely because it is convenient to manufacture it of a plate which is of substantially uniform thickness. The diameter of the plate 10 is less than the inner diameter of the pipe of which the ell is made, as indicated in Fig. 2 in which the pipe is represented by dotted lines. Projecting from the center of the concave side of the plate 10 is a fixed screw 11. The peripheral portion of the head consists of a plurality of segments 12 each of which has an inwardly projecting front ear 13, which is preferably divided as indicated by dotted lines in Fig. 5, and an inwardly projecting heel 14. Each segment is pivotally connected to the face plate 10 by a pintle 15 passing through the ear or ears 13 and through a lug 16, the base 17 of which is secured to the inner side of the plate 10 by screws 18. I do not limit myself to the precise pivotal connections described, it being only essential that the segments shall be so movable relatively to the face plate that when free to do so they may move inwardly or toward the axis of the head so that the head as a whole may collapse sufficiently to enable it to be inserted into, and removed from, operative position around the angular portion of the ell as presently described. The outer faces of the entire series

of segments constitute the periphery of the mandrel head, but said segments also have forming surfaces which, when expanded, constitute continuations of the convex forming face of the plate 10 so as to enable the proper form to be given to the end of the pipe which is spun down as hereinafter described.

Mounted on the screw 11 is a sleeve 19 having a circular flange 20, the outer edge of which supports the heels 14 of the series of segments. The contacting surfaces of the flange and heels are cone-shaped so that the flange operates as a cam to act on all the segments simultaneously to expand them, and to simultaneously release them so they may collapse to reduce the size of the head, according to which way the sleeve 19 is rotated relatively to the screw 11.

Connected to the outer end of the sleeve 19 by a universal coupling 21 is a shaft end 22 to which is connected one end of a flexible shaft 23 which may be of the well known type embodying a chain and a plurality of concentrically arranged coils wound in opposite directions. Operatively connected to the outer end of the flexible shaft is a handle 24. Obviously, this mandrel could be used to support an end portion of any pipe, longitudinally angular or not, so that any suitable tool or tools could be used for bending in the extreme end of such pipe to give it a form corresponding to the form of the head. And of course the external shape of the plate 10 and the movable segments need not be just as illustrated in the drawings. This part of my invention, viz. the mandrel, is however especially useful for the closing, by spinning, the ends of lead ells. To cooperate with the head of the mandrel in holding and rotating such an ell, I have devised a chuck which comprises a trough-shaped holder 25 having a spindle 26 to be rotated by the head stock of a lathe. A suitable lathe is represented somewhat conventionally in Fig. 1, the pulleys for rotating the spindle and chuck being indicated at 27. A suitable counterbalance 28 may be connected with the spindle to equalize the weight of the portion of the ell which projects laterally from the holder 25. A cap or clamp 29 at the front end of the holder is preferably hinged thereto at 30 (see Fig. 3) and secured in clamping position by a releasable bolt 31.

In operation the ell 32 is secured in the holder 25 by the clamp 29, the mandrel head supporting the pipe against the pressure of the clamp. The flexible shaft 23 enables the head to be expanded or contracted, by the hand of the worker inserted through the other end of the ell and actuating the handle 24. One or more hooks 33 engaging the end of the ell which extends

laterally from the holder or chuck, and connected with said holder as indicated by dotted lines in Fig. 1, may be employed to secure the ell firmly in position so that it will not be dislodged by centrifugal force when the chuck is rotated. A suitable spinning tool (not shown) may be supported by a tool post 34 and brought to bear against the portion of the pipe or ell which projects beyond the mandrel head, so as to cause said end to be spun down and form a tightly closed end of the ell, said closed end then conforming to the shape of the mandrel head. When this operation is finished, the worker releases the clamp 29, and by rotating the handle 24 of the mandrel shaft in the proper direction, withdraws the cam flange 20 from the heels of the segments sufficiently to permit the latter to collapse and permit the mandrel to be removed in condition ready to be inserted in the next ell; it being understood that the range of movement of the cam flange 20 and the segments 12, when the latter are collapsed or expanded, is made sufficiently great to permit of the easy and ready passage of the head around the angular portion of the ell when the removal of the mandrel from and its insertion into it is desired.

Having now described my invention, and specified certain of the ways in which it is or may be carried into effect, I claim—

1. A mandrel for use in closing the ends of ells by spinning, comprising a head which is constructed with an exterior forming surface and an interior adjusting member secured to and extending inward therefrom, a plurality of radially movable segments arranged in relation to and movably connected with such surface, a movable cone-shaped flange for cooperating with said segments to force them outward in a radial direction and permit of their retiring in an opposite direction, a second adjusting member for cooperation with the first mentioned adjusting member, and a flexible shaft connected with such second member whereby to operate it to cause this second member to expand said movable segments and permit of their collapse as desired, substantially as described.

2. The combination in a mandrel for use in closing the ends of ells by spinning, with a head having a face plate, a screw projecting rearwardly therefrom, and a plurality of radially movable segments pivotally connected to said plate, of a sleeve engaged with said screw and having a flange provided with a cone-shaped periphery to engage with a portion of each of said segments, and a flexible shaft connected with said sleeve to rotate it, substantially as described.

3. The combination with a rotatable trough-shaped holder, and a clamp to co-act therewith to externally grasp the pipe, of a

mandrel having an externally convex forming surface, radially movable segments operatively connected with said surface, means for spreading the segments radially, and a
5 flexible shaft operatively connected with said segment-spreading means.

In testimony whereof, I have hereunto set

my hand in the presence of two witnesses
this 19th day of April, 1910.

FREDERICK N. DU BOIS.

Witnesses:

THOMAS GANNON,
GRACE T. DIXON.