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(54) **POSITIONING MACHINE TO POSITION AN INNER PIPE OF A DOUBLE PIPE COIL FOR HEAT EXCHANGERS**

(57) A machine (1) to position an inner pipe (7) of a coil (5) for heat exchangers, for instance a gas boiler or the like, the coil (5) comprising an outer pipe (6) wherein such inner pipe (7) is inserted, said outer pipe (6) having free ends (11, 13) from which corresponding free ends (12, 14) of the inner pipe (7) project; said machine comprises support means (16, 23) and constraining means (19, 26) to support and constrain said coil respectively and pusher means (42) movable according to an alternating motion to and from a free end (12, 14) of the inner pipe (7) that is opposite thereto, said pusher means (42) cooperating alternatively with such ends (12, 14) so as to displace at least one section of the inner pipe (7) adjacent thereto and located in the outer pipe (6) close to a wall of said outer pipe adjacent to the end (11, 13) of the latter from which projects the end (12, 14) of the inner pipe which said pusher means (42) cooperate with.

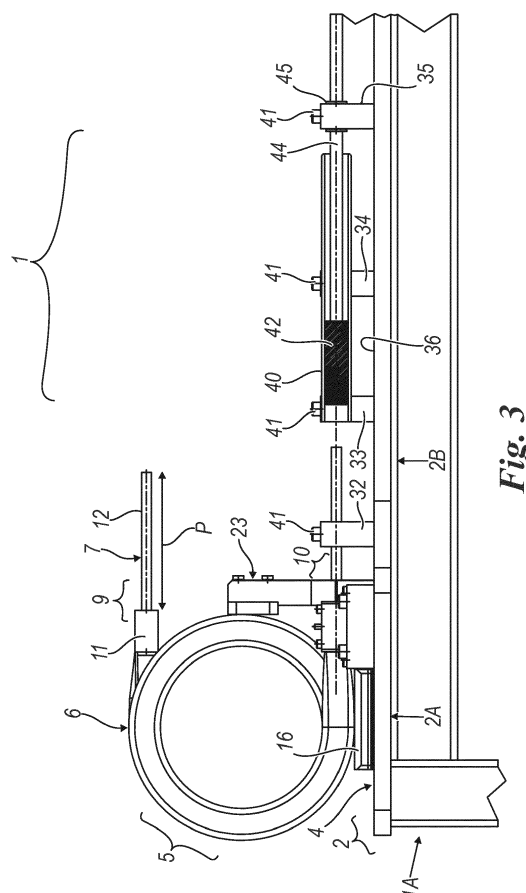


Fig. 3

Description

[0001] The object of the present invention is a positioning machine used to position an inner pipe of a double pipe coil for heat exchangers, according to the preamble of the main claim.

[0002] Coils of the "pipe-in-pipe" type for heat exchangers or coils having an outer pipe (or first pipe) with an inner pipe (or second pipe) inserted therein are known and used for long time: sanitary water from a room where the heat exchanger is installed flows through the inner pipe, whereas the water directed to heating elements of a heating plant located in such room flows through the outer pipe.

[0003] Usually, the inner pipe is more or less coaxial to the outer pipe, so as to determine a free section of the latter having a cross-section that is substantially constant from one end to the other of the second pipe. However, such feature entails the possibility that a limestone deposit is formed in the second pipe, along its inner wall which, over time, might prevent a normal and unobstructed flow of water towards said heating elements.

[0004] A purpose of the present invention is to offer a machine that allows to automatically obtain a coil of the pipe-in-pipe type mentioned above, wherein the formation of limestone is at least partially reduced at least in correspondence with its opposite ends (i.e. in the turns closest to such ends).

[0005] Another purpose is to offer a machine that allows to obtain coils of said type that feature all geometrical and functional characteristics, so as to make sure that all of them exhibit the same "cleanliness" from limestone.

[0006] A further purpose is to offer a machine of the mentioned type that is easy to use by an operator.

[0007] These purposes and others which will be apparent to those skilled in this sector are achieved by a machine according to the attached claims.

