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2,155,705

ADJUSTABLE TEMPLATE MEANS

Filed April 8, 1937

Fig. 1.

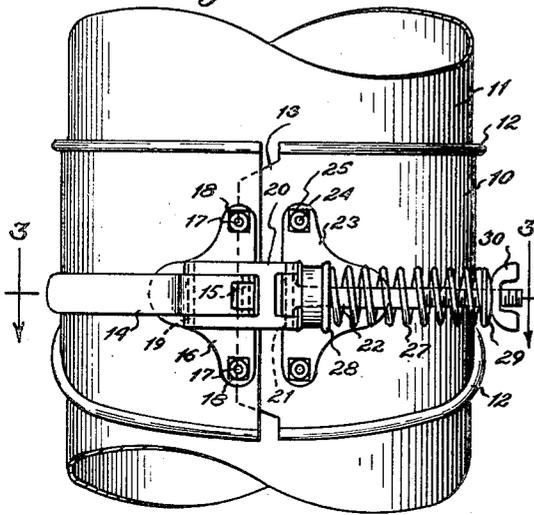


Fig. 2.

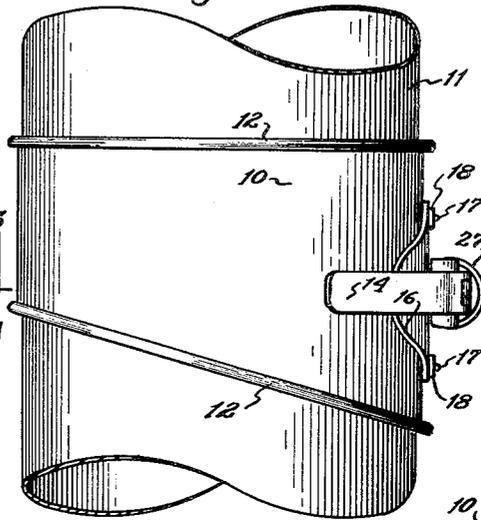


Fig. 3.

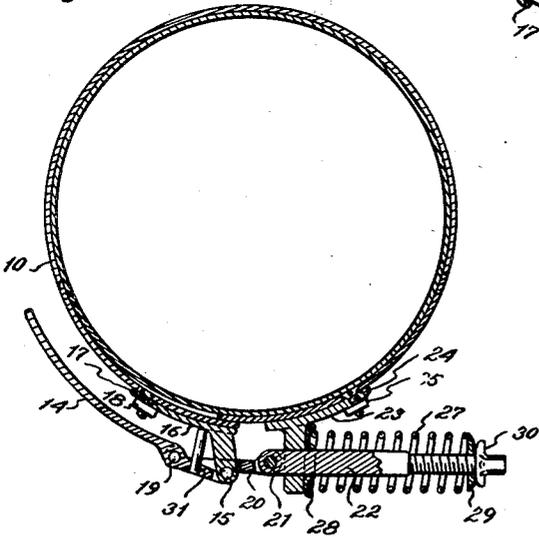


Fig. 4.

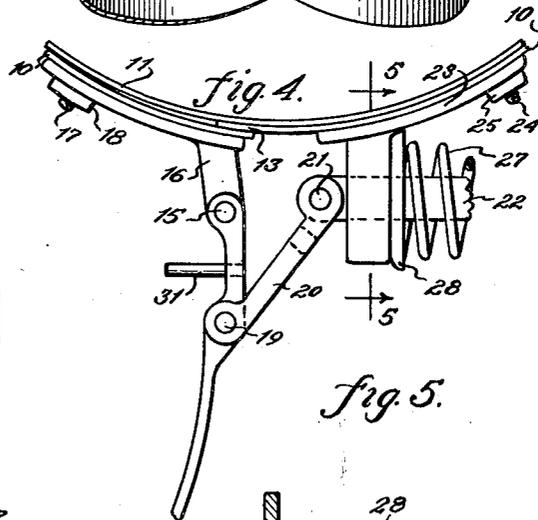


Fig. 5.

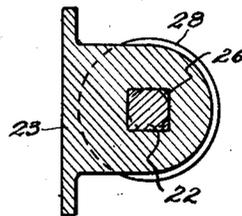
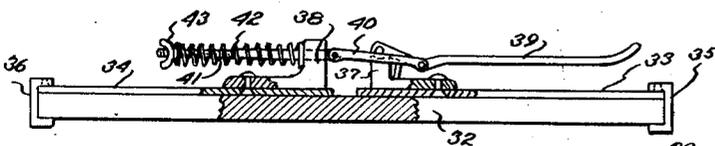


Fig. 6.



