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BENDING TOOL HAVING A SELECTIVELY POSITIONED FULCRUM

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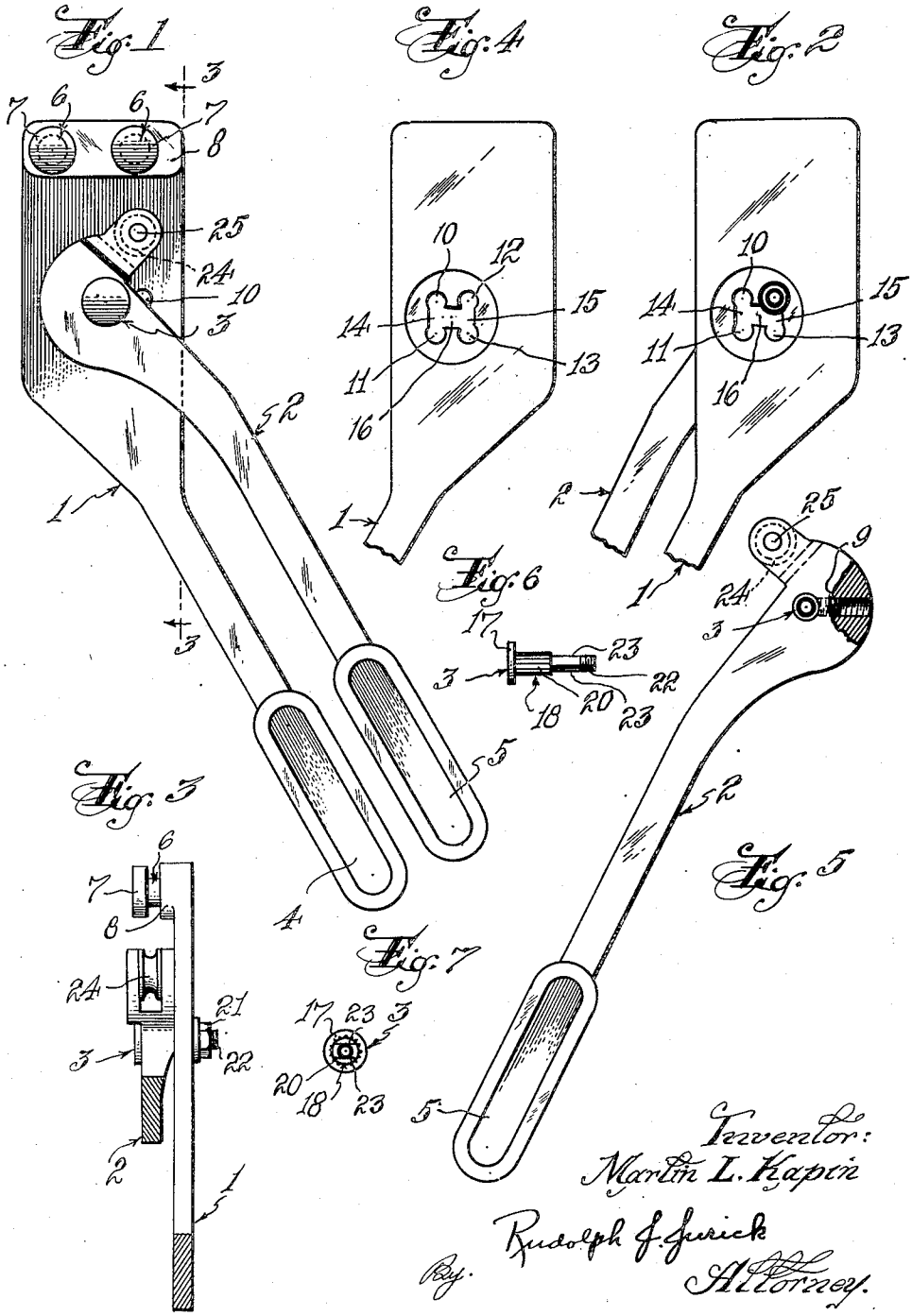

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BENDING TOOL HAVING A SELECTIVELY POSITIONED FULCRUM

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3 Claims. (Cl. 81—15)

This invention relates to a bending tool and more particularly to a tool for bending heavy transmission throttle arms.

Where automatic transmissions are used on vehicles, it is customary to provide a mechanical linkage between the engine carburetor throttle valve and the automatic transmission. The linkage must be maintained in the proper relationship so as to insure the correct movement of the transmission throttle arm throughout the entire range of movement of the carburetor throttle valve. During adjustment of the linkage it is often found necessary to bend the transmission throttle arm in order to obtain the proper relationship between the carburetor valve movement and the transmission throttle arm movement.