[0008] For a better understanding of the present invention, the following drawings are attached for merely explanatory, not limitative purposes, wherein:

figure 1 is a perspective view of a first side of a machine according to the invention;

figure 2 is a perspective view of another side of the machine of figure 1; and

figure 3 is a side view of the machine depicted in figure 1.

[0009] With reference to the mentioned figures, a machine according to the invention is generally identified by the reference numeral 1 and comprises a base 1A having a worktop 2 having a first and a second work zones 2A and 2B arranged orthogonally to each other. The former work zone 2A has a plane 4 suitable for supporting a coil 5 for a heat exchanger comprising, in a known manner, a first pipe (or outer pipe) 6 and a second pipe 7 internal to the former. The coil has a plurality of turns 8 and free

ends 9 and 10.

[0010] In correspondence with a first end 9 of the coil 5 there is provided a first end 11 of the outer pipe 6, from which a first end 12 of the second pipe or inner pipe 7 comes out; in correspondence with said second end 10 there are provided a second end 13 of the first outer pipe 6 and a second end 14 of the second pipe or inner pipe 7. The first and the second ends 12 and 14 of the inner pipe project from the outer pipe 6 by a short section P.

[0011] The machine 1 comprises, on a plane 4, a support or seat 16 suitable for receiving the coil 5 in such a way that the pipes 6 and 7 are arranged (in the embodiment depicted by the figures) along the second work zone 2B and the second pipe 7 projects, with both of its free ends 12 and 13 along or parallel to such zone. Next to the seat 16 there is provided a locking device 18 which locks the coil 5 comprising a movable piston 19 having a head 20 with such a circular hollow 21 as to make it possible its coupling with the end 11 or 13 of the outer pipe 6 present close to the plane 4. A frame 23, rising from such plane and having a through hole 24, receives in a through passing mode the second pipe 7 which, as already said above, extends onto the second work zone 2B.

[0012] The movable piston 19 is subjected to a (hydraulic, pneumatic, or hydropneumatic) actuator 25 which is located on the plane 4 and moves such piston 19 towards a fixed striker plate 26 integral to the first work zone 2A and preferably having a seat whose shape corresponds to that of the pipe 6, so as to receive the latter and hold it locked in cooperation with the piston 19 (like a vice). The piston 19 supports a pivot 29 which is movable in a guide 30 of a support 31 integral to the plane 4 and fixed thereto, such pivot 29 making it possible a correct guided movement of such piston.

[0013] On the second work zone 2B and more specifically on a plane 36 thereof there is present a plurality of parallelepiped blocks 32-35 spaced away from each other and each provided with a through hole 38. The end 12 or 14 of the inner pipe, as better explained below, is arranged and locked, upon locking the first pipe on the plane 4, within the hole 38 of the first block 32 at a certain distance from the block 33, whereas a sheath or cylinder 40 is inserted in and fixed by bolts 41 in the holes 38 of the blocks 33 and 34. In such sheath is movably located a piston 42 integral to a rod 44 passing through a bushing 45 located in the hole 38 of the block 35 and operated by a (pneumatic, hydraulic or hydropneumatic) pusher 46 movable in a cylinder 47 fixed to the plane 36.

[0014] This way, an operator puts the coil 5 in a first position wherein (as shown in the figures) its end 10 is close to the second work zone 2A and the inner pipe 7 projecting from the outer pipe 6 enters the hole 38 of the block 32, coaxial to the piston 42.

[0015] Then the pusher 46 is actuated which, by way of an alternating movement (i.e. by first approaching and then moving away from) hits the end 14 of the pipe 7, and then comes back to the position shown in figure 3

wherein, in a partial cross-section view, it is represented inside the sheath or cylinder 40. Thanks to the hit undergone, the inner pipe 7 moves within at least the turns 8 of the coil 5 close to the end 10 of the latter, said displacement taking place in such a way as to make such pipe approach the inner wall of the outer pipe 6 and move it from a position substantially along the axis of the latter.

[0016] A this point, the operator operates the actuator 25 (for instance, a double effect actuator) which disconnects the piston 19 from the pipe 6, thus freeing the coil. The operator rotates the latter in order to bring the other end 9 of the latter close to the work zone 2B, while inserting the first end 12 of the inner pipe 7 within the hole 38 of the block 32; then the actuator 25 is operated, which moves the piston 19 towards the first pipe or outer pipe 6 which is thus viced onto the fixed striker plate 26.

