Aug. 24, 1948. J. MIKLOWITZ 2,447,660

WEDGE GRIP FOR TENSILE TESTING MACHINES

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Fig. 1.

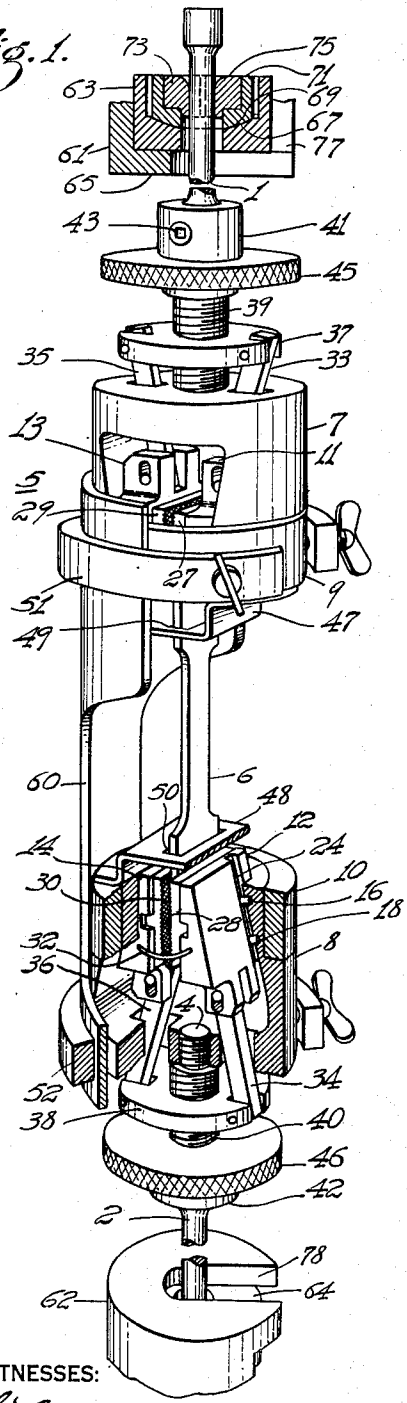


Fig. 2.

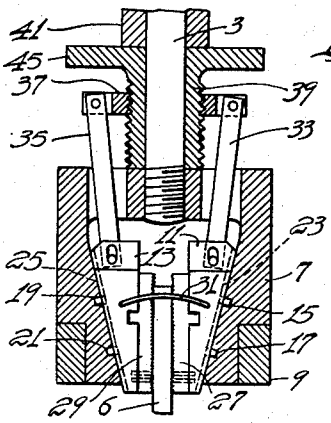


Fig. 3.

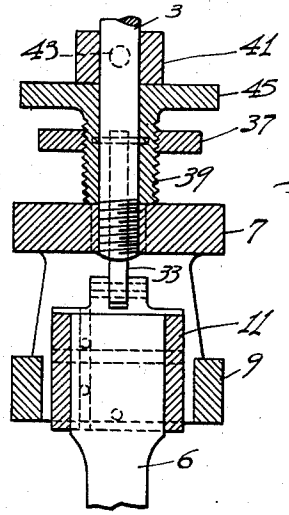
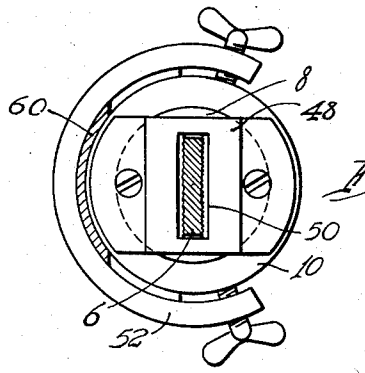


Fig. 4.



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WEDGE GRIP FOR TENSILE TESTING MACHINES

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9 Claims. (Cl. 73—103)

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My invention relates to chucks and, more particularly, to test-piece gripping means for investigating the tensile strength of test-pieces subject to tension in a testing machine.