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ADJUSTABLE TEMPLATE MEANS

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Application April 8, 1937, Serial No. 135,707

10 Claims. (Cl. 29-67)

My invention relates to templates, jigs, and similar devices for use with articles to be machined, cut, or otherwise processed, more particularly to such devices having adjustable clamping means for positively gripping articles of varying dimensions, and has for an object the provision of simple, reliable, and inexpensive devices of this character.

Templates or jigs of this general character have heretofore been provided with relatively movable portions for spanning the article to be machined or cut and with means for drawing the relatively movable portions together positively to grip the article. Considerable difficulty has been encountered in devices of this character, particularly in connection with templates for use in cutting pipe elbows from straight lengths of pipe, due to the fact that the pipe to be cut may vary in diameter to such an extent as seriously to affect the gripping action of the template. Thus, templates heretofore used have comprised a split band adapted to surround the pipe, and it will be apparent that if conventional non-adjustable clamping means are provided for drawing the split ends of the band together, considerable difficulty may arise due to variations in the diameter of the pipe. If the diameter of the pipe is too great it may be impossible to completely close the clamping means without deforming the pipe, and if the pipe diameter is too small closure of the clamping means may not effect the positive gripping action desired.

In an attempt to provide adjustability for template means of this character, it has also been proposed to provide screw type clamping means having right- and left-hand threads arranged to co-operate with the ends of the split band so as to draw these ends together when the threaded means is rotated. In order to provide the desired gripping action, it is, of course, necessary to use threads of relatively fine pitch and, accordingly, a considerable time may be required to effect gripping or releasing of the pipe. Furthermore, the degree of gripping action obtained is dependent entirely upon the person operating the threaded means, that is, it is dependent upon the force applied by the operator. Something is yet to be desired, therefore, in template means of this character for use with objects of varying dimensions and, accordingly, it is a further object of my invention to provide a self-adjustable template which is quickly operable between gripping and releasing positions and which operates with an automatic compensating action positively

to grip objects the external dimensions of which vary within wide limits.

In carrying out my invention in one form, I provide template means comprising relatively movable gripping portions for spanning the object to be processed, toggle means pivotally connected to one of the gripping portions, and resilient means interposed between the toggle means and the other of the gripping portions for exerting a force tending to draw the gripping portions together positively to grip the object when the toggle means is moved to its clamping position, the resilient means being arranged automatically to compensate for variations in the external dimensions of the object being gripped.

More particularly the template may comprise an axially split band adapted to surround a pipe to be cut, the split edges of the band being movable toward each other to cause the band to grip the pipe, and the toggle means may comprise a handle pivotally supported on one of the edges and pivotally engaged by a link which forms therewith an operating toggle. The other end of this link engages means for guiding this end of the link for reciprocal movement, and the knee point of the toggle is arranged to pass through its straight line position when the handle is moved between its clamping and its releasing positions. Interposed between the reciprocally movable end of the link and the other edge of the split band, I provide spring means adapted to be stressed by movement of the link for exerting on the band a force tending to draw the edges thereof together so as positively to grip the pipe, and an adjustable connection is provided between the spring means and the toggle link so that the template may be adjusted to provide for major variations in the pipe diameter, the spring means automatically compensating for minor variations in the pipe diameter. Since the knee point of the toggle passes through its straight line position during movement of the handle between its clamping and releasing positions, the spring means exerts on the toggle formed by the handle and the link a force which reverses as the toggle passes through its straight line position and, accordingly, the spring means selectively biases the handle to either its clamping position or its releasing position upon operation thereto.

For a more complete understanding of my invention, reference should now be had to the drawing in which:

Figure 1 is a plan view of template means embodying my invention for use in cutting off lengths of pipe;

Fig. 2 is a side view of the device shown in Fig. 1;

Fig. 3 is a sectional view taken along the line 3-3 of Fig. 1 showing the template in its clamping position, certain parts being shown in elevation more clearly to illustrate the construction;

Fig. 4 is a fragmentary enlarged view showing the template means in its releasing position;

Fig. 5 is a sectional view taken along the line 5-5 of Fig. 4; and

Fig. 6 is an elevational view partly in section of a modified form of template embodying my invention.