[0017] This operating step is followed by a new operation of the alternating movement (single approaching stroke to and disconnection from the pipe 7) of the piston 46 which hits the inner pipe and consequently modifies its position, within at least the turns 8 close to the first end 9 of the coil 5, within the outer pipe 7.

[0018] The coil can be definitively disconnected from the machine 1 for a subsequent and known machining and/or use.

[0019] Thanks to this invention, it is possible to calibrate and make it uniform the force whereby the piston 46 hits the inner pipe 7, which consequently moves within the end of the coil, always in the same manner, and gets close to the inner wall of the first pipe 6. This allows to bring such second pipe or internal pipe 7 closer to the axis of the coil 5 where, in the use of the heat exchanger for example in a domestic boiler, a usual gas burner is installed. It follows that the sanitary water that flows in the inner pipe is more heated with respect to what happens in the case that the pipe 7 is located along the axis of the outer pipe 6 and this makes it possible to prevent formation of limestone therein as well as to prevent sudden heat peaks from taking place inside that pipe.

[0020] The invention makes it possible an automatic repetitiveness of the operation whereby the inner pipe is positioned in the outer pipe and a constant outcome for such operation. All of this without requiring an operator's intervention, but for positioning the coil on the machine 1.

[0021] It goes without saying that other variants of the invention are possible in the light of the previous description which fall in the scope of the following claims.

Claims

1. A machine (1) to position an inner pipe (7) of a coil (5) for heat exchangers, for instance a gas boiler or the like, the coil (5) comprising an outer pipe (6) wherein such inner pipe (7) is inserted, said outer pipe (6) having free ends (11, 13) from which corresponding free ends (12, 14) of the inner pipe (7) come out, said machine being **characterized in that it**

comprises support means (16, 23) and constraining means (19, 26) to support and constrain said coil respectively and pusher means (42) movable according to an alternating motion to and from a free end (12, 14) of the inner pipe (7) that is opposite thereto, said constraint means (19, 26) comprising vice means suitable for tightening a free end (11, 13) of the outer pipe (6) corresponding to said end (12, 14) of the inner pipe, said pusher means (42) cooperating alternatively with such ends (12, 14) of the inner pipe (7) so as to displace at least one section of the inner pipe (7) adjacent to said end (12, 14) and located in the outer pipe (6) close to a wall of said outer pipe adjacent to the end (11, 13) of the latter held locked by the vice constraint means (19, 26) and from which projects the end (12, 14) of the inner pipe which said pusher means (42) cooperate with.

2. A machine according to claim 1, **characterized in that** the support means comprise a seat (16) suitable for supporting the coil (5) and a frame (23) rising above a flat part of the machine (1) and provided with a through hole (24) suitable for receiving in a through passing mode the end (12, 14) of the inner pipe (7) which projects from the outer pipe (6) and is capable of cooperating with the pusher means (42), the vice constraint means comprising a movable member (19) and a fixed strike plate (26) suitable for vicing the free end (11, 13) of the outer pipe (6).
3. A machine according to claim 2, **characterized in that** the flat part of the machine (1) comprises a first work zone (2A) suitable for supporting the coil (5) and a second work zone (2B) suitable for supporting the pusher means (42), the work zones (2A, 2B) being supported by a base (1A) of the machine (1).
4. A machine according to claims 2 and 3, **characterized in that** the movable member of the constraint means is a piston (19) subjected to an actuator (25) integral to the first work zone (2A), said piston having a head (20) suitable for coupling with the outer pipe (6) of the coil in a form coupling mode to press it against the fixed striker plate (26) and to vice it, such fixed striker plate (26) having a seat suitable for receiving said outer pipe (6) in a form coupling mode.
5. A machine according to claims 1 and 3, **characterized in that** the pusher means (42) are a piston movable in a sheath or cylinder (40) integral to the second work zone (2B), said movable piston being subjected to the action of an actuator (46, 47) fixed to such second work zone (2B), said actuator preferably comprising a pusher (46) movable in a cylinder (47) integral to said work zone.
6. A machine according to claim 5, **characterized in**

that such sheath or cylinder is supported by blocks (33, 34) rising above the second work zone, a further block (35) movably supporting the pusher (46), another block (32) having a hole (38) wherein the end (12, 14) of the inner pipe (7) is inserted suitable for cooperating with said movable piston.

