downwardly sloped outer surface; and a compression ring, mountable on the gripper and having a forwardly and upwardly sloped inner surface for engaging the gripper sloped outer surface whereby, if the compression ring is urged forwardly, it impels the gripper ring downwardly into tight frictional engagement with the pipe.

[0009] Preferably, a set of axially extending threaded bolts connect the front plate and second clamp means and threaded nuts, abutting the front surface of the front plate and the back surface of the second clamp means, may tighten the front plate against the pipe end face and actuate the second clamp means.

[00010] Preferably, the back plate is dimensioned to have an annular clearance relative to the inner surface of the pipe.

[00011] From the foregoing it will be understood: that increasing pressure within the bore of the pipe will push on the back plate when it abuts the front plate to increase compression and sealing of the seal means; that the slidable back plate preferably has a circumferential clearance with the pipe's inner surface so as to avoid scoring it and the stem functions to centralize the plate; that the first clamp means provides an anchoring function which enables the set of axial bolts and nuts to both draw the front plate into abutment with the end face of the pipe and to pull the compression ring forwardly along the gripper to thereby actuate the second clamp means into frictional engagement with the pipe; and that two distinct clamping actions are implemented within the length of a single set of axial bolts.

[00012] In another embodiment, the invention is concerned with a tool for closing and sealing an open end of a pipe, said tool having front and back ends, said pipe having an end face, a bore, an end opening and inner and outer surfaces, said tool comprising, in combination: an external front plate for extending across and abutting the pipe end face to form an annular interface therewith, said front plate having a flange extending beyond the pipe outer surface; said front plate having a central aperture extending through it; a clamp means for extending around, clamping onto and frictionally engaging the pipe outer surface to anchor said clamp means thereto; means, connecting the front plate and clamp means, for drawing the front plate into tight engagement with the pipe end face; a movable back plate for positioning with clearance within the bore of the pipe so as to

extend transversely thereof, said back plate carrying an annular, deformable, resilient seal means at its front end for sealing the interface; said back plate further having a forwardly projecting stem for slidably extending through the aperture; said back plate and stem forming a unit which is movable in use so as to deliver the seal means to the interface and compress it against the front plate and pipe inner surface to seal the interface; and disengagable means, mountable on the stem for biasing the unit into sealing position and locking it in said position.

Description of the Drawing

[00013] Figure 1 is a sectional side view of the tool;

[00014] Figure 2 is a perspective view of the tool of Figure 1; and

[00015] Figure 3 is an exploded view of the tool.

Description of the Preferred Embodiment

[00016] The invention provides a mechanical assembly or tool 1 for closing and sealing the open end 2 of a pipe 3 which is, for example, to undergo hydraulic pressure testing.

[00017] In general outline, the tool 1 comprises: a front plate 4 for closing the opening 5 at the end 2 of the pipe 3; a split, flanged, bolted first clamp 6 adapted to extend around the pipe 3 and operative when tightened to frictionally engage the pipe's outer surface 7 and to provide an anchoring function; a second clamp 8, positioned rearwardly of and abutting the first clamp 6, for also frictionally engaging the pipe's outer surface 7; several axially extending threaded bolt and nut assemblies 11; each assembly 11 having a bolt 9 extending through and connecting the front plate 4 and first and second clamps 6, 8 and nuts 10 for biasing the front plate 4 into abutting relation with the end face 12 of the pipe 3, to thereby form an interface 13; the nut and bolt assemblies 11 further function to actuate the second clamp 8, as described below; a movable back plate 40 is positioned within the bore 41 of the pipe 3 and oriented transversely relative to the pipe axis; the front end 42 of the back plate 40 is configured to carry an annular seal 43 for sealing the interface 13; a stem 45 slidably extends forwardly from the back plate 40

through a central aperture 16 extending axially through the front plate 4; a nut 46 threads on the stem 45 and functions to draw the back plate 40 toward the front plate 4 so that the seal 43 is compressed against the front plate 4 and pipe inner surface 22 so as to seal the interface 13; and a passageway 47 extends through the stem 45 and back plate 40 for delivery of pressure testing fluid into the bore 41 of the pipe 3.

[00018] In greater detail, the tool 1 comprises an externally positioned front plate 4 adapted to extend across and close the pipe opening 5. The diameter of the front plate 4 is greater than that of the pipe 3, so as provide a peripheral outer flange 14. A series of spaced apart bolt holes 15 extend through the flange 14, parallel to the axis of the pipe 3. A central aperture 16 also extends axially through the plate 4.