Referring now to Figs. 1 to 5, inclusive, I have shown my invention as applied to a template comprising a split band 10 adapted to surround a pipe 11 which is to be cut, the edges of the band 10 being provided with suitable beads 12 for guiding a cutting tool in a manner well known in the art. Since the cutting apparatus ordinarily used with templates of this character for cutting pipe elbows from straight lengths of pipe is well known in the art and constitutes no part of the present invention, such cutting apparatus has not been shown. Such cutting apparatus, for example, may comprise a pair of inner and outer cutting rolls having circumferential knife edges arranged progressively to cut the pipe as the cutting rolls move about the periphery thereof, the outer cutting roll being provided with a groove for receiving the guide bead 12 on the split band 10. One of the split edges of the band 10 is provided with a tongue 13 which extends in interlapping relation with the other edge of the band so as to guide the split edges for movement toward each other positively to grip the pipe when the clamping means to be hereinafter described is operated to its clamping position.

In the preferred embodiment of my invention shown, the clamping means is of the type known in the art as toggle means and comprises a handle 14 one end of which is pivotally mounted on a pin 15 carried by a supporting member 16 which is rigidly secured to one edge of the split band 10 in any suitable manner as, for example, by the bolts and nuts 17 and 18, respectively, the heads of the bolts 17 being countersunk as shown in Fig. 3. Intermediate its ends the handle 14 carries a pivot pin 19 for pivotally engaging one end of a bifurcated link 20, the other end of which pivotally engages a pin 21 extending through and carried by a reciprocating member 22 journaled for reciprocal movement in a supporting member 23 which is secured by suitable bolts and nuts 24 and 25, respectively, to the other edge of the split band 10.

As shown, the supporting member 23 is provided with an outwardly extending portion having an aperture 26 therein (Fig. 5) through which the reciprocal member 22 extends, and a spring 27 is provided surrounding the reciprocal member 22 with one end of the spring engaging a spring seat 28 which abuttingly engages the extending portion of the support 23, and the other end of the spring engaging a spring seat 29 which abuttingly engages an adjustable member or nut 30, which nut threadedly engages the outermost end of the reciprocal member 22.

It will thus be seen that the reciprocal member 22 and the support 23 constitute guide means for guiding one end of the link 20 for reciprocal movement, and the link 20 in co-operation with the handle 14 forms a toggle the knee point of which is formed by the pivot pin 19.

In Fig. 4 the template means is shown with the handle 14 and the toggle formed by the handle and the link 20 in their respective releasing positions, in which positions the spring 27 is relaxed and the band 10 accordingly does not grip the pipe 11. It will be apparent that when the handle 14 is moved from the releasing position shown in Fig. 4 to the clamping position shown in Fig. 3, the toggle will be moved towards its straight line position so as to move the right-hand end of the link 20 in a left-hand direction and stress the spring 27, the spring 27 thereupon exerting a force upon the band 10 which force tends to draw the edges of the band together so that the band positively grips the pipe 11. In the clamping position shown in Fig. 3, the knee point of the toggle formed by the pivot pin 19 has passed slightly beyond the straight line position of the toggle, and, accordingly, the spring 27 exerts on the link 20 and the handle 14 a force which tends to rotate the handle 14 in a clockwise direction about the pivot pin 15. Movement of the handle 14 in this direction is prevented, however, by a stop pin 31 which extends outwardly from the handle 14 for abutting engagement with the support 16. It will likewise be apparent that when the handle 14 is moved from the position shown in Fig. 3 toward the releasing position shown in Fig. 4, the stress on the spring 27 decreases so as to release the grip of the band 10 on the pipe 11, and the force exerted by the spring on the toggle is reversed as soon as the knee point 19 of the toggle passes through its straight line position so that the spring thereafter biases the handle 14 for movement in a counterclockwise direction. Accordingly, the spring 27 is effective selectively to bias the handle 14 to either its clamping position shown in Fig. 3, or to its releasing position shown in Fig. 4 upon operation of the handle to these positions.

The spring 27 permits relative reciprocal movement of the member 22 and the right-hand end of the link 20 with respect to the support 23 which is secured to one edge of the band 10, and, accordingly, the clamping means automatically compensates for variations in the diameter of the pipe 11. Thus, if a larger diameter pipe is used, the pin 21 when in the clamping position shown in Fig. 3 will be spaced farther from the outwardly extending portion of the support 23, the spring 27 being compressed to a greater degree, while if a smaller diameter of pipe is encountered, the pin 21 when in the clamping position will be closer to the outstanding portion of the support 23. In each case the spring 27 exerts on the band 10 a force which is sufficient to cause a positive gripping action. The degree of automatic compensation which is obtainable by the spring 27 is, of course, limited to small variations in the diameter of the pipe, and in order to provide for universal application of the template means to pipe diameters which vary through a somewhat larger range, the clamping means may be initially adjusted to approximately the desired diameter by adjusting the nut 30 along the reciprocal member 22.