7. A machine according to claim 3, **characterized in that** the work zones (2A, 2B) are arranged orthogonally to each other.

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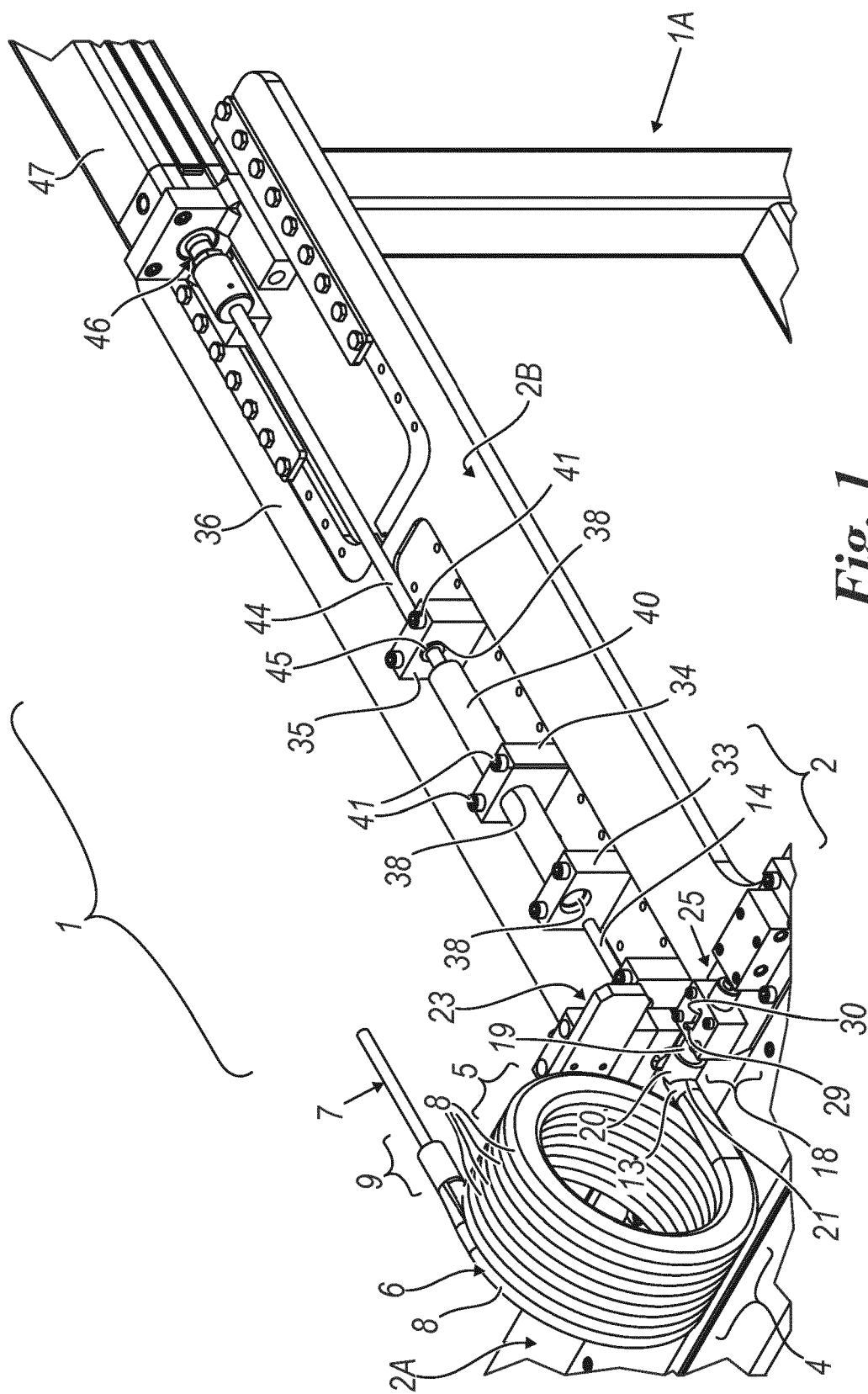