Different automatic transmissions may utilize different sized throttle arms and it would be very costly and inconvenient if it were necessary to have a separate bending tool for every size of throttle arm. The improved bending tool of this invention is provided with a selectively positioned fulcrum means whereby different sized transmission throttle arms may be accommodated in the one bending device thereby eliminating the necessity of having a different bending tool for every size of throttle arm.

While it is generally necessary to bend the transmission throttle arm only a small amount in order to effect the proper relationship between the movement of the transmission throttle arm and the carburetor throttle valve, it may sometimes be necessary to bend the transmission throttle arm to a considerable degree in order to obtain the proper relationship. The bending device of this invention is adjustable so that not only may different sized throttle arms be bent but also any one size of transmission throttle arm may be bent through a wide degree of angles.

The transmission throttle arm is generally mounted upon a shaft which extends into the interior of the transmission casing and care must be taken during the bending of the throttle arm so as not to bend the shaft for, if the shaft is bent, the job changes from one of minor adjustment to one of major repair. The improved bending tool of this invention supplies, through an operator, all the forces which are necessary to bend the throttle arm. This minimizes the possibility of bending the shaft while the throttle arm is being bent as it is not necessary to exert any force upon the shaft while bending the throttle arm.

An object of this invention is the provision of a bending tool comprising a pair of pivotally connected levers having a selectively positioned fulcrum which tool is of rugged and simple construction and easy to operate.

An object of this invention is the provision of a device for bending throttle arms, said device comprising a pair of levers pivotally connected by means of a selectively positioned fulcrum, and means attached to the levers for engaging the throttle arm to be bent.

An object of this invention is the provision of a throttle arm bending device comprising a pair of levers pivoted

intermediate of their ends, corresponding ends of each lever forming hand grips, the opposite corresponding ends of each lever having means for engaging the throttle arm, said levers being pivoted intermediate of their ends by means of a selectively positioned fulcrum whereby throttle arms of various sizes may be accommodated and throttle arms of any given size may be bent to varying degrees.

An object of this invention is the provision of a device for bending throttle arms and the like, such device comprising a pair of levers which are provided with a pivotal connection at a point intermediate the ends thereof, corresponding ends of each lever forming hand grips, the other end of one lever having formed thereon a pair of lugs between which the throttle arm is placed, the other end of the other lever being formed with a throttle arm engaging member in the form of a grooved roller, said pivotal connection comprising a selectively positioned fulcrum means whereby throttle arms of various sizes may be accommodated and throttle arms of any given size may be bent to varying degrees.

An object of this invention is the provision of a device for bending throttle arms and the like, such device comprising a pair of levers which are provided with a pivotal connection at a point intermediate the ends thereof, corresponding ends of each lever forming hand grips, the other end of one lever having formed thereon a pair of lugs between which the throttle arm is placed, the other end of the other arm being formed with a throttle arm engaging member in the form of a grooved roller for reducing friction between the throttle arm and lever when the throttle arm is being bent, said pivotal connection being of a selectively positioned fulcrum type comprising a plurality of pairs of holes in one of said levers, substantially parallel slots having a width somewhat less than the diameter of said holes and communicating with each of a pair of holes, a transverse slot interconnecting said parallel slots intermediate the ends of the parallel slots, a cylindrical pin rigidly fastened to the other said lever and extending through the one lever, said pin being provided with a flat portion on the cylindrical portion thereof, the maximum thickness of the pin perpendicular to the flat portion being somewhat less than the width of the parallel slots thereby providing a sliding engagement between the pin and the slots when the pin is in a slot, and the diameter of the pin being somewhat less than the diameter of the holes thereby providing a rotary engagement between the pin and hole when the pin is in a hole.

These and other objects and advantages will become apparent from the following description when taken with the accompanying drawings illustrating the invention. It will be understood that the drawings are for purposes of illustration only and are not to be construed as defining the scope or limitations of the invention, reference being had for the latter purpose to the appended claims.

In the drawings wherein like reference numerals represent like parts in the several views:

Figure 1 is a front elevation of the throttle arm bending device;

Figure 2 is a fragmentary back elevation of the device;

Figure 3 is a sectional view along line 3—3 of Figure 1;

Figure 4 is a fragmentary back elevation of the rear lever;

Figure 5 is a back elevation of the front lever with a portion of the front lever broken away;

Figure 6 is an enlarged side view of the pin upon which the levers pivot; and

Figure 7 is an enlarged end view of the pin.