[00019] A split and flanged collar 23 is positioned around the pipe 3. The inner diameter of the collar halves 19 is slightly less than the outer diameter of the pipe 3. Transversely oriented bolt holes 17 extend through the flanges 18 of the collar halves 19. Threaded bolts 20 extend through the flange bolt holes 17. Nuts 21 are threaded onto the bolts 20 and pull the collar halves 19 tightly about the pipe 3 so that they clamp onto and frictionally engage the outer surface 7 of the pipe 3. In sum, the bolted collar 23 provides a circumferential first clamp 6 anchored on the pipe 3.

[00020] A segmental annular gripper ring 25 is mounted about the pipe 3, rearwardly of the collar 23. The inner surface 26 of the gripper ring 25 is flat and conforms to the outer surface 22 of the pipe 3. The outer surface 27 of the gripper ring 25 is downwardly sloped to the rear.

[00021] A compression ring 28 seats on the gripper ring 25. The inner surface 29 of the compression ring 28 is upwardly sloped to the front and conforms with the gripper ring's outer surface 27. A series of bolt holes 30 extend through the compression ring 28.

[00022] As previously stated, bolts 9 extend axially through the bolt holes 17, 30 of the front plate 4 and compression ring 28. Nuts 10, 31 are threaded onto the front and back ends 32, 33 of the bolts 9 and function to draw the front plate 4 into abutting relation with the pipe end face 12 and to urge the compression ring 28 into tight engagement with the gripper ring 25, thereby driving the gripper ring 25 downwardly or radially to frictionally engage the pipe 3.

[00023] Collectively the gripper ring 25, compression ring 28 and nut and bolt assemblies provide a second clamp 8 which may be actuated to deliver a downwardly directed frictional engagement with the pipe 3.

[00024] From the foregoing it will be noted that only two sets of bolts and nuts are used to apply and activate a clamping means 34, comprising a circumferentially acting first clamp 6 and a radially acting second clamp 8.

[00025] A back plate 40 is transversely positioned within the pipe bore 41. The back plate 40 has a clearance 44 with the inner surface 22 of the pipe 4, so that it may move forwardly toward the front plate 4. The front end 42 of the back plate forms an annular seat 48 for receiving and carrying an O-ring seal 43. The seal 43 is resilient and deformable.

[00026] A forwardly projecting stem 45 is connected to the front face 49 of the back plate 40. The stem 45 slidably extends through the central aperture 16 of the front plate 4, so that it is externally accessible. The stem and back plate together form a movable unit 50.

[00027] The outer surface of the stem 45 is threaded. A nut 46 is threaded thereon. The nut 46 functions to draw the back plate 40 forwardly toward the front plate 4, to thereby press the O-ring seal 43 against the front plate 4 and pipe inner surface 22, for sealing the interface 13. The nut 46 further functions to lock the unit 50 in place.

[00028] The stem 45 and back plate 40 may form an internal passageway 47 through which test water may be introduced into the pipe bore 41.

What is claimed is:

1. A tool for closing and sealing an open end of a pipe, said tool having front and back ends, said pipe having an end face, a bore, an end opening and inner and outer surfaces, said tool comprising, in combination:

an external front plate for extending across and abutting the pipe end face to form an annular interface therewith, said front plate having a flange extending beyond the pipe outer surface, said front plate having a central aperture extending through it;

a clamp means for extending around, clamping onto and frictionally engaging the pipe outer surface to anchor said clamp means thereto;

means, connecting the front plate and clamp means, for drawing the front plate into tight engagement with the pipe end face;

a movable back plate for positioning with clearance within the bore of the pipe so as to extend transversely thereof, said back plate carrying an annular, deformable, resilient seal means at its front end for sealing the interface, said back plate further having a forwardly projecting stem for slidably extending through the aperture, said back plate and stem forming a unit which is movable in use so as to deliver the seal means to the interface and compress it against the front plate and pipe inner surface to seal the interface; and

disengagable means, mountable on the stem for biasing the unit into sealing position and locking it in said position.

2. A tool for closing an sealing the open end of a pipe, the tool having front and back ends and comprising, in combination:

an external front plate for extending across and abutting the open end face of the pipe, to form an annular interface therewith;

the front plate having a central aperture extending therethrough and a peripheral flange for projecting radially beyond the pipe outer surface;

an axially movable back plate for transversely positioning within the bore of the pipe, said back plate carrying at its front end an annular, resilient, deformable seal means for sealing the interface;

downwardly sloped outer surface; and a compression ring, mountable on the gripper and having a forwardly and upwardly sloped inner surface for engaging the gripper sloped outer surface whereby, if the compression ring is urged forwardly, it impels the gripper ring downwardly into tight frictional engagement with the pipe.

