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DEVICE FOR REPAIRING AUTOMOBILE BODY MEMBERS AND THE LIKE

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2 Sheets-Sheet 2

Fig. 4.

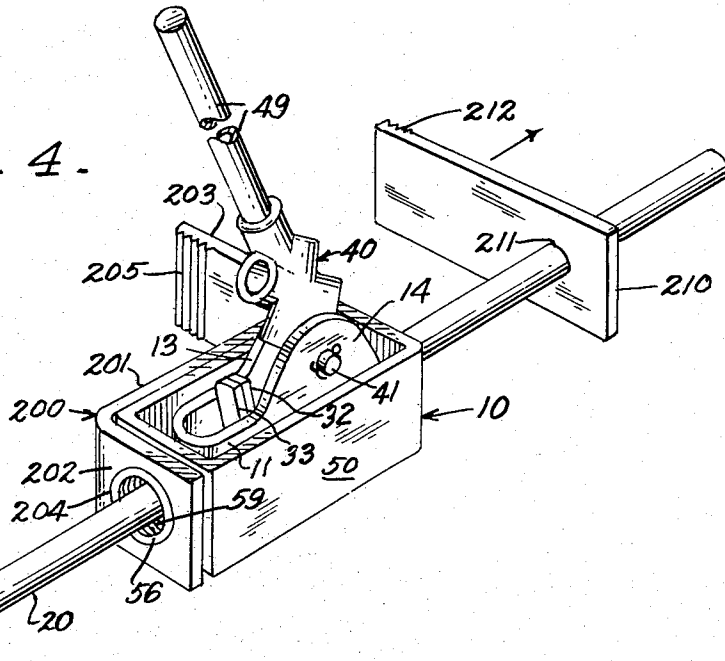
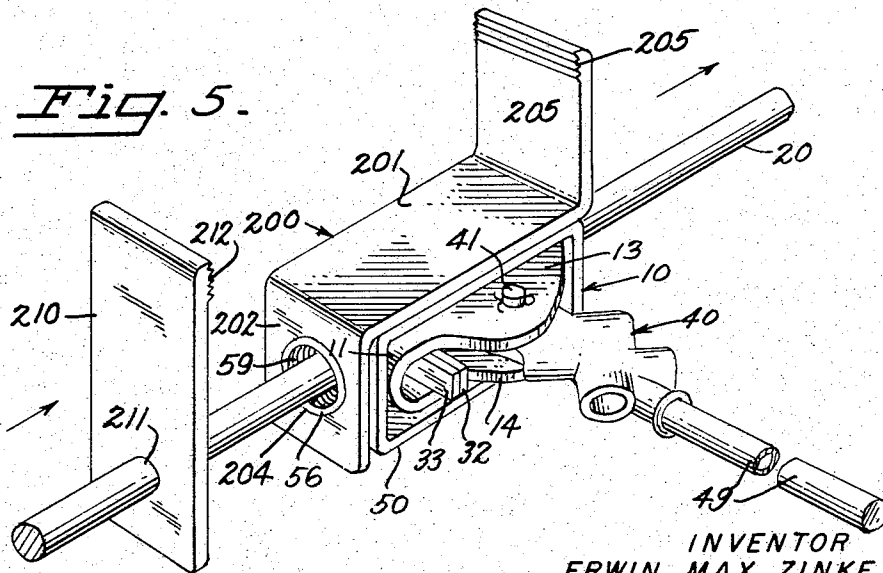


Fig. 5.



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DEVICE FOR REPAIRING AUTOMOBILE BODY MEMBERS AND THE LIKE

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16 Claims. (Cl. 153—32)

This invention relates to an improved device for repairing automobile body members and the like. This application is a continuation-in-part of my earlier filed application, Serial Number 124,712, filed October 31, 1949, which issued on December 2, 1950, as Patent Number 2,620,011.

The invention solves several problems. One such problem is that of obtaining a tool that has the maximum strength per weight. A tool that is too heavy tires the mechanic, but tools made from such light metals as aluminum have lacked the requisite strength. This problem has been solved by a novel combination of parts made from light weight metals (e. g. aluminum) with parts made from metals of great strength (e. g. steel). In this novel combination almost all the stress is taken up by a relatively small amount of steel, while the great bulk of the tool is made from aluminum and is protected from stress by the steel.