Referring to Figure 1 of the drawings, the bending device comprises a pair of lever arms 1 and 2 which pivot about a pin 3 and are provided with hand gripping surfaces 4 and 5, respectively, at corresponding ends thereof.

The lever 1 is provided with a pair of upstanding lugs 6 which are mounted upon a boss 8. The lugs 6, as best seen in Figure 3, have enlarged heads 7 which prevent the throttle arm which is to be bent from slipping off the ends of the lugs.

The lever 2 is bifurcated at one end and contains a pin 25 which spans the gap between the bifurcated ends and supports a grooved roller 24. Such roller reduces the friction between the end of the lever and the throttle arm which is being bent as there is relative movement between the two during the bending process.

The levers 1 and 2 of the bending device are provided with a selectively positioned fulcrum. A selectively positioned fulcrum is necessary, primarily, for two reasons: first, to obtain different degrees of bending of any given throttle arm with the same bending tool and, secondly, to accommodate different sized throttle arms in the same bending tool. The pivotal connection, which is provided between the two levers, enables the operator to select any one of four fulcrum positions for the levers, thereby providing the bending tool with the necessary selectively positioned fulcrum means.

The pivotal connection of the bending device comprises an H-shaped aperture in the lever 1, as best illustrated in Figures 2 and 4 of the drawings, and a pin 3, which is rigidly fastened to the lever 2 and extends through the H-shaped aperture in the lever 1.

The H-shaped aperture in the lever 1 comprises two pairs of circular-shaped holes 10, 11 and 12, 13 respectively, which pairs of holes are connected by elongated slots 14 and 15, respectively, the longitudinal axis of each slot intersecting the centers of the interconnected holes. The width of the slots 14 and 15 is somewhat less than the diameter of the holes 10, 11 and 12, 13; the reason for which will become obvious as the description of the pivotal connection proceeds. A transverse slot 16 connects the slots 14 and 15 at a point intermediate the ends of the slots 14 and 15.

The pin 3, which extends through the H-shaped aperture in the lever 1, comprises a head 17 and a cylindrical portion 18 as illustrated in Figures 6 and 7 of the drawings. The head of the pin 3 abuts the side of the lever 2 and the pin 3 is securely fastened to the lever 2 by means of a set screw 9, such as illustrated in Figure 5 of the drawings, or by means of splines 20 on the cylindrical portion 18 of the pin such as illustrated in Figure 6 of the drawings, or any other suitable means. A nut 21, engages threads 22 on the end of the pin 3 thereby preventing the levers from separating. The cylindrical portion 18 of the pin 3 which extends through the H-shaped aperture in lever 1 is provided with a pair of oppositely disposed flat parallel plane surfaces 23 as best seen in Figures 6 and 7 of the drawings.

The diameter of the cylindrical portion 18 of the pin 3 is somewhat less than the diameter of the holes 10, 11 and 12, 13 in the lever 1. Being somewhat less in diameter than the holes, the pin may be rotated while in any one of the four holes thereby providing a bending tool, which may be operated to bend transmission throttle arms, which has a selectively positioned fulcrum. The parallel slots 14 and 15, along with the transverse slot 16, are necessary in order that the pin may be easily and quickly slid from one hole to another, for, without the slots, it would be necessary for the operator, in order to change fulcrum positions, to remove the nut 21 from the end of the pin 3, place the pin in the desired hole, and then replace the nut. The parallel slots 14 and 15 along with the transverse slot 16, permit the fulcrum of the bending tool to be selectively adjusted without disassembly of the levers 1 and 2.

The diameter of the cylindrical portion 18 of the pin 3 is somewhat greater than the width of the parallel slots 14 and 15, while the perpendicular distance between the flat parallel plane surfaces 23 on the cylindrical

portion 18 of the pin 3 is somewhat less than the width of the slots 14 and 15. Obviously, the pin may be slid in the slots only when the flat parallel plane surfaces 23 are parallel to the sides of the slots. In this manner, it is seen that the fulcrum point of the bending device may be changed from one operative position to another merely by aligning the flat parallel plane surfaces 23 with the sides of the slots and sliding the flat parallel plane surfaces 23 along the sides of the slots to any of the desired holes 10, 11, 12 or 13.

The width of the transverse slot 16 is greater than the diameter of the cylindrical portion 18 of the pin 3. This allows the pin to be moved across the transverse slot while in any relative relation to the slot; it not being necessary to have the flat parallel plane surface 23 in parallel relation to the sides of the transverse slot in order to move the pin from one parallel slot to the other. The transverse slot 16 must be somewhat wider than the diameter of the cylindrical portion 18 of the pin 3, at least at the point that the transverse slot terminates in the parallel slots, in order that the flat parallel plane surfaces 23 of the pin 3 may be aligned with the sides of the parallel slots as the pin enters one of the parallel slots 14 or 15 from the transverse slot 16, for if the transverse slot was not somewhat greater in width than the diameter of the cylindrical portion 18 of the pin 3, at least at the point that the transverse slot terminates in the parallel slots, it would not be possible to transfer the pin from the parallel slots to the transverse slot, or vice versa, as the case may be.