Chucks for gripping test-pieces are known in the art but such devices as are now available on the market are cumbersome, inconvenient to manipulate, do not provide for proper alignment of the test-piece with the relatively movable elements of the machine, and are expensive.

One broad object of my invention is the provision of a chuck, for holding test-pieces being tested in a tensile machine, that shall be simple, inexpensive, but above all, be easily and expeditiously manipulated and provide correct alignment of the test-piece.

The prior art provides gripping means usually for standard cylindrical test-pieces, but the present demands on the research worker often require that information be obtained about the tensile properties of rolled sheet material, or molded sheet material. The sheet material to be tested may be rolled metal sheet, rolled plastic, molded plastic, glass sheet, sheet fiber, plywood, paper, etc. No very satisfactory means for gripping standard sheet test-pieces are available in the prior art though some are known.

It is, therefore, also an object of my invention to provide for efficiently and reliably retaining the ends of strip test-pieces to the relatively movable elements of a tensile machine.

Another object of my invention is the provision of test-piece gripping means that accurately align the test-piece axis with the tension producing members of a tensile machine.

The objects hereinbefore recited are merely illustrative. Other objects and advantages will become more apparent from a study of the following specification and the accompanying drawing, in which:

Figure 1 is a perspective view of my invention, the view having certain parts broken away to more clearly illustrate the internal structure of some of the elements;

Fig. 2 is a sectional view on a longitudinal section plane of one chuck member;

Fig. 3 is a sectional view on a longitudinal section plane substantially normal to the section plane of the showing in Fig. 2; and

Fig. 4 is a sectional view on a transverse section plane substantially at the middle region and looking toward one of the chuck elements.

In the several views, like reference characters refer to corresponding parts. My device finds special utility with tensile testing machines, and

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in Figure 1, the rods 1 and 2 represent the two members to be attached to the relatively movable elements of such tensile testing machine. These rods 1 and 2 are rotatably and swivelly mounted in suitable couplings, in a manner well known in the art.

At the upper end of rod 1, I show one of the couplings in section. In this coupling, 61 comprises a housing for the cylindrical block 63. This housing 61 has an opening 77 at the front big enough to permit the block 63 to be slipped in from the front. The back of the housing has an internal contour conforming substantially to the outer contour of block 63. The floor 65 of the housing has a narrow slot open at the front to receive the rod 1 to the position shown.

The block 63 has a well at the top provided with spherical seat 67. A second cylindrical block 71 having a spherical outer bottom surface 69 engages the seat 67. The block 71 has a lesser outer diameter than the inner diameter of the well in the block 63. Block 71 thus has a swivel engagement with block 63.

The block 71 has a central well at the top for receiving two semicircular inserts 73 and 75 having axially projecting tongues so that these inserts in use remain in proper relation to the block 71 and in proper relation to the upper end of rod 1. The inserts have upwardly facing surfaces of the same contour as the downwardly directed curved shoulder regions of the upper, or head, end of rod 1. Rod 2 fits into a coupling exactly like the one at the top except that all the elements thereof face in the opposite direction to the coupling elements at the top. The housings 61 and 62 represent the relatively movable members of the tensile machine. The preferred construction of the tensile machine is such that housing 62, during a destructive rupturing test of the test-piece, moves down with reference to housing 61 and where housing 61 is fixed with reference to the machine frame.

The inner ends of the rods 1 and 2, that is, the ends directed toward each other, are provided with extensions 3 and 4, so that these rods may be readily brought into firm threaded engagement with the chuck means 5 for holding the test-piece, or work-piece, as 6.

Extension 3 is rigidly coupled to the frame 7 by the screw connection shown. Note particularly Fig. 2. The frame 7 comprises a generally cylindrical block having a dovetail transverse cut open at one end, as shown, the lower end, and a pair of openings at the other or upper end. The

lower end is provided with a strengthening ring 9.

The dovetail cut thus provides a pair of chuck jaw guideways, or surfaces, falling in planes that make equal angles with the frame axis and intersect each other on a section line that is perpendicular to the axis of frame 7.