A further problem that has been solved by this invention is the provision of a novel form of jack attachment that can be used for spreading objects apart or for pushing them toward each other. This attachment can be changed in a few seconds from one type of action to the other.

These and other features will appear from the following detailed description of a preferred embodiment of the invention, reference being had to the accompanying drawings. It should be understood, however, that the drawings and descriptions are illustrative and are not intended to narrowly limit the scope of the invention, which is defined in the appended claims.

In the drawings:

Fig. 1 is a view in perspective of a jack embodying the principles of the present invention.

Fig. 2 is an enlarged view in elevation and in section of the jack of Fig. 1, with the handle rod removed from its socket.

Fig. 3 is a view in section taken along the line 3—3 in Fig. 2.

Fig. 4 is a view in perspective showing the jack of Figs. 1-3 with a novel form of attachment, embodying the principles of this invention, the attachment being positioned to act as a spreader.

Fig. 5 is a view in perspective showing the jack and the attachment of Fig. 4 in a different position, where it acts to compress two objects together.

The jack

The jack 10 of this invention is shown in Figs. 1 to 3. It includes a hollow body member 11 preferably made from aluminum or other light weight metal. The body member 11 has a central depending member 12 and a pair of upwardly extending yoke arms 13 and 14. The space between the yoke arms 13 and 14 is open and extends down into the hollow interior of the body 11. There is also an opening 15 through the lower side of the body 11, adjacent the member 12.

An axial opening 16 extends through the front wall 17

of the body member 11, and another axial opening 18 extends through the rear wall 19. These axial openings 16 and 18 are aligned, and together with the hollow interior of the body member 11 they form a straight passage through the jack body 11. The movable portion of the jack is a round steel rod 20 that extends through this passage, clearance being provided so that it does not touch the body 11. The rod 20 preferably has one enlarged threaded end 21, the other end 22 preferably being rounded and not enlarged or threaded.

Adjacent the mid-section of the body member 11 there are a pair of vertical ribs 25. These serve to divide the body interior into two portions. In one body portion, a spring 26 pushes out from the ribs 25 against the forward one 27 of a pair of friction washers 27, 28. The washers 27, 28 have depending flanges 29, 30 that extend down through the lower opening 15, where the flange 30 engages the portion 31 of the jack body 11. The washers 27, 28 also have upper flanges 32, 33 that extend upwardly out of the body 11.

The spring 26 and the body portion 31 act to keep the friction washers 27, 28 normally on an inclination with respect to the rod 20 and in engagement with it, so that they serve as a brake to retain the rod 20 in a pre-set position and prevent it from slipping to the right in Fig. 2, when under tension, but do not prevent the rod from moving to the left. When the jack 10 is to be released and the rod 20 is to be moved freely to the right, the upwardly extending flanges 32, 33 are manually pushed to the left (in Fig. 2). During normal jacking the friction washers 27, 28 act like a ratchet to prevent slipping and hold the jack 10 while the handle 49 is swung back for another stroke.

In the other body portion into which the ribs 25 divide the body 11, a spring 35 is compressed between the forward wall 17 and the forward one of three friction washers 36, 37, and 38, the washer 38 resting against the ribs 25. Normally these washers 36, 37, 38 do not engage the rod 20, but when tilted forward they do engage it, and since they outnumber the washers 27, 28, they grip the rod with more total force of friction.

The three friction washers 36, 37, and 38 are used for jacking the rod 20 to the left. For this purpose a lever 40 is pivotally secured on a pintle 41 that passes between the yoke arms 13 and 14. The lever 40 may have a pawl 42 that engages the upper portion of the washer 38 and pushes it and the other two washers 36, 37 forward. The friction washers 36, 37 and 38 clamp against the rod 20 and (outnumbering the friction washers 27, 28) move the rod 20 forward a length corresponding to the stroke of the lever pawl 42. There is preferably a second pawl 43 on the lever 40 that helps to straighten the washers 36, 37, and 38 on the return stroke of the lever 40, while the washers 27, 28 retain the rod 20 in its advanced position.

The lever 40 preferably has a plurality of sockets 44, 45, 46, 47, and 48, all of which are adapted to receive a jack handle 49, depending on the most convenient handle position for the particular jacking operation.

The entire aluminum body 11, which contains the working parts of the jack 10, is jacketed in a rectangular closed band 50. The band 50 is preferably a strap of steel or other suitable metal, with a front opening 51 aligned axially with the front body opening 16 and a rear opening 52 aligned axially with the rear body opening 18.