The pin 3 is rigidly fastened to the lever 2; therefore, in order to rotate the pin it is merely necessary to rotate the levers 1 and 2 relative to each other. The pin is not only rigidly fastened to lever 2, but it is fastened in such a position that while the levers of the bending tool are in any of the four fulcrum positions and the levers are in an operative bending position, relative to each other, the flat paralel plane surfaces 23 on the pin 3 do not lie parallel to the sides of the parallel slots 14 and 15. While the levers are in operative bending position, only rotary movement between the two levers is possible. In order to move the levers to a different fulcrum position, to either accommodate a different size throttle arm or to effect a different degree of bending on a given size throttle arm, it is necesary to first place the flat parallel plane surfaces 23, on the pin 3, in a parallel relationship to the sides of the slots 14 and 15. This is done by rotating the levers to a position in which the levers are spread wide apart, or preferably at an angle of approximately 90° to each other. While in this position, the flat parallel plane surfaces 23 on the pin 3 will be parallel to the sides of the parallel slots and the pin may be slid out of the hole it is in, and into the connecting slot. From the slot, the pin may be moved to any desired hole, thereby changing the fulcrum position between the two levers.

In operating the bending device the levers are spread apart enough to accomodate a throttle arm, which is placed between the lugs 6 and over the grooved roller 24. As the handles of the levers are brought together, roller 24 will roll along the throttle arm, bending the arm. During the bending process, there will be a downward component of force upon the left-hand lug and an upward component of force upon the right-hand lug, as viewer in Figure 1 of the drawings. The resulting bend will be in the same direction with respect to the tool at all times, therefore, to bend the arm in the opposite direction, it is merely necessary to turn the tool over.

It will be noted that the forces necessary to bend the throttle arm are all supplied by the bending device. It is not necessary to support the arm at any point other than provided by the tool. This is important, as adjustments to the throttle arm are preferably made while the linkage is in position in the vehicle. The use of the

bending device allows the throttle arm to be bent without applying any force to the shaft upon which the throttle arm is connected. This prevents inadvertent bending of the shaft which would necessitate a major repair operation.

If the transmission throttle arm is too large to fit between the lugs 6 and the roller 24 when the pin 3 is in the hole 12 as illustrated in Figures 1 and 2 of the drawings, it is merely necessary to pivot the levers approximately 90° with respect to each other, and slide the pin 3 from the hole 12 to the hole 13. This results in moving the lever 2, and consequently the throttle arm engaging roller 24, directly away from a line through the centers of each of the lugs 6. The space between the lugs and rollers is increased thereby providing room for a larger sized throttle arm.

If, on the other hand, the transmission throttle arm is not too large to fit between the lugs 6 and over the roller 24 when the pin 3 is in the hole 12 as illustrated in Figures 1 and 2 of the drawings, but it is found that the throttle arm cannot be bent far enough to obtain the proper adjustment, while the fulcrum is in the position illustrated, it is merely necessary to rotate the levers approximately 90°, slide the pin half way down the slot 15 to the level of the transverse slot 16, through the transverse slot to the slot 14 and up to the hole 10. This results in moving the lever 2, and consequently, the roller 24, parallel to a line through the centers of the lugs 6. The angle to which the throttle arm may now be bent is greater than when the pin was in the hole 12.

In a similar manner, if, during the bending of a larger size throttle arm which would necessitate the use of the fulcrum hole 13, the proper degree of bend could not be obtained while the pin was in the hole 13, it would merely be necessary to move the pin to the hole 11. A bend of a greater degree could then be made on the larger size throttle arm.

Having now described my invention, certain changes and modifications in the construction and assembly of the various parts will occur to those skilled in the art. While I show an H-shaped aperture in the lever 1 comprising two pairs of holes interconnected by a pair of parallel slots, which parallel slots are in turn interconnected by a transverse slot, it will be obvious that additional slots may be provided parallel to the pair of parallel slots shown, and the transverse slot extended to connect all of the parallel slots. This would provide an additional range of degrees to which any one sized transmission throttle arm could be bent.