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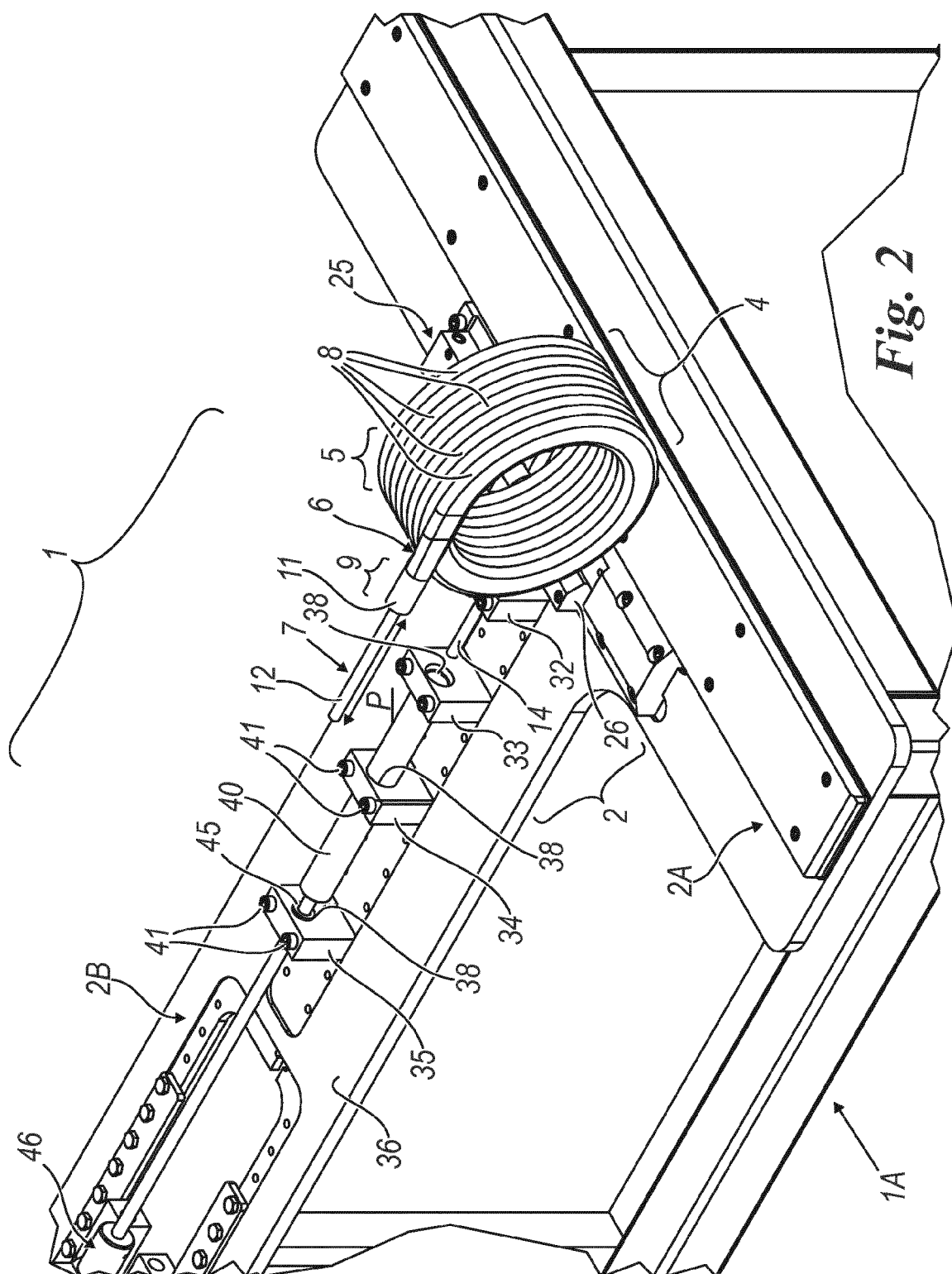
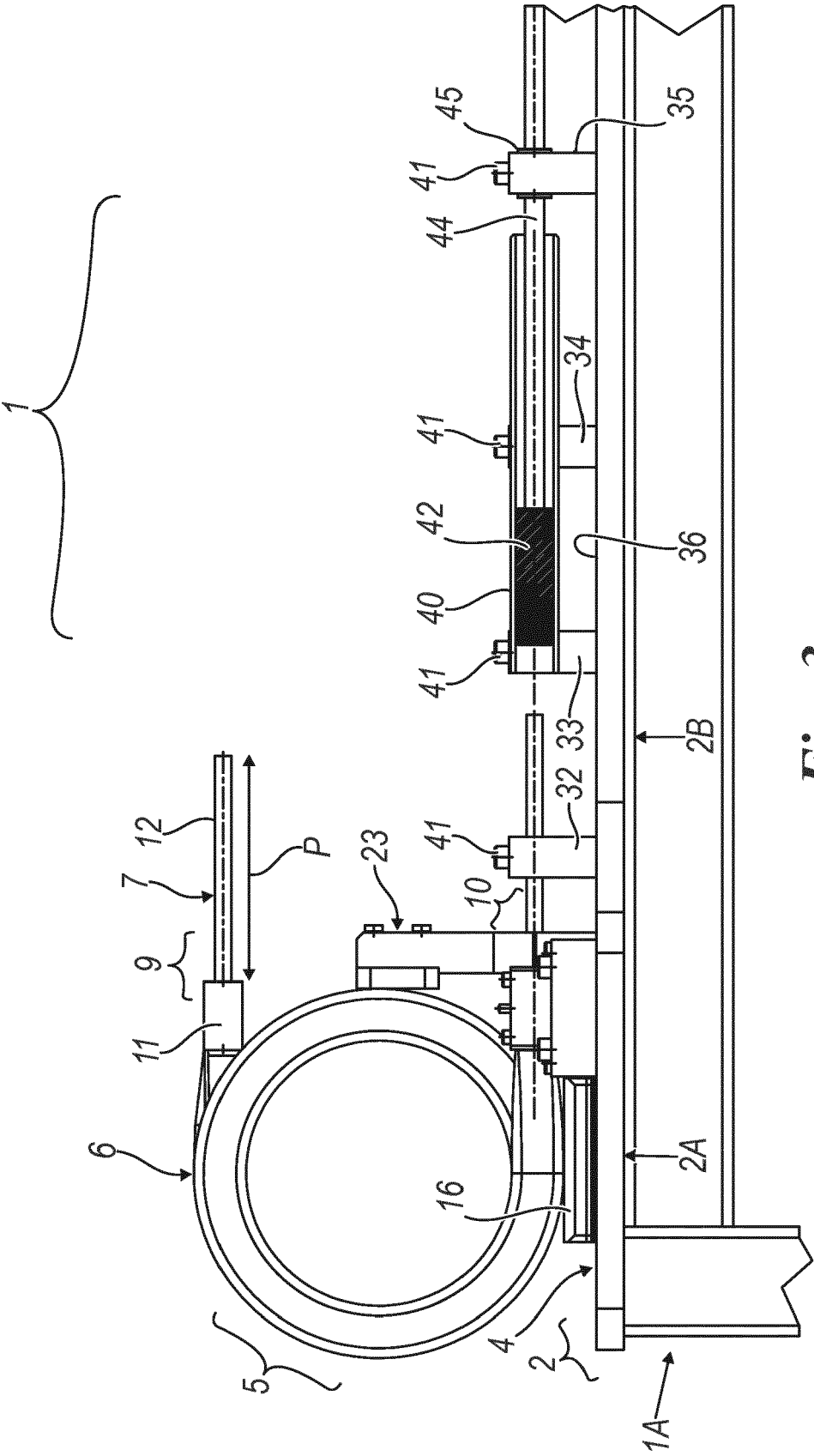


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 15 17 7219

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		12 November 2015	Vinci, Vincenzo
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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