While template means embodying my invention are particularly applicable to pipe-cutting operations, my invention is not limited thereto, and in Fig. 6 I have shown a somewhat different form of template for positively gripping plates or other flat objects such, for example, as the plate 32. In this embodiment of my invention the movable portions of the template comprise

a pair of plates 33 and 34, the outermost ends of which are respectively provided with clips 35 and 36, the plates and the clips being arranged to span the plate 32 so that when the plates 33 and 34, respectively, are drawn inwardly upon operation of the clamping means to its clamping position, the clips 35 and 36 positively grip the plate 32. It will, of course, be understood that the plates 33 and 34 may be of any desired character and may be provided, for example, with suitable drill-guiding apertures, or the edges of the plates may be shaped to guide suitable cutting tools. In this embodiment of my invention supporting members 37 and 38, respectively, are secured to the movable portions 33 and 34, the support 37 being arranged pivotally to support a handle 39 which pivotally engages a toggle link 40, the opposite end of which is pivotally connected to a reciprocal member 41 journaled in the support 38 and surrounded by a spring 42, the opposite ends of which respectively abut the support 38 and an adjustable nut 43. It is believed that the operation of this embodiment of my invention will be clear from the above description of the embodiment shown in Figs. 1 to 5, inclusive, and accordingly the operation will not be described in detail.

It will thus be seen that I have provided improved template means which may be quickly and easily clamped to an object to be processed or worked, which template means positively grips the object and automatically compensates for minor variations in the dimensions of the object and which may be initially adjusted to take care of major variations in the dimensions of the object. In addition to the speedy opening and closing operation provided, the clamping means is so arranged as to be selectively biased to either its clamping or releasing positions so as to insure positive operation thereof.

While I have shown particular embodiments of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

1. Clamping means for positively gripping objects of varying external dimensions comprising relatively movable gripping portions for spanning an object, toggle means including a pair of pivotally engaging links one of which is pivotally connected to one of said gripping portions, a slidable member journaled in the other of said gripping portions and pivotally connected to the other of said toggle links, said toggle means being movable from a clamping position to a releasing position, spring means interposed between said slidable member and the other one of said gripping portions and adapted to be stressed upon movement of said toggle means to said clamping position for exerting on said gripping portions a force tending to draw said portions together positively to grip said object, and an adjustable connection between said spring means and said slidable member for adjusting said clamping means to provide for major variations in the external dimensions of the object, said spring means automatically compensating for minor variations in the external dimension of the object.

2. Clamping means for positively gripping objects of varying external dimensions comprising relatively movable gripping portions for

spanning an object, an operating handle pivotally mounted on one of said portions for movement between a clamping position and a releasing position, a link pivotally engaging said handle for forming therewith an operating toggle, means pivotally mounting the opposite end of said link and guiding the same for reciprocatory movement when said handle is operated between said clamping and releasing positions, and resilient means connected to the other one of said gripping portions and to said opposite end of said link and adapted to be stressed by movement of said link for exerting on said gripping portions a force tending to draw said portions together positively to grip said object when said handle is moved to said clamping position.

3. Clamping means for positively gripping objects of varying external dimensions comprising relatively movable gripping portions for spanning an object, an operating handle pivotally mounted on one of said portions for movement between a clamping position and a releasing position, a link pivotally engaging said handle for forming therewith an operating toggle, means pivotally mounting the opposite end of said link and guiding the same for reciprocatory movement when said handle is operated between said clamping and releasing positions, and spring means connected between the other one of said gripping portions and said opposite end of said link and adapted to be stressed by movement of said link for exerting on said gripping portions a force tending to draw said portions together positively to grip said object when said handle is moved to said clamping position, said spring means permitting limited reciprocatory movement of said opposite end of said link relative to said other gripping portion to compensate for variations in the external dimensions of said object.

4. Clamping means for positively gripping objects of varying external dimensions, comprising relatively movable gripping portions for spanning an object, toggle means including a pair of links, one of which is pivotally supported on one of said gripping portions, said toggle means having a knee-point which passes through its straight line position upon movement of said toggle means between clamping and releasing positions, and resilient means interposed between the other link of said toggle means and the other of said gripping portions and pivotally connected to said other toggle link for exerting on said gripping portions a force tending to draw said portions together positively to grip said object when said toggle means is moved to said clamping position, said resilient means exerting on said toggle means a biasing force which reverses upon passage of said knee-point through said straight line position, whereby said resilient means selectively biases said toggle means to said clamping position or to said releasing position upon operation of said toggle means thereto.