A steel bushing 53 may be positioned in the front opening 51, preferably being welded or otherwise secured to the band 50. The bushing 53 has an outwardly-extending radial flange 54 that is preferably positioned inside the band 50, abutting the band 50 and the front wall 17 of the body 11. The bushing 53 also has a

tubular portion 55 of reduced diameter (both exteriorly and interiorly) that extends back from the flange 54 and inside the front opening 16 of the body 11.

A substantially identical steel bushing 56 may be welded to the opposite end of the band 50, around the opening 52. Preferably, its flange 57 rests on the outside face of the band 50. A tubular portion 58 of reduced diameter extends into the rear opening 18 of the body 11.

The portions 55 and 58 of the bushing 53, 56 support the body 11 inside the band 50. Preferably the front end 17 of the body 11 abuts the rear face of the flange 54, while the rear end 19 of the body abuts the band 50. There may be clearance between the sides of the body 11 and the band 50.

The assembly of the jack 10 may be noticed at this point. The band 50 may be assembled from a short flat piece 50a that forms the front end (through which the opening 51 passes) and a longer bar 50b that is bent into a U-shape (the opening 52 passing through the bowl of the U). The bushing 53 is welded in place on the piece 50a, with its flange 54 behind the piece 50a. The bushing 56 is welded in place on the piece 50b, with its flange 57 on the outside of the piece 50b. The two bushings 53, 56 are inserted in the openings 16, 18 aligned, and then the members 50a and 50b are welded together so that the band 50 becomes integral.

Both bushings 53 and 56 are preferably threaded interiorly at 59 to receive various fittings. Normally these fittings will be tubular so as to encircle the rod 20. For example, Fig. 1 shows a tubular fitting 60 threaded into the rear bushing 56, for a pushing operation. The fitting 60 could be threaded into the front bushing 53 for a pulling operation, as will be explained in the operation section below.

The bushings 53, 56 are positioned with their flanges 54, 57 on opposite sides of the band 50, because their normal operating thrusts are in different directions and it is desired to resolve all thrust forces against the band 50. This resolution of forces is an important feature of the invention. The band 50, with its bushings 53, 56, takes all the strain that converges on the jack 10, and thereby makes it possible to have a lightweight body 11 because it is freed from all severe stresses.

The flange 54 is located inside the band 50, because the normal thrust forces will urge the flange 54 outward from the body 11 and therefore against the band 50. For the same general reason, the flange 57 is outside the band 50. In this instance the force is inward, toward the body 11, and this positioning directs all the thrust against the band 50.

A jack body made entirely of steel or from cast iron would be too heavy for mechanics to use over long periods of time, but the aluminum body 11 holds down the total weight of the jack body 10 to less than 5 pounds, including the lever 40, the band 50 and its bushings 53, 56. Moreover, a jack body made entirely of aluminum would be too weak, even if made substantially larger than the body 11, but the steel band 50 and its bushings 53, 56 keep the small light body 11 from flying apart and take care of all the pressures converging on the body.

Operation of the jack

When the jack 10 is used for pushing outwardly, suitable attachments may be threaded on the fitting 60 or on the threaded end 21 of the rod 20. Then when the jack handle 49 is moved back and forth, the rod 20 moves out further at the front end, and thereby increases the distance between the attachments. The thrust is entirely on the steel members: on the rod 20 from one end and inwardly against the bushing 56 from the other end. The bushing 56 rests on the band 50, which resolves all the thrust, so that none of it acts on the aluminum body 11.

When the jack is to be used for pulling inwardly, the fitting 60 may be threaded into the front bushing 53. The jacking action will move the rod 20 to the left and pull its outer end toward the outer end of the fitting 60.

Again the thrust is entirely on the steel members: in this case on the rod 20 from one end and outwardly on the bushing 53. The flange 54 of the bushing 53 resolves this force against the steel band 50, so that none of it acts on the aluminum body 11.

Dual purpose attachment

Figs. 4 and 5 show an attachment that may be used both for spreading and compressing.

