Feb. 6, 1951 B. F. KELLEY 2,540,451

PIPE ALIGNING DEVICE

Filed April 13, 1946 2 Sheets-Sheet 1

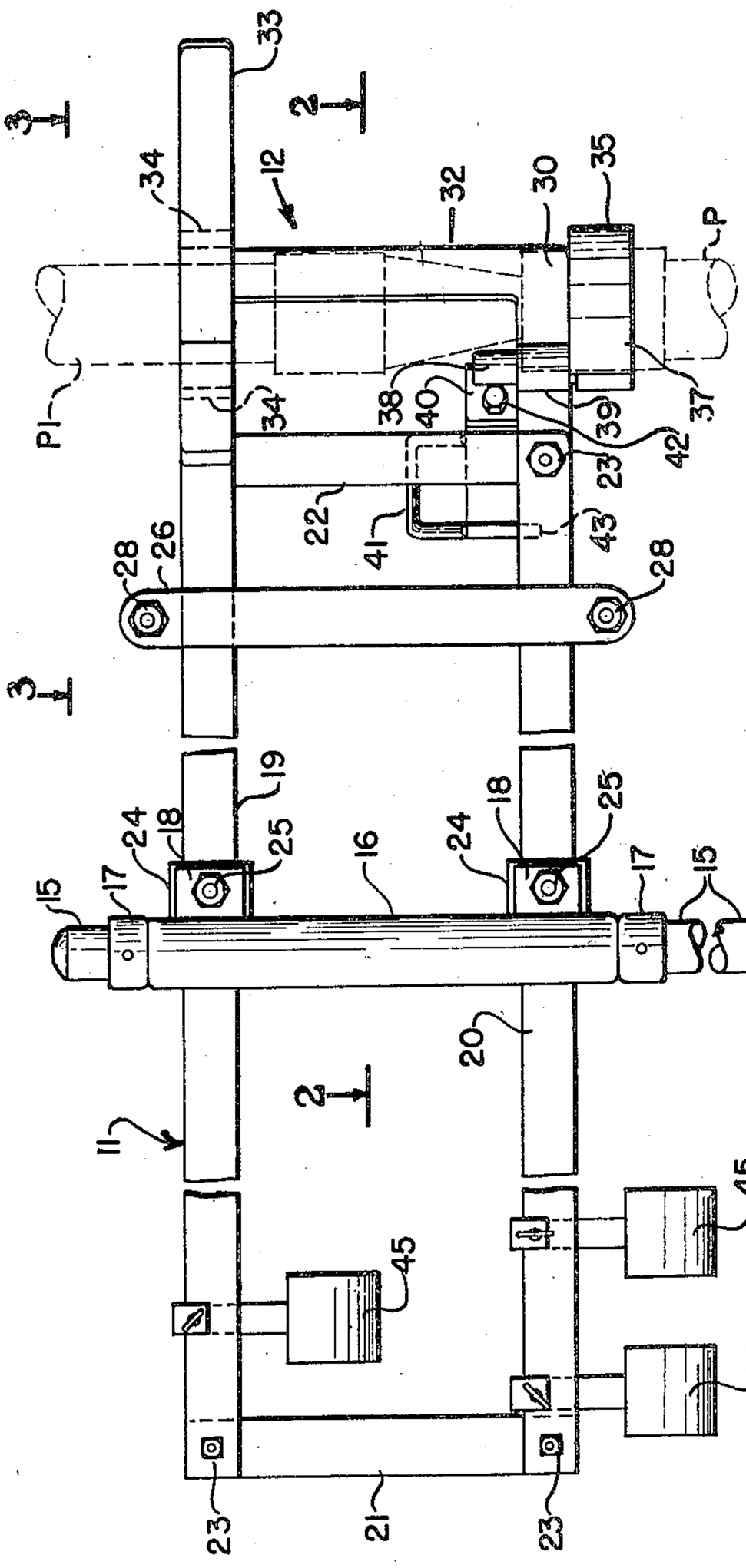