[0009] Preferably, a set of axially extending threaded bolts connect the front plate and second clamp means and threaded nuts, abutting the front surface of the front plate and the back surface of the second clamp means, may tighten the front plate against the pipe end face and actuate the second clamp means.

[00010] Preferably, the back plate is dimensioned to have an annular clearance relative to the inner surface of the pipe.

[00011] From the foregoing it will be understood: that increasing pressure within the bore of the pipe will push on the back plate when it presses against the front plate to increase compression and sealing of the seal means; that the slidable back plate preferably has a circumferential clearance with the pipe's inner surface so as to avoid scoring it and the stem functions to centralize the plate; that the first clamp means provides an anchoring function which enables the set of axial bolts and nuts to both draw the front plate into abutment with the end face of the pipe and to pull the compression ring forwardly along the gripper to thereby actuate the second clamp means into frictional engagement with the pipe; and that two distinct clamping actions are implemented within the length of a single set of axial bolts.

[00012] In another embodiment, the invention is concerned with a tool for closing and sealing an open end of a pipe, said tool having front and back ends, said pipe having an end face, a bore, an end opening and inner and outer surfaces, said tool comprising, in combination: an external front plate for extending across and abutting the pipe end face to form an annular interface therewith, said front plate having a flange extending beyond the pipe outer surface; said front plate having a central aperture extending through it; a clamp means for extending around, clamping onto and frictionally engaging the pipe outer surface to anchor said clamp means thereto; means, connecting the front plate and clamp means, for drawing the front plate into tight engagement with the pipe end face; a movable back plate for positioning with clearance within the bore of the pipe so as to

extend transversely thereof, said back plate carrying an annular, deformable, resilient seal means at its front end for sealing the interface; said back plate further having a forwardly projecting stem for slidably extending through the aperture; said back plate and stem forming a unit which is movable in use so as to deliver the seal means to the interface and compress it against the front plate and pipe inner surface to seal the interface; and disengagable means, mountable on the stem for biasing the unit into sealing position and locking it in said position.

Description of the Drawing

[00013] Figure 1 is a sectional side view of the tool;

[00014] Figure 2 is a perspective view of the tool of Figure 1; and

[00015] Figure 3 is an exploded view of the tool.

Description of the Preferred Embodiment

[00016] The invention provides a mechanical assembly or tool 10 for closing and sealing the open end 2 of a pipe 3 which is, for example, to undergo hydraulic pressure testing.

[00017] In general outline, the tool 10 comprises: a front plate 6 for closing the opening 5 at the end 2 of the pipe 3; a split, flanged, bolted first clamp 4, comprising sections 4a, 4b, adapted to extend around the pipe 3 and operative, when tightened, to frictionally engage the pipe's outer surface 17 and to provide an anchoring function; a second clamp 8, positioned rearwardly of and abutting the first clamp 4, for also frictionally engaging the pipe's outer surface 17; several axially extending threaded bolt and nut assemblies 11a; each assembly 11a having a bolt 11 extending through and connecting the front plate 6 and first and second clamps 4, 8 and nuts 12 for biasing the front plate 6 into abutting relation with the end face of the pipe 3, to thereby form an interface; the nut and bolt assemblies 11a further function to actuate the second clamp 8, as described below; a movable internal back plate 20 is positioned within the bore 9 of the pipe 3 and is oriented transversely relative to the pipe axis; the front end of the back plate 20 is configured to carry an annular seal 22 for sealing the interface; a stem 24 slidably extends forwardly from the back plate 20

through a central aperture 7 extending axially through the front plate 6; a nut 23 threads on the stem 24 and functions to draw the back plate 20 toward the front plate 6 so that the seal 22 is compressed against the front plate 6 and pipe inner surface 9a so as to seal the interface; and a passageway 25 extends through the stem 24 and back plate 20 for delivery of pressure testing fluid into the bore 9 of the pipe 3.

[00018] In greater detail, the tool 10 comprises an externally positioned front plate 6 adapted to extend across and close the pipe opening 5. The diameter of the front plate 6 is greater than that of the pipe 3, so as provide a peripheral outer flange 14. A series of spaced apart bolt holes 15 extend through the flange 14, parallel to the axis of the pipe 3. A central aperture 7 also extends axially through the plate 6.