The attachment comprises two pieces 200 and 210. The member 200 comprises a bent steel bar or strap having a central section 201 and two end arms 202, 203 at opposite ends, both arms being turned at 90° to the central section 201 but in opposite directions. The end arm 202, which is approximately the length of the short ends of the strap 50, is turned inwardly at 90°, and the end arm 203 is turned outwardly 90°. An opening 204 through the inner arm 202 enables it to fit over the bushing 56. The outer arm 203 is provided with a serrated portion 205 that can grip when the attachment is being used for compression. The outer dimension of the member 200 (from the outer surface of the inner arm 202 to the outer surface of the outer arm 203) is approximately the outer dimension of the jack 10 (from the outer face of bushing 53 to the outer face of bushing 56).

A second steel bar 210 is used in combination with the member 200. The bar 210 is straight and has an opening 211 adapted to fit over the rod 20. When forced at a slight angle, the bar 210 clamps on the rod 20 and remains fixed in position. A serrated gripping portion 212 is provided at its outboard edge.

For a spreading operation the member 200 is put on the jack 10 with the opening 204 around the rear bushing 56 and with the central portion 201 resting against the band 50. The inner arm 202 rests on the flange 57, parallel to and the same length as the side of the band 50 that is beneath the bushing 56. The central portion 201 extends about the same length as the band 50, and the outer member 203 projects outwardly at the front end of the body 11. The member 210 is inserted over the rod 20 at the front end of the jack. The members 203 and 210 are inserted between the objects to be spread apart. The friction of the member 210 against the rod 20 maintains it in position on the rod 20, while the force against the member 200 merely acts to force the central portion 200 firmly against the strap 50. Jacking urges the member 210 apart from the arm 203, so as to spread the objects apart.

For compression, the member 200 remains in the same position, and the position of the member 210 is reversed. The inward arm 202 of the member 200 will still have its opening 204 around the rear bushing 53 and its central portion 201 will still extend toward the forward end of the jack 10, overlying the strap 50. The member 210 is placed on the portion of the rod 20 that projects out from the rear end of the jack 10. Jacking causes the rod 20 to move the member 210 toward the arm 203. Again the force acts on the member 210 to clamp it frictionally to the rod 20, while the force on the arm 203 merely compresses the central portion 203 tight against the strap 50.

It will be noted that in each case, the gripping surface 205 of the arm 203 engages the work and that the force is in the same direction, pushing the central portion 201 against the strap 50. The bar 210 is reversed in the operations, its gripping surface 212 facing the same direction as the surface 205 during compression and in the opposite direction during spreading. If the rod 20 is of the type that is threaded on one end, it will be necessary to pull out the rod 20 and reverse it when changing between spreading and compressing, so that the bar 210 can slip over the unthreaded end 22. This can be done by pushing forward on the washer flange 33

and then pulling the rod 20 out, again pressing the washers 27, 28 forward for reinsertion.

I claim:

1. A jack, including in combination: a body made from lightweight metal and having an axial passage extending therethrough; a closed band of strong metal surrounding said body and keyed thereto adjacent its axial extremities, said band having axial openings therethrough in line with said axial passage; a rod of strong metal extending through said axial openings and passage; a pair of load-engaging means, one of which also engages said body band, the other of which also engages said rod and is mounted thereon, whereby the load-engaging pressure is transmitted from the load engaging means to said band and said rod; and means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes said moving and holding means including means for transmitting the pressure on said rod to said body, said body being enabled to withstand the pressure by virtue of said band.

2. The jack of claim 1 in which said band is keyed to said body by means of annular members of said band extending into the openings through said body at each outer end of said axial passage, part of said moving means bearing upon one of said members.

3. The jack of claim 1 in which there are annular bushings of strong metal secured to said band in line with said axial openings, said bushings having an annular portion that fits in the opening through said body at each axial extremity and keys said band to said body, said bushings also being able to receive rigid fittings that may extend axially outwardly from said band and may serve as one said load-engaging means so that the force bearing on said fittings is transmitted to said band rather than to said body.

4. The jack of claim 3 in which said bushings each have a radially outwardly extending flange of large diameter than said axial openings through said band, the diameter of the remainder of said bushings being slightly smaller than said axial openings; the bushing at the end said rod moves toward being secured to said band with the flange inside said band and the rest of said bushing projecting outwardly through said axial opening; the bushing at the opposite end also projecting outwardly with its flange resting on and secured to the outside of said band.