A pair of generally wedge-shaped chuck jaws 11 and 13 is disposed in the frame 7 for sliding engagement with the guide ways. A pair of pins as 15 and 17, and 19 and 21, is mounted respectively in the guide ways and engage grooves 23 and 25, respectively, to prevent any movement of the jaws 11 and 13, other than translation, with reference to frame 7.

The jaws 11 and 13 have wear resistant surface plates 27 and 29 removably secured in the facing parallel surfaces of the jaws. These plates may be, and preferably are, provided with a knurled surface to more effectively grip the work-piece to be tested for tensile properties. In order that the jaws 11 and 13 may at all times be in firm contact with the guide-ways and also be in suitable spaced relation when a test-piece is to be inserted, a pair of expansion springs, as 31, one on each side, engage the jaws in suitable depressions.

The upper ends of the jaws 11 and 13 are connected to a pair of links 33 and 35 by a loose connection. The links project through the openings, or slots, in the upper end of the frame 7, and at their upper ends are connected to the nut 37. The nut 37 has threaded engagement with the external threads of the sleeve 39 disposed for rotation on the rod 3 and held against axial movement between the frame 7 and the abutment 41 firmly secured, by a suitable setscrew 43, on the rod 3.

The sleeve 39 is provided with the peripherally knurled manipulating disk 45 which may be integral with the sleeve 39. By rotating the disk 45, the sleeve 39 is rotated, and, since the nut 37 is restrained against rotation by the type of connection of the links 33 and 35 to the jaws, the jaws are moved on the guideways. The radial component of the jaw motion thus provides for effective gripping of the test-piece 6.

To effectively center the test-piece, I provide the strap 47 having the central slot 49. The slot 49 is placed symmetrical with respect to the axis of frame 7 and is not necessarily in the shape of a narrow slot but has a contour conforming to the end of the test-piece.

Since two chuck means are required, the one for the purpose of gripping the other, or lower, end of the test-piece is in construction and function in every respect like the upper chuck means at the top. In brief, the elements designated by the even reference characters 2, 4, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 62 and 66 correspond in structure and function in every respect to the odd reference characters 1, 3, 7 to 47, inclusive, and 61 to 65, except that rod 1 is usually, during a test operation, fixed with reference to the frame of the tensile machine, whereas the rod 2 is movable with reference to the frame of the tensile machine.

It is of considerable advantage to be able to mount the test-piece in the chuck means and to properly align the test-piece 6 with rods 1 and 2 and frames 7 and 8, while such chuck means are not in position on the tensile machine. To facilitate work-bench assembly and alignment of the test-piece, I provide the arcuate mounting shell 60 having the arcuate strengthening ring segments 51 and 52 at its ends. Each ring segment

is provided with a pair of thumb-screws for rigidly interconnecting frames 7 and 8.

From Fig. 4, it will be noted that the inner arcuate contour of the shell 60 at the regions of the strengthening ring segments 51 and 52 conforms for a semicircle to the outer contour of frames 7 and 8, respectively. This construction insures that when frames 7 and 8 are in position in the shell 60 these frames will be axially aligned.

The strengthening ring segments 51 and 52 are provided with the thumb-screws shown. When these thumb-screws are brought in firm engagement with frames 7 and 8, the axial alignment of frames 7 and 8 is definitely maintained.

The straps 47 and 48, having the centering slots 49 and 50, respectively, further insure that the test-piece is so disposed in the chuck means and so gripped by the jaws that substantially no eccentricity of the disposition of the parts, as rod 1, frame 7, test-piece 6, frame 8 and rod 2, is possible. Only when the test-piece is thus mounted in the assembly and the assembly is still rigidly held in fixed relation by the shell 60 are the blocks 63 and 64 inserted in the housings 61 and 62. After the blocks 63 and 64 are seated and the housings 61 and 62 moved relatively firmly to seat all the parts in the end couplings, the thumb-screws on ring sector 52 are released. During downward movement of rod 2 with reference to rod 1, no stress is thus placed on the arcuate member 60 but the tension is applied to the test-piece only.