FIG. 1

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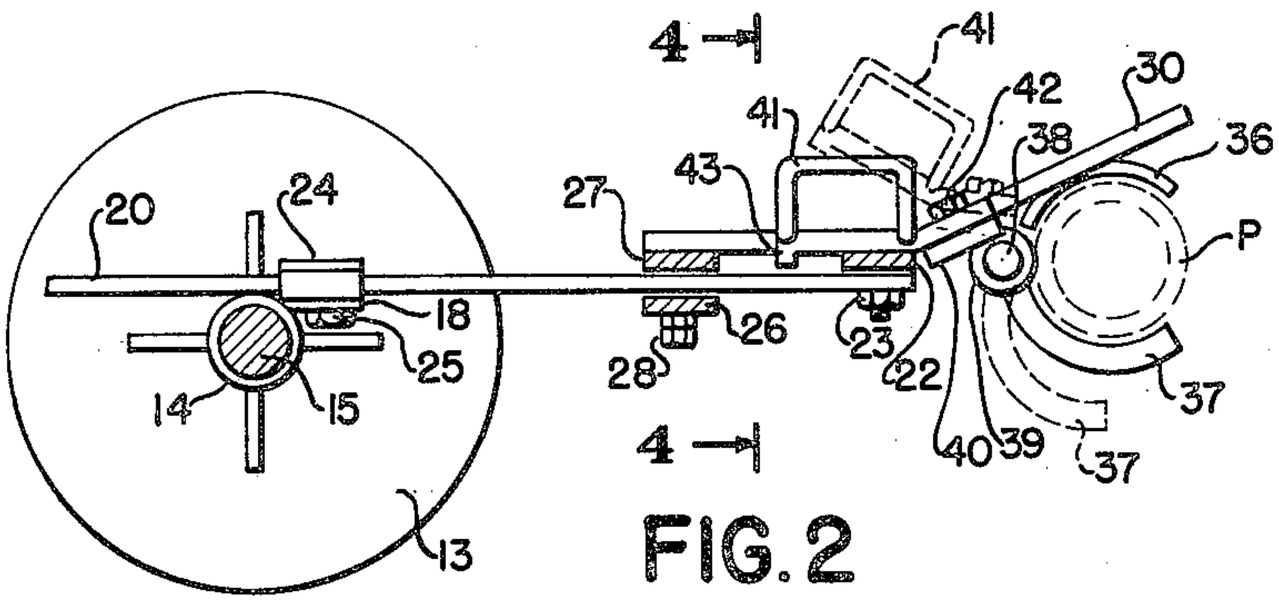
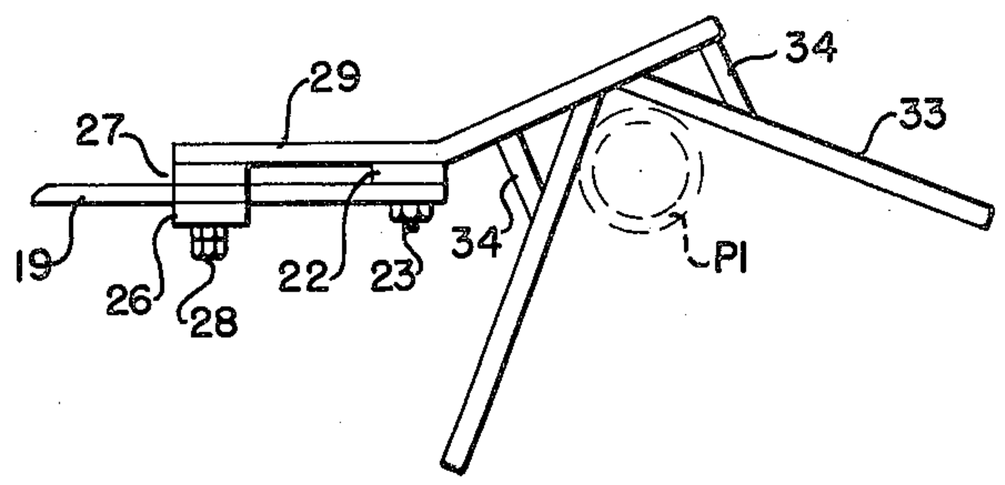