5. A jack, including in combination: an aluminum body having an axial passage extending therethrough; a closed steel band surrounding said body and keyed thereto adjacent its axial extremities, said band having axial openings therethrough; a steel rod of strong metal extending through said axial openings and passage; a load-engaging means connected to said rod and transmitting its load-engaging pressure thereto; a second load-engaging means connected to said band and transmitting its load-engaging pressure thereto; and means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes, said means bearing against said body, said steel band supporting said body against breakage or injury by the pressures exerted by said moving means.

6. The jack of claim 5 in which said band is keyed to said body by means of annular members on said strap that extend into the openings through said body at each outer end of said axial passage.

7. The jack of claim 5 in which there are steel annular bushings secured to said band in line with said axial openings, said bushings having an annular portion that fits in the openings through said body at each axial extremity and keys said band to said body, said bushings also being threaded to receive rigid threaded fittings that may extend axially outwardly therefrom and serve as said second load-engaging means.

8. In a jack of the type having a body with a protuberance on one end around an axial opening therethrough and a rod movable axially through said opening

and held in position by said body, the combination therewith an attachment for spreading objects apart or compressing them together, said attachments comprising two strong metal bars; one said bar being a flat substantially straight piece with an opening therethrough adapted to receive said jack rod, for frictional engagement therewith upon the application of force to the outer end of said bar; the second said bar comprising a central portion with an arm perpendicular thereto at each end, one said arm having an opening therethrough adapted to fit over said rod and against said protuberance, the other arm extending in the opposite direction from the first said arm at the other end of said central portion and extending substantially the same radial distance from the axis as the first said bar.

9. The combination with a jack in which there is a body with an axial passage therethrough and a jack rod movable therealong, and in which said body has an annular protuberance around the axial opening at the end where said jack rod moves inwardly toward said body, of: a metal member having a central portion substantially the length of said body with an arm perpendicular thereto at each end, said arms extending in opposite directions, one of said arms having an opening therethrough adapted to fit said protuberance; and a matching, substantially flat bar having an opening to receive said jack rod for frictional engagement therewith when force is applied to the outer end of said flat bar, said bar extending out parallel to the outwardly extending arm of said metal member and for substantially the same radial distance, said flat bar being applied to said rod on the opposite end of said body from said protuberance when used with said outwardly extending member for spreading objects apart, and said flat bar being located on the same side as said protuberance when it and said outwardly extending member are used for pushing objects axially toward each other.

10. A jack, including in combination: a body made from lightweight metal and having an axial passage extending therethrough; a closed band of strong metal surrounding said body and keyed thereto adjacent its axial extremities, said band having axial openings therethrough in line with said axial passage; annular bushings of strong metal secured to said band in line with said axial openings, said bushings having an annular portion that fits in the opening through said body at each axial extremity and keys said band to said body, said bushings also being able to receive rigid fittings that may extend axially outwardly from said band, said bushings each having a radially-outwardly extending flange of larger diameter than said axial openings through said band, the diameter of the remainder of said bushings being slightly smaller than said axial openings; a rod of strong metal extending through said axial openings and passage; means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes, the bushing at the end said rod moves toward being secured to said band with the flange inside said band and the rest of said bushing projecting outwardly through said axial opening, the bushing at the opposite end also projecting outwardly with its flange resting on and secured to the outside of said band; and an attachment for spreading objects apart or compressing them together, said attachment comprising two strong metal bars; one said bar being a flat substantially straight piece with an opening therethrough adapted to receive said jack rod, for frictional engagement therewith upon the application of force to its outer end; the second said bar comprising a central portion substantially the length of said band and adapted to rest thereon, with an arm perpendicular thereto at each end, one said arm having an opening therethrough adapted to fit over the body of one of said bushings, the other arm extending in the opposite direction from the first said arm at the other end of said central portion and extending substantially the same radial distance from the axis as the first said bar.

11. A jack, including in combination: a body made from lightweight metal and having an axial passage extending therethrough; a closed band of strong metal surrounding said body and keyed thereto adjacent its axial extremities, said band having axial openings there-
 through in line with said axial passage; a rod of strong metal extending through said axial openings and pas-
 sage; means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes, said band having an annular protuberance around the axial opening at the end where said jack rod moves inwardly toward said body; a metal member having a central portion substantially the length of said band with an arm perpendicular thereto at each end, said arms extending in opposite directions, one of said arms having an opening therethrough adapted to fit said protuberance; and a matching substantially flat bar having an opening to receive said jack rod for frictional engagement therewith when force is applied to the outer end of said flat bar, said bar extending out parallel to the outwardly extending arm of said metal member and for substantially the same radial distance, said flat bar being applied to said rod on the opposite end of said body from said protuberance when used with said outwardly extending member for spreading objects apart, and said flat bar being located on the same side as said protuberance when it and said outwardly extending member are used for pushing objects axially toward each other.

