

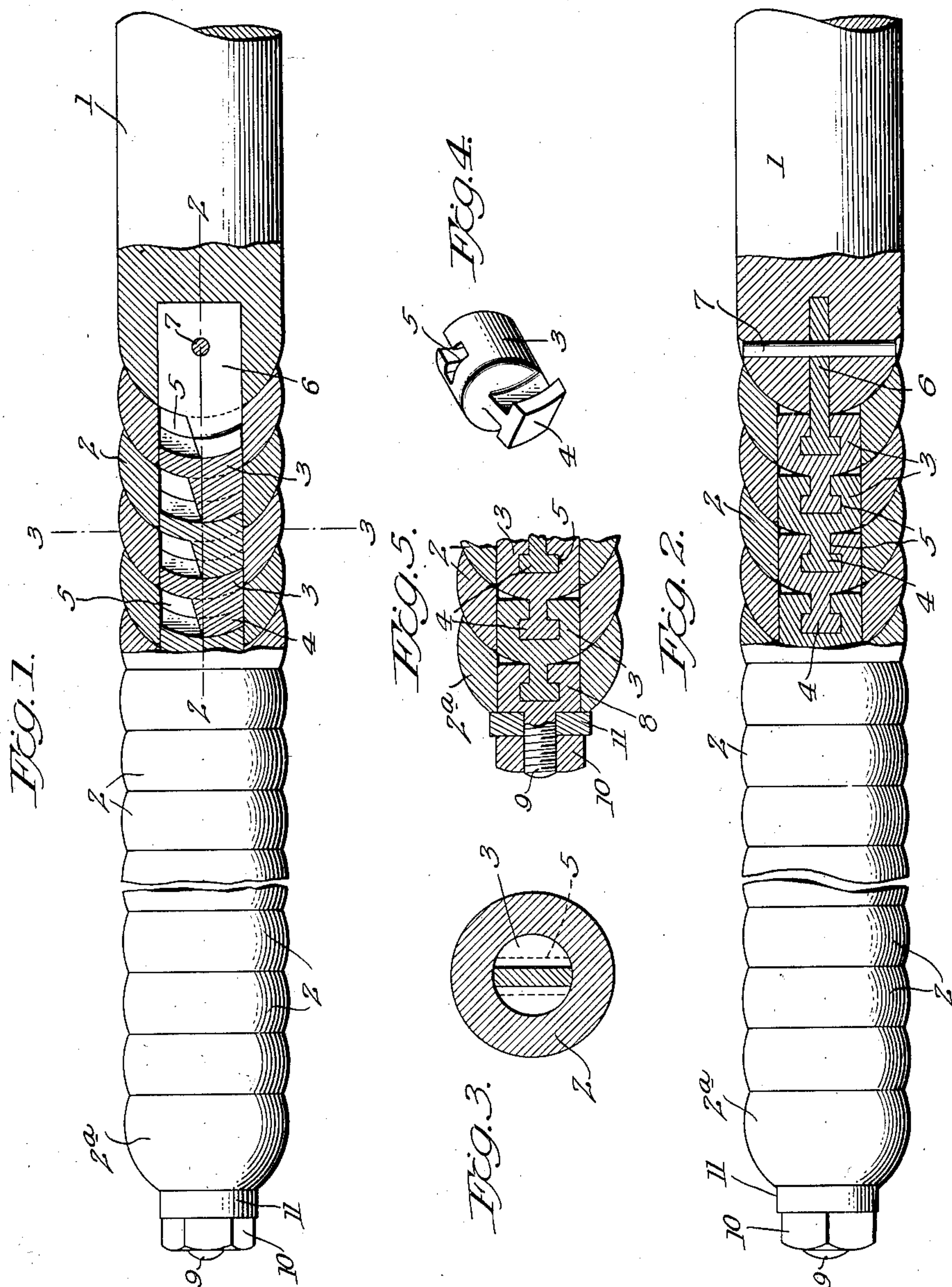
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PIPE BENDING MANDREL OR PUNCH

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PIPE-BENDING MANDREL OR PUNCH.

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The present invention relates to improvements in mandrels which are primarily intended to be employed in bending tubes or pipes having relatively thin walls.

5 The subject matter of the invention is a mandrel having a flexible section adapted to be bent with a tube fitted thereon, and which will operate to automatically restore the desired cross section form of any portions of
10 the tube which may have been deflected during the bending operation, as the mandrel is withdrawn from the bent tube.