FIG. 2



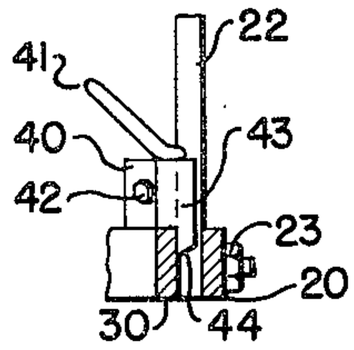




FIG. 4

FIG. 3

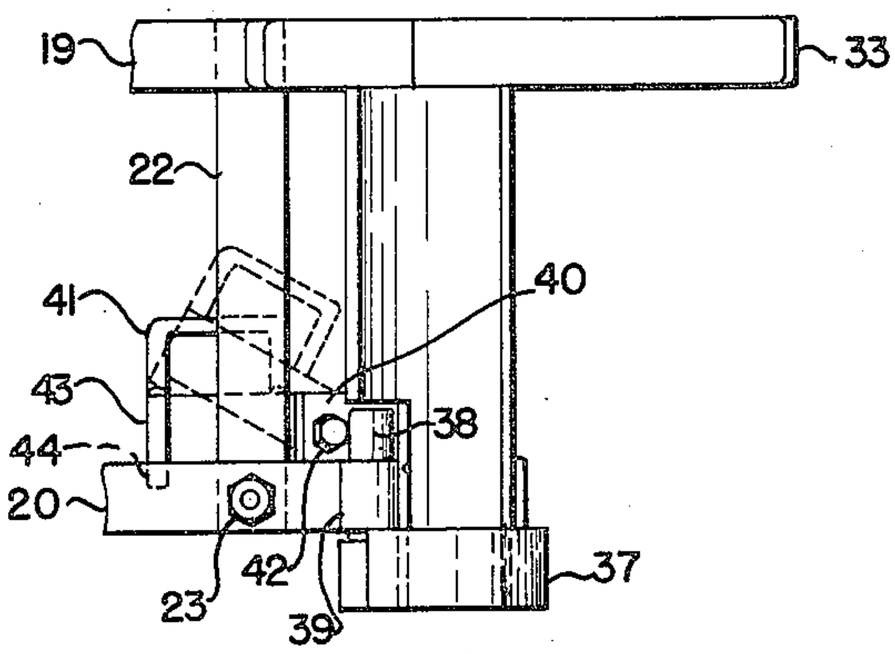



FIG. 5

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# UNITED STATES PATENT OFFICE

2,540,451

## PIPE ALIGNING DEVICE

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Application April 13, 1946, Serial No. 661,974

5 Claims. (Cl. 255—1)

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This invention relates to a pipe aligning device, and particularly to such a device for aligning pipe sections being run into a well.

In the drilling of wells, particularly by the rotary method, and in the casing and tubing operations connected therewith, long strings of pipe are employed which are normally and necessarily made up by joining together successively a series of pipe sections, the ends of which are normally equipped with complementary threaded ends, which are screwed together to make up the string. During such operations, particularly when a string is being made up, the portion in the well is normally suspended in vertical position by suitable support means at the top of the well and firmly held against rotation or other movement. The pipe section to be added is normally attached to a flexible cable supported in a derrick mounted over the well, and is swung thereby into a vertical position over the end of the pipe string in the well and its lower end, usually carrying the male threaded end or pin, is then guided manually by workmen into proper position to engage the female threaded coupling or box on the upper end of the pipe string in the well.

Due to the fact that the added pipe section is usually from thirty to one hundred feet in length, and generally of very heavy weight, the momentum developed in the free end of the pipe section while being swung into position by the hoisting cable creates considerable physical hazard to the workmen engaged in making up the pipe string, and in considerable difficulty and loss of time in obtaining the necessary exact alignment of the threaded ends of the pipe sections required to make up the sections smoothly and quickly and to avoid damage to the threads on the ends of the sections as they are being aligned.

Accordingly, it is a principal object of this invention to provide a simple, effective pipe aligning device which is relatively automatic in its control of the alignment of pipe sections to be joined and which is safe to operate and cheap to construct. Other and more specific objects and advantages of this invention will be apparent from the following detailed description when read in conjunction with the accompanying drawing which illustrates useful embodiments in accordance with this invention.

In the drawings:

Fig. 1 is a side elevation of a pipe aligning device in accordance with this invention, showing in broken lines the related positions of the ends of pipe sections as aligned by the device for joining;

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Fig. 2 is a top sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a top view along line 3—3 of Fig. 1;

Fig. 4 is a detail of one of the elements of the device; and

Fig. 5 is a detail of an aligning head in accordance with another embodiment of this invention.

Referring to the drawings, the device in accordance with this invention comprises a support member, generally designated by the numeral 10, which rotatably and pivotally supports an arm member, designated generally by the numeral 11, which carries at one end thereof a pipe aligning head structure, designated generally by the numeral 12.

As illustrated in the drawings, support member 10 includes a base plate 13 adapted to be rigidly connected to a suitable support structure such as the derrick floor or some other fixed portion of the well equipment adjacent the well. A tubular socket 14 is vertically mounted in the center of base plate 13. A shaft 15 is mounted in socket 14 and extends vertically therefrom. A tubular sleeve 16 is mounted on shaft 15 between a pair of set collars 17, which may be vertically adjusted along shaft 15 to raise and lower sleeve 16 thereon as may be desired. A pair of vertically spaced perforated lugs 18 are rigidly fastened to sleeve 16 and extend laterally therefrom.