While I have described and shown but one specific embodiment, I do not wish to be limited to the particular disclosure made but wish to be limited only by the scope of the claims hereto appended.

I claim as my invention:

1. In a test-piece gripping device, for a tensile machine having a stationary member and a movable member movable with reference to the stationary member, in combination, a frame element having a dovetail transverse cut in one end thereof, connecting means for connecting said frame element to one of said relatively movable members of the tensile machine, said frame element being provided with a pair of facing jaws disposed for sliding motion on the facing surfaces of the dovetail, jaw operating means disposed on said connecting means for slidably moving said jaws, whereby the jaws are moved toward each other to grip a test-piece, or away from each other to release the test-piece, depending on the manipulation of said jaw operating means, guide means associated with the frame element and the jaws to prevent any rotary motion of said jaws with reference to the frame element, biasing means for said jaws for biasing the jaws away from each other to thus at all times cause said jaws to be in firm but slidable operative engagement with said frame element, wear resistant elements removably secured in the facing surfaces of said jaws, and a strengthening member surrounding the end of the frame element provided with the dovetail cut, and a second frame element similar to the first frame element, connecting means for connecting said second frame element to the other member of said tensile machine, said second frame element being provided with all the cooperating elements of the first frame element, and means for releasably interconnecting the frame elements so that they are held in operative relation to each other when not connected to the relatively movable members of the tensile machine.

2. In a chuck for gripping a workpiece, in combination, a cylindrical frame element, a dovetail cut in one end of the element, said cut being symmetrical with respect to the axis of the frame element to thus present two facing surfaces falling in two intersecting planes intersecting the axis at their line of intersection in such manner that the line of intersection is substantially normal to the axis of the frame element, a supporting rod rigidly attached in axial alignment with the other end of the frame element, an abutment rigidly fixed to said rod in spaced relation to the connection of the rod to the frame element, a sleeve rotatably disposed on the rod in abutting relation to the frame element and the abutment on the rod, said sleeve being provided with external threads and a member for rotating the sleeve, a nut disposed on the threads of the sleeve, a pair of jaws disposed for sliding guided movement on the facing surfaces of the dovetail cut in the frame element, said jaws being provided with workpiece engaging surfaces parallel to the frame element axis, a pair of links interconnecting corresponding ends of the jaws with the nut on the threads of the sleeve, said links extending through holes in the end of the frame element connected to the rod whereby rotation of the sleeve, through said links, causes longitudinal and radial movement of the jaws in the frame element, means for biasing the jaws against the frame element, centering means at the open end of the frame element, namely, the end provided with the dovetail cut, for centering a workpiece with reference to the frame element, whereby rotation of the sleeve will cause said jaws to grip the workpiece in such a way that the workpiece is in axial alignment with the frame element, and ring means surrounding the frame element at the said open end of the frame element for strengthening the frame element.

3. In a chuck for gripping a workpiece, in combination, a cylindrical frame element, a dovetail cut in one end of the element, said cut being symmetrical with respect to the axis of the element to thus present two facing surfaces falling in two intersecting planes intersecting the axis at their line of intersection in such manner that the line of intersection is substantially normal to the axis of the frame element, a supporting rod rigidly attached in axial alignment with the other end of the frame element, an abutment rigidly fixed to said rod in spaced relation to the connection of the rod to the frame element, a sleeve rotatably disposed on the rod in abutting relation to the frame element and the abutment on the rod, said sleeve being provided with external threads, a nut disposed on the threads of the sleeve, a pair of jaws disposed for sliding guided movement on the facing surfaces of the dovetail cut in the frame element, said jaws being provided with workpiece engaging surfaces parallel to the frame element axis, a pair of links interconnecting corresponding ends of the jaws with the nut on the threads of the sleeve, said links extending through holes in the end of the frame element connected to the rod, whereby rotation of the sleeve, through said links, causes longitudinal and radial movement of the jaws in the frame element, means for biasing the jaws against the frame element, centering means at the open end of the frame element, namely, the end provided with the dovetail cut, for centering a workpiece with reference to the frame element, whereby rotation of the sleeve will cause said jaws to grip the workpiece in such a way that the workpiece is in axial alignment with the frame element, and ring means surrounding the frame element at the said open end of the frame element for strengthening the frame element.