Also, any number of additional holes could be provided in line with the pairs of holes 10, 11 and 12, 13, along the longitudinal axis extended of the parallel slots, and the parallel slots lengthened to interconnect all the parallel positioned holes. In this manner, a greater number of sizes of throttle arms could be accommodated in one bending tool.

It is also obvious that the pin connecting the two leverss could be provided with only one flat surface and the bending tool would still function in the same manner. In addition, a grooved roller is not a necessity. A groove on the end of the lever 2 or any other suitable throttle arm engaging structure could be used.

The above changes and modifications may be made without departing from the scope or spirit of the invention as set forth in the following claims.

I claim:

1. A device for bending throttle arms and the like which comprises a pair of crossed levers joined by a pivotal connection intermediate their ends, the said pivotal connection including a pin having a cylindrical portion, which cylindrical portion is provided with a flat portion thereon, said pin being securely fastened to one of said levers, said other lever being provided with a plurality of pairs of holes, said holes having a diameter somewhat greater than the diameter of the cylindrical portion of the pin so as to allow rotary movement between said pin and hole when the pin is in a hole, said pairs of holes being joined by substantially parallel slots which slots have a width somewhat greater than the maximum thickness of the pin perpendicular to the flat portion of the pin but less than the diameter of the cylindrical portion of said pin so as to allow only sliding engagement between the pin and the slot when the pin is in the slot and the flat portion on the pin is parallel to the sides of the slot, means forming a transverse slot interconnecting the parallel slots intermediate the ends of the parallel slots, said transverse slot being somewhat wider than the diameter of the cylindrical portion of the pin so as to permit both rotary and sliding engagement when the pin is in the transverse slot, each of said levers having a hand grip at corresponding ends thereof, the other end of one lever being provided with a throttle arm engaging member and the other lever being provided with a pair of upstanding lugs, said lugs and throttle arm engaging member being adapted to engage the throttle arm for bending the same when the throttle arm is disposed between the said lugs and the said throttle arm engaging member, and upon pivotal movement of the levers.

2. A device for bending throttle arms and the like which comprises a pair of crossed levers joined by a pivotal connection intermediate their ends, the said pivotal connection being of a selectively positioned fulcrum type and including a pin having a cylindrical portion, which cylindrical portion is provided with a flat portion thereon, said pin being rigidly secured to one of said levers, said other lever being provided with a plurality of pairs of holes, said holes having a diameter somewhat greater than the diameter of the cylindrical portion of the pin, said pin extending through one of said holes, said pairs of holes joined by substantially parallel slots having a width somewhat greater than the maximum thickness of the pin perpendicular to the flat portion of the pin, said parallel slots having a width somewhat less than the diameter of the cylindrical portion of said pin, means forming a transverse slot interconnecting the parallel slots intermediate the ends of the parallel slots, said transverse slot being somewhat wider than the diameter of the cylindrical portion of the pin, said pin being slidable out of the one said hole when the flat portion on the pin is rotated to a position which is substantially parallel to the sides of the parallel slots, each of said levers having a hand grip at corresponding ends thereof, the other end of one lever being provided with a throttle arm engaging member and the other lever being provided with a pair of upstanding lugs, said lugs and throttle arm engaging member being adapted to engage the throttle arm for bending the same when the throttle arm is disposed between the said lugs and the said throttle arm engaging member, and upon pivotal movement of the levers.

3. A device for bending throttle arms and the like which comprises a pair of crossed levers joined by a pivotal connection intermediate their ends, the said pivotal connection including a pin having a cylindrical portion, which cylindrical portion is provided with a flat portion thereon, said pin being securely fastened to one of said levers, said other lever being provided with an H-shaped aperture comprising a plurality of pairs of holes, said pairs of holes being interconnected by substantially parallel slots having a width somewhat less than the diameter of the cylindrical portion of said pin, said parallel slots having a width somewhat greater than the maximum thickness of the pin perpendicular to the flat portion thereof, said holes having a diameter somewhat greater than the diameter of the cylindrical portion of the pin, means forming a transverse slot having a width somewhat greater than the diameter of the cylindrical portion of the pin, said transverse slot interconnecting the parallel slots intermediate the ends of the parallel slots, said pin extending through one of said holes and being movable from the one of said holes only when the pin has been rotated

so that the flat portion of the pin lies on a plane which is substantially parallel to the sides of the parallel slots, each of said levers having a hand grip at corresponding ends thereof, the other end of one lever being provided with a throttle arm engaging member and the other lever being provided with a pair of upstanding lugs, said lugs and throttle arm engaging member being adapted to engage the throttle arm for bending the same when the throttle arm is disposed between the said lugs and the said throttle arm engaging member, and upon pivotal movement of the levers.

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