Arm member 11 comprises a pair of spaced parallel bars 19 and 20 connected at their opposite ends to parallel cross members 21 and 22 by means of bolts 23. The bolted connections of cross members 21 and 22 to the ends of bars 19 and 20 are such as to provide relative movement between the bars and cross members about the connections therebetween. A sleeve 24 is mounted on each of the bars 19 and 20 intermediate their ends and the sleeves 24 are adapted to be pivotally bolted at 25 to lugs 18. With this arrangement it will be seen that arm 11 will thus pivot in a vertical plane about lugs 18 and, through the attachment of lugs 18 to sleeve 16, will also rotate about shaft 15 in a generally horizonal plane. Bars 19 and 20 are enclosed between a pair of parallel bars 26 and 27, the opposite ends which extend above and below bars 19 and 20 and are bolted together at 28. This arrangement of bars 26 and 27 functions to prevent twisting of the members forming arm 11, while, at the same time, permitting free movement of bars 19 and 20 between bars 26 and 27 in the vertical plane.

Aligning head 12 comprises a pair of parallel bars 29 and 30 forming extensions over-

lapping the ends of bars 19 and 20, respectively, and rigidly connected to bars 22 and 27

The opposite ends of bars 29 and 30 are rigidly connected together by means of a cross member 32 to impart rigidity to the head structure. Bars 29 and 30 are also bent at a slight angle relative to the plane of bars 19 and 20.

Bar 29 carries a generally V-shaped pipe aligning guide member 33, horizontally disposed and having its apex adjacent one face of bar 29, the arms of the V being rigidly connected to bar 29 by means of spacers 34. The included angle of the V is preferably a right angle.

Bar 30 has mounted thereon a second pipe aligning member, designated generally by the numeral 35, and comprising a generally circular clamp, having a stationary segment 36, which is rigidly connected to bar 30, and a movable segment 37. The latter has one end fastened to a shaft 38, journaled in a bearing 39 mounted on bar 30. The opposite end of shaft 38 is connected to an arm 40 to which an operating handle 41 is connected by means of a bolt 42 which permits handle to pivot about arm 40 in a vertical plane. Handle 41 carries a depending finger 43, the lower end of which preferably has an upwardly sloping face 44 which is adapted, when handle 41 is moved to the position to close the clamp formed by segments 36 and 37, to engage the upper rear edge of bar 30 and, as pressure is applied in moving handle 41, to slide up over the upper edge of bar 30, the handle pivoting vertically about bolt 42, and to drop into the space between the ends of bars 20 and 30, thereby locking handle 41 and its connected segment 37 in the closed position. When it is desired to unlock the clamp, an upward pull on handle 41 will lift finger 43 out of the space between bars 20 and 30 and permit rotation of handle 41 to open the clamp.

To assure proper alignment of the pipe sections, guide member 33 is so positioned relative to clamp 35 that the vertical axis of clamp 35 will lie in a plane bisecting the angle included in guide member 33.

A plurality of counter-balance weights 45 are slidably mounted on the ends of bars 19 and 20 opposite aligning head 12 to balance the weight of the latter when it is being moved into and out of position for aligning pipe sections, thereby reducing the manual effort required and making for increased speed and smoothness of operation.

Fig. 5 illustrates a somewhat modified form of aligning head structure in that segment 36 is replaced by an arcuate trough 46, the upper end of which is rigidly fastened to bar 29 beneath guide member 33 and the lower end of which extends below bar 30, to which it is fastened, and forms the stationary segment corresponding to segment 36 of the previously described embodiment.

The aligning device is employed in the following manner: With clamp 35 open, handle 41 being swung in the clockwise direction to open the clamp, arm 11 is swung toward the end of a pipe section P which may be suspended in a well, until segment 36 rests against the end of the pipe. The level of segment 36 will have been previously adjusted to contact either the box or collar on the end of the pipe or the pipe itself below the collar, whichever position is preferred by the operator. Handle 41 is then swung sharply in the anti-clockwise direction, closing movable segment 37 around the end of the pipe. As this



occurs finger 43 on handle 41 will slip over bar 30, thereby locking clamp 35 about the end of the pipe. This operation fixes the position of the aligning head for reception of the end of a pipe section $P_1$ which will be swung from the derrick (not shown) and as the end of the suspended pipe enters the mouth of guide member 33 it will be automatically guided into properly aligned position over the end of pipe P into which it will then be lowered to engage the threads of the complementary pin and box members.