[00019] A split and flanged first clamp 4 is positioned around the pipe 3. The inner diameter of the sections 4a, 4b of the clamp 4 is slightly less than the outer diameter of the pipe 3. Transversely oriented bolt holes extend through the flanges of the sections 4a, 4b. Threaded bolts 26 extend through the flange bolt holes. Nuts 27 are threaded onto the bolts 2b and pull the clamp sections 4a, 4b tightly about the pipe 3 so that they clamp onto and frictionally engage the outer surface of the pipe 3. In sum, the bolted sections 4a, 4b provide a circumferential first clamp 6 anchored on the pipe 3.

[00020] A segmental annular gripper ring 30 is mounted about the pipe 3, rearwardly of the first clamp 4. The inner surface of the gripper ring 30 is flat and conforms to the outer surface of the pipe 3. The outer surface 28 of the gripper ring 30 is downwardly sloped to the rear.

[00021] A compression ring 28a seats on the gripper ring 30. The inner surface 31 of the compression ring 28a is upwardly sloped to the front and conforms with the gripper ring's outer surface 28. A series of bolt holes 30 extend through the compression ring 28a.

[00022] As previously stated, bolts 11 extend axially through the bolt holes of the front plate 6 and compression ring 28a. Nuts 12 are threaded onto the front and back ends of the bolts 11 and function to draw the front plate 6 into abutting relation with the pipe end face and to urge the compression ring 28a into tight engagement with the gripper ring 30, thereby driving the gripper ring downwardly or radially to frictionally engage the pipe 3.

[00023] Collectively the gripper ring 30, compression ring 28a and nut and bolt assemblies 11a provide a second clamp 8 which may be actuated to deliver a downwardly directed frictional engagement with the pipe 3.

[00024] From the foregoing it will be noted that only two sets of bolts and nuts are used to apply and activate a clamping means, comprising a circumferentially acting first clamp 4 and a radially acting second clamp 8.

[00025] A back plate 20 is transversely positioned within the pipe bore 9. The back plate 20 has a clearance with the inner surface 9a of the pipe 3, so that it may move forwardly toward the front plate 6. The front end of the back plate 20 forms an annular seat for receiving and carrying an O-ring seal 22. The seal 22 is resilient and deformable.

[00026] A forwardly projecting stem 24 is connected to the front face of the back plate 20. The stem 24 slidably extends through the central aperture 7 of the front plate 6, so that it is externally accessible. The stem and back plate together form a movable back plate unit.

[00027] The outer surface of the stem 24 is threaded. A nut 23 is threaded thereon. The nut 23 functions to draw the back plate 20 forwardly toward the front plate 6, to thereby press the O-ring seal 22 against the front plate 6 and pipe inner surface 9a, for sealing the interface. The nut 23 further functions to lock the back plate unit in place.

[00028] The stem 24 and back plate 20 may form an internal passageway 25 through which test water may be introduced into the pipe bore 9.

What is claimed is:

1. A tool for closing and sealing an open end of a pipe, said tool having front and back ends, said pipe having an end face, a bore, an end opening and inner and outer surfaces, said tool comprising, in combination:

an external front plate for extending across and abutting the pipe end face to form an annular interface therewith, said front plate having a flange extending beyond the pipe outer surface, said front plate having a central aperture extending through it;

a clamp means for extending around, clamping onto and frictionally engaging the pipe outer surface to anchor said clamp means thereto;

means, connecting the front plate and clamp means, for drawing the front plate into tight engagement with the pipe end face;

a movable back plate for positioning with clearance within the bore of the pipe so as to extend transversely thereof, said back plate carrying an annular, deformable, resilient seal means at its front end for sealing the interface, said back plate further having a forwardly projecting stem for slidably extending through the aperture, said back plate and stem forming a unit which is movable in use so as to deliver the seal means to the interface and compress it against the front plate and pipe inner surface to seal the interface; and

disengagable means, mountable on the stem, for biasing the unit into sealing position and locking it in said position.

2. A tool for closing and sealing the open end of a pipe, the tool having front and back ends and comprising, in combination:

an external front plate for extending across and abutting the open end face of the pipe, to form an annular interface therewith;

the front plate having a central aperture extending therethrough and a peripheral flange for projecting radially beyond the pipe outer surface;

an axially movable back plate for transversely positioning within the bore of the pipe, said back plate carrying at its front end an annular, resilient, deformable seal means for sealing the interface;