12. A jack, including in combination: a body having an axial passage extending therethrough between axial openings at each end, said body having a protruding annular boss around one of said openings; a rod extending through said axial openings and passage; means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes; and means for spreading objects apart or compressing them together, said means comprising two strong metal bars; one said bar being a flat substantially straight piece with an opening therethrough adapted to receive said jack rod, for frictional engagement therewith upon the application of force to its outer end; the second said bar comprising a central portion substantially the length of said body and adapted to rest thereon, with an arm perpendicular thereto at each end, one said arm having an opening therethrough adapted to fit over said annular boss, the other arm extending in the opposite direction from the first said arm at the other end of said central portion and extending substantially the same radial distance from the axis as the first said bar.

13. A jack, including in combination: a body having an axial passage extending therethrough between axial openings at each end; a rod extending through said axial openings and passage; means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes; said body having an annular protuberance around the axial opening at the end where said jack rod moves inwardly toward said body; a metal member having a central portion substantially the length of said body with an arm perpendicular thereto at each end, said arms extending in opposite directions, one of said arms having an opening therethrough adapted to fit said protuberance; and a matching substantially flat bar having an opening to receive said jack rod for frictional engagement therewith when force is applied to the outer end of said flat bar, said bar extending out parallel to the outwardly extending arm of said metal member and for substantially the same radial distance, said flat bar being applied to said rod on the opposite end of said body from said protuberance when used with said outwardly extending member for spreading objects apart, and said flat bar being located on the same side as said protuber-

ance when it and said outwardly extending member are used for pushing objects axially toward each other.

14. A jack, including in combination: a body made from lightweight metal and having an axial passage extending therethrough; a closed band of strong metal surrounding said body and keyed thereto adjacent its axial extremities, said band having axial openings therethrough in line with said axial passage; first load-engaging means connected to said band and transmitting its load-engaging pressure thereto, whereby said body is protected therefrom; a rod of strong metal extending through said axial openings and passage; second load-engaging means connected to said rod and transmitting its load-engaging force thereto; and means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes, said means comprising a friction clamp adapted to engage said rod, an operating member for tilting the clamp into gripping engagement with said rod, spring means for returning said clamp to normal untilted position, said spring means bearing between said clamp and said body, and a holding clamp engaging said body to retain said jack rod in the position where it is moved; whereby said band strengthens said body so that said jack can be light in weight and still withstand far higher pressures than a body, constructed solely of said lightweight metal and without said band, could withstand.

15. A jack, including in combination: an aluminum body having an axial passage extending therethrough; a closed steel band surrounding said body and keyed thereto adjacent its axial extremities, said band having axial openings therethrough; first load-engaging means connected to said band and transmitting its load-engaging force thereto; a steel rod of strong metal extending through said axial openings and passage; second load-engaging means connected to said rod and transmitting its load-engaging force thereto; and means in said body for moving said rod forward axially and for holding it in its advanced position between advancing strokes, said means including clamp means adapted to engage said rod, means for moving said clamp means in one direction, spring means bearing on said body and opposing said movement, means for releasing said clamp means, and spring pressed holding means bearing on said body and engaging said rod when said clamp means is released; said aluminum body being enabled to withstand large pressures transmitted to it by said rod-moving means by virtue of being surrounded by and supported by said closed steel band.

16. The jack of claim 15 in which said first load-engaging means comprises a first strong metal bar with a central portion substantially the length of said band and adapted to rest thereon, with arms perpendicular thereto at each end but extending in opposite directions, one said arm having an opening therethrough substantially larger in diameter than said rod so that said rod can move freely therethrough; a projection on said band co-axial with said rod and adapted to fit into said arm opening and aid in supporting said first bar; said second load-engaging means comprising a second strong metal bar, being substantially straight with an opening therethrough adapted to receive said jack rod and to engage said rod when said second bar is slightly inclined thereto, said two bars being thereby adapted for spreading objects apart or moving them together.

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