When the joint is made up, handle 41 is pulled up to release finger 43 and swung in the clockwise direction to open clamp 35. The aligning structure is then rotated about shaft $15^a$ sufficient distance to clear the pipe, and the string of pipe with the added section $P_1$ is lowered into the well until the upper end of section $P_1$ is in position to receive the next joint of pipe, whereupon the operations of the pipe aligning device, as above described, are repeated for aligning the next joint and the whole sequence repeated as often as required for making up the entire string of pipe.

It will be understood that the aligning structure herein described may be used for aligning pipe sections which are to be welded, rather than screwed together.

Through the use of the double-hinged arm 11, of the form illustrated, the vertical position of the aligning head can be readily and speedily adjusted to the varying heights above the well head of the end of the pipe in the well, without changing the vertical alignment of the upper and lower aligning members.

To accommodate the aligning device to pipes of different sizes, the segments 36 and 37 may be replaced by other segments, the radii of which appropriately correspond to the outside diameter of the pipe to be handled.

Various alterations and changes may be made in the details of this invention without departing from the scope of the appended claims but within the spirit of this invention. For example, the aligning head may be arranged to be clamped to a stationary portion of the well structure adjacent the pipe in the well, rather than to the joint of pipe itself, and the position of the upper aligning guide altered correspondingly to effect pipe alignment in the manner described.

What I claim and desire to secure by Letters Patent is:

1. A pipe aligning device, comprising, a vertical support member, an arm member pivotally connected to said support member to swing thereon in horizontal and vertical planes, a head member mounted on one end of said arm member and pivoted thereon for movement in a vertical plane, a segmental clamp mounted on said head member for releasably clamping the head member to one of two pipes to be axially aligned, and a guide member rigidly mounted on said head member in vertically spaced relation to said clamp, said guide member being open at one side and having side walls converging inwardly from said open side shaped to guide the second of said pipes into axial alignment with the first pipe when the second pipe is swung laterally into the open side of said guide member.

2. A pipe aligning device, comprising, a vertical support member, an arm member pivotally connected to said support member to swing thereon in horizontal and vertical planes, a head member mounted on one end of said arm member and pivoted thereon for movement in a vertical

plane, a segmental clamp mounted on said head member including complementary arcuate segments hinged at one side to releasably embrace one of two pipes to be axially aligned, and a guide member rigidly mounted on said head member in vertically spaced relation to said clamp, said guide member being open at one side and having side walls converging inwardly from said open side shaped to guide the second of said pipes into axial alignment with the first pipe when the second pipe is swung laterally into the open side of said guide member.

3. A pipe aligning device, comprising, a vertical support member, an arm member pivotally connected to said support member to swing thereon in horizontal and vertical planes, a head member mounted on one end of said arm member and pivoted thereon for movement in a vertical plane, a segmental clamp mounted on said head member including complementary arcuate segments hinged at one side to releasably embrace one of two pipes to be axially aligned, and a V-shaped guide member rigidly mounted on said head member in vertically spaced relation to said clamp, said guide member having its arms converging at equal angles to a plane extending through the vertical axis of said clamp whereby to guide the second of said two pipes into axial alignment with the first pipe when said second pipe is inserted between the arms of said guide member.

4. A pipe aligning device, comprising, a vertical support member, an arm member pivotally connected to said support member to swing thereon in horizontal and vertical planes, a head member mounted on one end of said arm member and pivoted thereon for movement in a vertical plane, a segmental clamp mounted on said head member for releasably clamping said head member to one of two pipes to be axially aligned, said clamp including a pair of complementary arcuate segments, one of which is fixedly attached to said head member and hinged to the other, a handle connected to the movable segment for moving the latter into clamping engagement with said one pipe, releasable latching means carried by said handle and engageable with said head member for locking the handle thereto when the



movable segment is in the closed position, and a guide member rigidly mounted on said head member in vertically spaced relation to said clamp, said guide member being open at one side and having side walls converging inwardly from said open side shaped to guide the second of said pipes into axial alignment with the first pipe when the second pipe is swung laterally into the open side of said guide member.

5. A pipe aligning device, comprising, a vertical support member, an arm member pivotally connected to said support member to swing thereon in horizontal and vertical planes, said arm member comprising a pair of vertically spaced parallel arm elements, a pair of parallel cross bars pivotally connected to the opposite ends of said arm elements, a head member connected to one of said cross bars, vertically spaced pipe aligning elements mounted on said head, one of said aligning elements comprising a segmental clamp for releasably clamping said head member to one of two pipes to be axially aligned, and the other of said aligning elements comprising a V-shaped guide member having its arms converging at equal angles to a plane extending through the vertical axis of said clamp whereby to guide the second of said two pipes into axial alignment with the first pipe when said second pipe is inserted between the arms of said guide member.

BENJAMIN F. KELLEY.


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