4. In a chuck for gripping a workpiece, in combination, a cylindrical frame element, a dovetail cut in one end of the element, said cut being symmetrical with respect to the axis of the element to thus present two facing surfaces falling in two intersecting planes intersecting the axis at their line of intersection in such manner that the line of intersection is substantially normal to the axis of the frame element, a supporting rod rigidly attached in axial alignment with the other end of the frame element, an abutment rigidly fixed to said rod in spaced relation to the connection of the rod to the frame element, a sleeve rotatably disposed on the rod in abutting relation to the frame element and the abutment on the rod, said sleeve being provided with external threads, a nut disposed on the threads of the sleeve, a pair of jaws disposed for sliding movement on the facing surfaces of the dovetail cut in the frame element, said jaws being provided with workpiece engaging surfaces parallel to the frame element axis, a pair of links interconnecting corresponding ends of the jaws with the nut on the threads of the sleeve, said links being restrained against rotation with reference to the frame element, whereby rotation of the sleeve, through said links, causes longitudinal and radial movement of the jaws in the frame element, means for biasing the jaws against the frame element, centering means at the open end of the frame element, namely, the end provided with the dovetail cut, for centering a workpiece with reference to the frame element, whereby rotation of the sleeve will cause said jaws to grip the workpiece in such a way that the workpiece is in axial alignment with the frame element, and ring means surrounding the frame element at the said open end of the frame element for strengthening the frame element.

5. In a chuck for gripping a workpiece, in combination, a cylindrical frame element, a dovetail cut in one end of the element, said cut being symmetrical with respect to the axis of the element to thus present two facing surfaces falling in two intersecting planes intersecting the axis at their line of intersection in such manner that the line of intersection is substantially normal to the axis of the frame element, a supporting rod rigidly attached in axial alignment with the other end of the frame element, an abutment rigidly fixed to said rod in spaced relation to the connection of the rod to the frame element, a sleeve rotatably disposed on the rod in abutting relation to the frame element and the abutment on the rod, said sleeve being provided with external threads and a member for rotating the sleeve, a nut disposed on the threads of the sleeve, a pair of jaws disposed for sliding movement on the facing surfaces of the dovetail cut in the frame element, said jaws being provided with workpiece engaging surfaces parallel to the frame element axis, a pair of links interconnecting corresponding ends of the jaws with the nut on the threads of the sleeve, said links being restrained against rotation with reference to the frame element, whereby rotation of the sleeve, through said links, causes longitudinal and radial movement of the jaws in the frame element, means for biasing the jaws against the frame element, centering means at the open end of the frame element, namely, the end provided with the dovetail cut,

for centering a workpiece with reference to the frame element, whereby rotation of the sleeve will cause said jaws to grip the workpiece in such a way that the workpiece is in axial alignment with the frame element, and ring means surrounding the frame element at the said open end of the frame element for strengthening the frame element.

6. In a chuck for gripping a workpiece, in combination, a cylindrical frame element, a dovetail cut in one end of the element, said cut being symmetrical with respect to the axis of the element to thus present two facing surfaces falling in two intersecting planes intersecting the axis at their line of intersection in such manner that the line of intersection is substantially normal to the axis of the frame element, a supporting rod rigidly attached in axial alignment with the other end of the frame element, an abutment rigidly fixed to said rod in spaced relation to the connection of the rod to the frame element, a sleeve rotatably disposed on the rod in abutting relation to the frame element and the abutment on the rod, said sleeve being provided with external threads, a nut disposed on the threads of the sleeve, a pair of jaws disposed for sliding movement on the facing surfaces of the dovetail cut in the frame element, said jaws being provided with workpiece engaging surfaces parallel to the frame element axis, a pair of links interconnectng corresponding ends of the jaws with the nut on the threads of the sleeve, said links being restrained against rotation with reference to the frame element, whereby rotation of the sleeve, through said links, causes longitudinal and radial movement of the jaws in the frame element, centering means at the open end of the frame element, namely, the end provided with the dovetail cut, for centering a workpiece with reference to the frame element, whereby rotation of the sleeve will cause said jaws to grip the workpiece in such a way that the workpiece is in axial alignment with the frame element, and ring means surrounding the frame element at the said open end of the frame element for strengthening the frame element.