A further object of the invention is to provide a tool which will have its several parts
15 or elements so connected that besides constituting a mandrel for bending tubes, it may be utilized as a punch if so desired.

In the accompanying drawings:

20 Figure 1 is an elevation, partially in section, of a mandrel constructed in accordance with the present invention.

Figure 2 is a similar view, the sectional portion being on substantially the line 2—2 of Figure 1.

25 Figure 3 is a transverse section on the line 3—3 of Figure 1.

Figure 4 is a detail, perspective, view of one of the couplers or members of the sectional core.

30 Figure 5 is a detail, sectional view, of the terminal member of the core.

Referring to the drawings, in the several views of which like reference characters designate corresponding parts, it will be seen
35 that the article comprises a rigid stem or rod 1 and a flexible portion connected with and extending beyond the end of the rod 1. Said flexible section is formed by a series of substantially spherical shaped, tubular, members 2, which surround a flexible core that is
40 connected at one end to the rod or stem 1.

Each section 2 of the mandrel is provided with a recess which receives a portion of the next member of the series, or the forward
45 end of the stem 1 and permits relative movement between said sections. Means are provided whereby the several sections 2 are held in proper nested relation and in continuous
50 contact in the direction of the length of the rod or stem 1, while permitting relative lateral movement between the several sections so that the mandrel is adapted to be readily bent with a tube fitted thereover about any suitable axis.

The particular core or means employed for
55 connecting the tubular, spherical shaped, sections 2 with the rod or stem 1 comprises a series of members, each including a body 3, having the form and dimensions of the bore
60 or passage through the sections 2, provided at one end with a projecting, substantially T-shaped, head 4 and at its opposite end with a socket or recess 5 shaped to receive the head 4 of the next rearmost core member of the series.

65 As shown, the outer surface of the end wall of the body 3 of each coupler or core member has a curved contour corresponding to that of the outer section 2 of the mandrel, within which it is arranged, and the outer
70 face of the head 4 and corresponding wall of the socket or recess 5 are similarly shaped so that, while the members 3 act to provide a core which normally prevents longitudinal separation of the mandrel sections 2, they do
75 not at all interfere with free lateral movement between said sections or bending of the mandrel.

The flexible core is connected with the stem or mandrel rod 1 by a link-like member 6, which is fitted in a slot in the rod or stem 1 and secured in position by a transverse pin or rivet 7, the projecting end of said link having a T-shaped head, similar in form to the head 4 of the core member 3, which is received
85 in the recess or socket 5 of the adjacent core member.

The terminal core member 8 is provided with a longitudinally extending, threaded, pin-like portion 9, on which is secured a nut
90 10. The terminal exterior section 2^a of the mandrel is preferably made slightly larger than the intermediate sections, constituting a head, which as the mandrel is withdrawn from a bent tube will act to remove any
95 irregularities that may have formed in the tube wall during the bending and restore the tube to the desired cross sectional form. Between such terminal member or sizing head 2^a and the nut 10 an anti-friction ring 11 is
100 provided.

It will be seen that by means of the nut 10 the several members of the core and the mandrel sections 2 will be drawn into close contact in the direction of the length of the
105 rod or stem 1, but that this engagement, while providing a substantially longitudinally rigid implement that may be utilized if de-

sired as a punch, will not interfere at all with free relative movement in any direction laterally between the mandrel sections so that it can freely bend with a tube placed thereon.

The nut 10 holds the sizing head and spherical sections 2 in such close engagement longitudinally of the mandrel and stem, that there is provided a tool, which, if desired might be employed as a punch for indenting or perforating metal, suitable power being applied to the end of the rod or stem section 1.

An important feature of the invention is that it provides a construction by means of which the length of the flexible section may be readily varied, or any member thereof easily be removed and replaced, if desired.

By detaching the nut 10 any desired number of the exterior sections 2 may be stripped off from the core and quickly replaced by new ones, or, if desired, by removing said exterior sections, the members of the core may be easily separated. When thus separated, additional core members can be easily inserted in position to lengthen the core, or detached to reduce the length thereof.

The exterior members 2 may all be of substantially the same diameter, or they may be of different diameters and arranged so that the mandrel will taper slightly from the stem 1 to the head 2^a. By employing a tapering body, the friction between the mandrel and tube produced by the bending operation will be reduced.