5. Clamping means for positively gripping objects of varying external dimensions comprising relatively movable gripping portions for spanning an object, an operating handle pivotally mounted on one of said portions for movement between a clamping position and a releasing position, a link pivotally engaging said handle for forming therewith an operating toggle, the knee-point of which moves through its straight line position upon movement of said handle between said clamping and releasing positions, means guiding the opposite end of said link for reciprocatory movement when said handle is operated,

and spring means connected between the other one of said gripping portions and said opposite end of said link for exerting on said gripping portions a force tending to draw said portions together positively to grip said object and for selectively biasing said handle to either its clamping or releasing position upon operation thereto, said spring means permitting reciprocity movement of said opposite end of said link relative to said other gripping portion to compensate for variations in the external dimensions of said object.

6. In combination, tool guiding template means having relatively movable portions for spanning an object to be machined, toggle means including a pair of pivotally engaging links one of which is pivotally connected to one of said movable portions, said toggle means being movable between clamping and releasing positions, and resilient means interposed between the other one of said toggle links and the other one of said movable portions and adapted to be stressed upon movement of said toggle means to said clamping positions for exerting a force tending to draw said portions together whereby said template means positively grips said object to prevent slippage during the machining operation, said resilient means providing automatic compensation for variations in the external dimensions of said object.

7. In combination, a template for use in cutting off lengths of pipe, comprising an axially split band adapted to surround the pipe, the split edges of said band being movable toward each other to cause said band positively to grip said pipe during the cutting operation, means on said band for guiding a cutting tool, toggle means including a pair of pivotally engaging links one of which is pivotally supported on one of said split edges, said toggle means being movable between clamping and releasing positions, spring means interposed between the other one of said toggle links and the other edge of said band and adapted to be stressed upon movement of said toggle means to said clamping position for exerting on said band a force tending to draw said edges together whereby said band positively grips said pipe, and an adjustable connection between said spring means and said other toggle link for adjusting said template to provide for major variations in the diameter of the pipe being cut, said spring means automatically compensating for minor variations in the diameter of the pipe being cut.

8. In combination, a template for use in cutting off lengths of pipe, comprising a band adapted to surround the pipe having portions movable relative to each other for positively gripping the pipe, means on said band for guiding a cutting tool, toggle means pivotally connected to one of said movable portions for movement between clamping and releasing positions, said toggle means having a knee-point which passes through its straight line position during said movement of said toggle means, and resilient means interposed between said toggle means and the other of said movable portions for exerting a force tend-

ing to draw said portions together when said toggle means is moved to said clamping position whereby said band positively grips said pipe, said resilient means exerting on said toggle means a force which reverses upon passage of said knee-point through said straight line position, whereby said resilient means selectively biases said toggle means to either said clamping or releasing positions upon operation of said toggle means thereto.

9. In combination, a template for use in cutting off lengths of pipe, comprising an axially split band adapted to surround the pipe, the split edges of said band being movable toward each other along the surface of said pipe to cause said band positively to grip said pipe during the cutting operation, means on said band for guiding a cutting tool, an operating handle pivotally mounted on one of said split edges for movement between clamping and releasing positions, a link pivotally engaging said handle for forming therewith an operating toggle the knee-point of which passes through its straight line position upon movement of said handle between said clamping and releasing positions, means pivotally supporting the opposite end of said link and guiding the same for reciprocity movement when said handle is operated, and spring means connected between the other edge of said band and said opposite end of said link for exerting on said band a force tending to draw said edges together whereby said band positively grips said pipe, and for selectively biasing said handle to either its clamping or releasing positions upon operation thereto, said spring means permitting reciprocity movement of said link relative to said other edge of said band to compensate for variations in the diameter of the pipe being cut.

10. Clamping means for positively gripping objects having varying external dimensions, comprising gripping portions for spanning an object, said gripping portions having end portions closely adjacent each other and movable toward and away from each other substantially parallel to a surface of said object, a pair of outwardly extending supporting posts respectively rigidly secured to said end portions closely adjacent each other, a handle member pivotally connected to one of said posts for movement between clamping and releasing positions, a reciprocity member journaled in said other supporting post for slidable movement therethrough, a spring for urging said reciprocity member away from said handle, and a link pivotally connected to said handle and to the other end of said reciprocity member adjacent said handle to form a toggle with said handle, whereby when said handle is moved toward clamping position said toggle moves said member in a direction to stress said spring and exert on said clamping portions a force tending to move said end portions toward each other positively to grip said object in said clamping portions, said toggle being arranged to move said end portions toward each other without effecting transverse movement thereof away from said object, and said spring compensating for variations in the external dimensions of said object.

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