7. In a chuck for gripping a workpiece, in combination, a cylindrical frame element, a dovetail cut in one end of the element, said cut being symmetrical with respect to the axis of the element to thus present two facing surfaces falling in two intersecting planes intersecting the axis at their line of intersection in such manner that the line of intersection is substantially normal to the axis of the frame element, a supporting rod rigidly attached in axial alignment with the other end of the frame element, an abutment rigidly fixed to said rod in spaced relation to the connection of the rod to the frame element, a sleeve rotatably disposed on the rod in abutting relation to the frame element and the abutment on the rod, said sleeve being provided with external threads and a member for rotating the sleeve, a nut disposed on the threads of the sleeve, a pair of jaws disposed for sliding guided movement on the facing surfaces of the dovetail cut in the frame element, said jaws being provided with workpiece engaging surfaces parallel to the frame element axis, a pair of links interconnecting corresponding ends of the jaws with the nut on the threads of the sleeve, said links extending through holes in the end of the frame element connected to the rod whereby said nut on the threads of the sleeve is restrained against rotation with reference to the frame element,

whereby rotation of the sleeve, through said links, causes longitudinal and radial movement of the jaws in the frame element, means for biasing the jaws against the frame element, and ring means surrounding the frame element at the said open end of the frame element for strengthening the frame element.

8. In a test-piece gripping device for a tensile machine having a stationary member and a movable member, movable with respect to the stationary member, in combination, a frame element having a dovetail cut transverse one end thereof, connecting means secured to the other end of the frame element for connecting said frame element to one of said relatively movable members of said tensile machine, said frame element being provided with a pair of facing jaws disposed for sliding motion on the facing surfaces of the dovetail cut, jaw operating means for slidably moving said jaws axially of the frame element, means for maintaining said jaws in slidable contact with the surfaces of the dovetail cut, whereby axial movement of the jaws will also cause the jaws to move radially of the frame element, a strengthening member surrounding the first mentioned, namely the face end of the frame element provided with the dovetail cut, and a second frame element constructed like said first frame element, connecting means for connecting the second frame element to the other member of the relatively movable members of the tensile machine, said second frame element being provided with all the same type of cooperating elements as the first frame element, and releasable means for securing the two frame elements to each other in axial alignment so that the frame elements and the parts, including the test piece, attached thereto may, as a unit, be connected to the relatively movable members of the testing machine.

9. In a test piece gripping device for a tensile machine having a stationary member and a movable member, movable with respect to the stationary member, in combination, a frame element having a dovetail cut transverse one end thereof, connecting means secured to the other end of the frame element for connecting said frame element to one of said relatively movable members of said tensile machine, said frame element being provided with a pair of facing jaws disposed for sliding motion on the facing surfaces of the dovetail, jaw operating means for slidably moving said jaws axially of the frame element, means for maintaining said jaws in slidable contact with the surfaces of the dovetail cut, whereby axial movement of the jaws will also cause the jaws to move radially of the frame element, wear resistant surfaces fixed on the facing surfaces of the jaws, a strengthening member surrounding the first mentioned, namely, the free end of the frame element provided with the dovetail cut, guide means for the jaws for effecting movement of translation only of said jaws with reference to the frame element, and a second frame element constructed like said first frame element, connecting means for connecting the second frame element to the other member of the relatively movable members of the tensile machine, said second frame element being provided with all the same type of cooperating elements as the first frame element, and releasable means for securing the two frame elements to each other in axial alignment so that the frame elements and the parts thereto con-

nected, which parts include the test piece, may, as a unit, be secured to the relatively movable members of the testing machine.

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