The head 2^a, however, will be of the cross sectional form and dimensions of the tube to be bent, so that when the mandrel is withdrawn after the bending operation, said head will act to remove any irregularities that may have been produced by the bending and leave the interior of the bent tube smooth and of the desired cross sectional form.

We claim:

1. A tube bending mandrel comprising a rigid stem, a flexible core formed by a series of members detachably united end to end by a headed projection on each member engaging a socket in the next member of the series and permitting relative lateral movement between said members, one of the terminal members of said series being connected to the stem, a series of substantially spherical, tubular, members fitted over said core and each having a recess receiving a portion of the next section, and means connected to the other terminal member of the core for retaining the core members in engagement and said tubular members in nested engaging relation.

2. A tube bending mandrel comprising a rigid stem, a flexible core formed by a series of members each provided at one end with a T-shaped head and at its other end with a socket receiving the head of the next member of the series, one of the terminal members of the core being connected to the stem, a se-

ries of substantially spherical, tubular, members fitted over the core and each having a recess receiving a portion of the next section, and means connected to the other terminal core member for retaining the tubular members on the core and in nested relation.

3. A tube bending mandrel comprising a rigid stem, a flexible portion formed by a series of tubular, substantially spherical shaped, sections, each having a recess receiving a portion of the next section of the series, a core connected to the stem and extending through all of said sections and including a series of members each provided at one end with a head connected to the body by a reduced neck and at its other end with a socket receiving the head and neck of the next member of the series, and means at the free terminal of the core for retaining the core members in engaged relation.

4. A tube bending mandrel comprising a series of tubular, nested, sections, a series of couplers fitting the bores of said sections and each having at one end a projecting T-shaped head and at its opposite end a corresponding socket receiving the head of the next coupler of the series, and means engaging one of the couplers for holding the tubular sections in nested relation.

5. A tube bending mandrel comprising a series of substantially spherical, tubular, sections, each being recessed to effect a nesting of the several sections, and a series of couplers fitted to the bores in the sections and each provided at one end with an integral head, connected with its body by a reduced neck, and at its other end with a socket shaped to receive the head and neck of the next coupler of the series.

6. A tube bending mandrel comprising a series of tubular, substantially spherical, nested, sections, and a flexible core formed of a series of members, each including a body of substantially the transverse dimensions of the bore of the section in which it is arranged, said body having at one end a head connected with the body by a reduced neck and having an end face approximately parallel with the exterior surface of the surrounding section, each body having at its other end a socket to receive the head of the next core member, and means for maintaining the outer sections on the core.

7. A tube bending mandrel comprising a rod or stem, a series of tubular, substantially spherical, sections, each having a recess receiving an end of the stem or a portion of the next succeeding section of the series, and a core attached to the stem and extending through all of said sections, said core being composed of a plurality of members connected to maintain rigid contact between the several tubular sections in the direction of the length of the rod or stem while permitting relative lateral movement between said sec-

tions, the spherical sections being removable without affecting the connection between the core members and the latter being separable by relative movement when the spherical sections have been detached.

5 8. A tube bending mandrel comprising a rigid stem, a flexible core attached at one end to the stem, and including a plurality of members connected to prevent separation in
10 the direction of the length of the core and free to move laterally relative to each other, a series of tubular, spherical shaped, sections, independent of the connection between the members of the core surrounding the core and
15 each having a recess receiving a portion of the next section of the series, and means engaging the terminal core member for retaining the exterior sections in nested relation, said sections being removable without affect-
20 ing the connection between the core members and the latter being separable by relative lateral movement when the spherical sections have been detached.

25 9. A tube bending mandrel comprising a rigid stem, a flexible core attached at one end

to the stem and terminating in a threaded portion, said core including a series of members connected by means maintaining a rigid connection between the members in the direction of the length of the core while permitting
30 relative lateral movement between said members and which connection may be broken by relative lateral movement of the core members, a series of tubular, spherical shaped, sections independent of the core and the con-
35 nection between the members thereof, fitted over the core and each having a recess receiving a portion of the next section of the series, and a nut engaging the terminal core member and holding said exterior sections in nested
40 relation.

In testimony whereof, we, PHILIP MUELLER and HELENA SCHUERMANN, executrix of the last will and testament of ANTON C. SCHUERMANN, deceased, have hereunto set our hands. 45

PHILIP MUELLER.

HELENA SCHUERMANN,

Executrix of Anton C. Schuermann, deceased.