Jan. 7, 1936. J. T. LANE 2,026,581

CLAW BAR

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Fig. 2

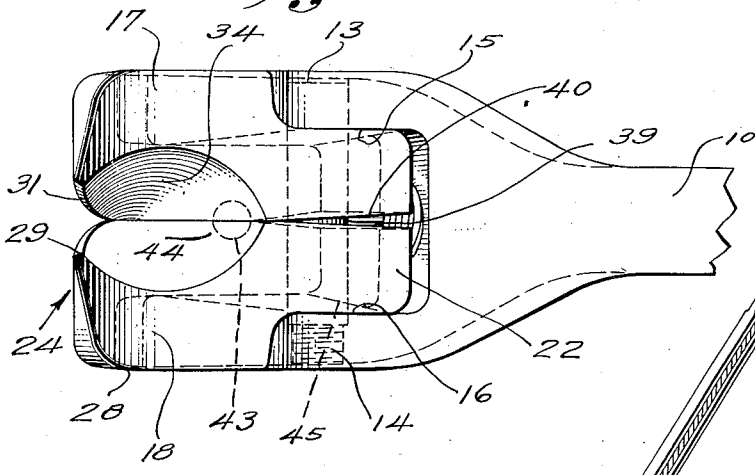


Fig. 1

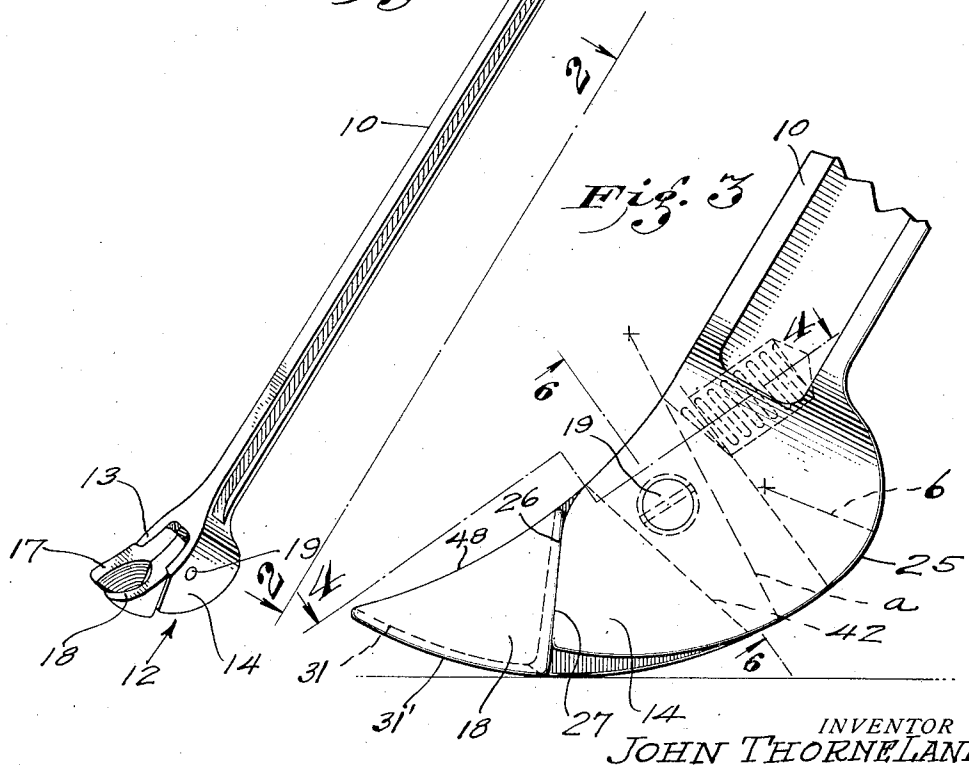


Fig. 3

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Fig. 4

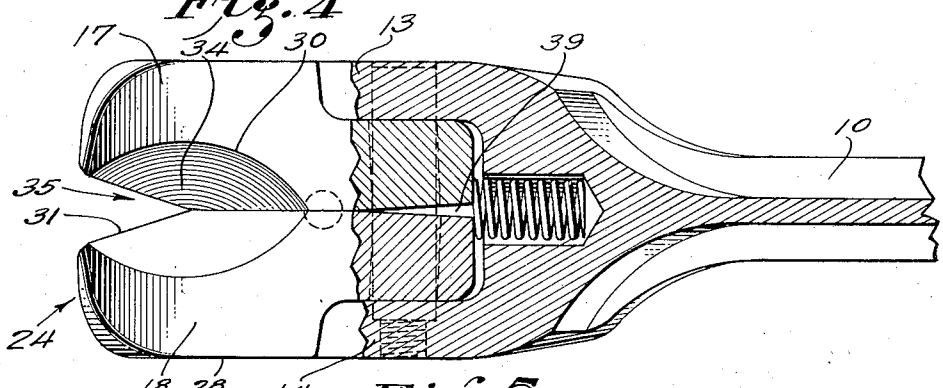


Fig. 5

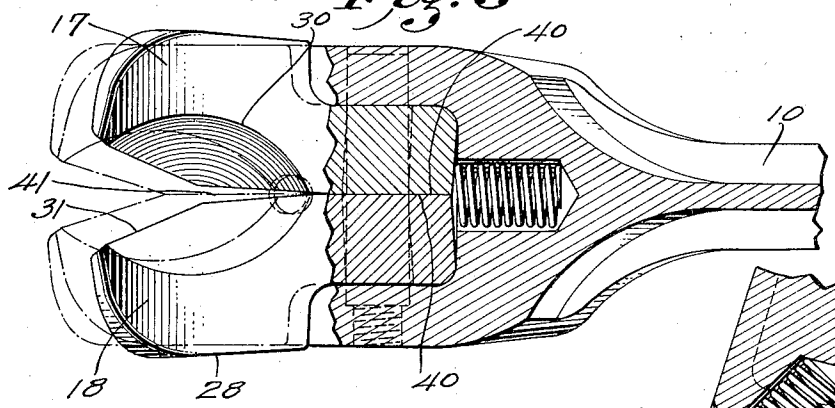


Fig. 7

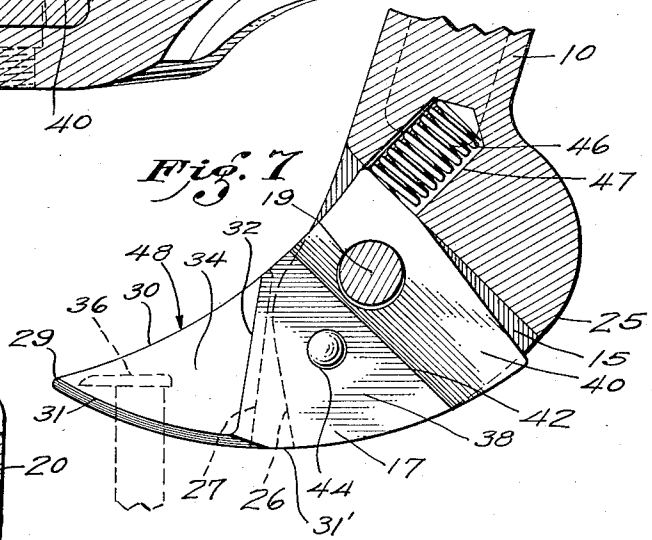
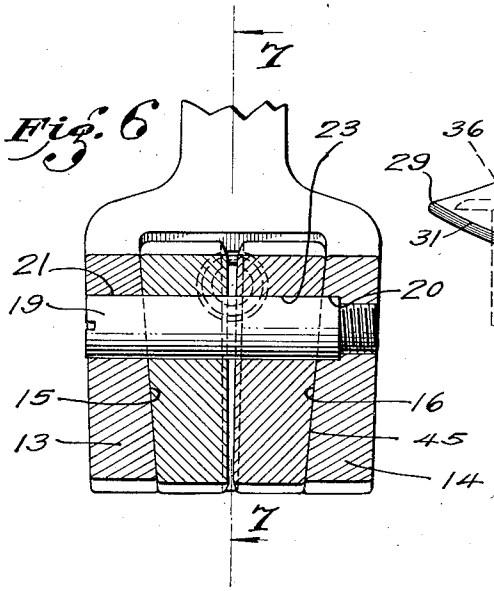


Fig. 6



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UNITED STATES PATENT OFFICE

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CLAW BAR

John Thorne Lane, Los Angeles, Calif.

Application July 25, 1934, Serial No. 736,889

13 Claims. (Cl. 254—24)

This invention relates to a tool and particularly pertains to a claw bar.

In various industries and especially in construction work, it is necessary to extract nails, spikes and stay bolts from timbers through which they have been secured. A common instance of this sort being the withdrawal of railway spikes from cross ties. It often occurs that the members which are to be withdrawn have been in place for a long time and have rusted to such an extent as to be tightly fastened in position. In some instances the heads have been broken off of the member to be extracted, thus increasing the difficulty with which it may be withdrawn, and it is the principal object of the present invention to provide a claw bar which may be conveniently positioned with relation to the member to be extracted, and which may then be moved with relation to its fulcrum to cause its pulling jaws to simultaneously bite-in and grip the opposite sides of the member to be extracted, and to exert an upward pull on the member in a manner to apply the leverage force parallel to the length of the spike so that it will be pulled directly out of the material in which it has been driven and will be positively gripped as it is pulled, irrespective of whether or not it is provided with a head underneath which the gripping jaws might engage.

The present invention contemplates the provision of a fulcrum bar having an enlarged bifurcated head structure at its lower end, the under face of which head is arcuate to provide a fulcrum face which will progressively change as force is applied to swing the bar downwardly and which will exert a prying force substantially at right angles to the surface upon which the head is resting. Said head being fitted with a pair of gripping jaws which have the function of exerting a longitudinal pull upon an object to be extracted and to simultaneously bite into the body of the object to grip and hold the same.

The invention is illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a view in perspective showing the assembled claw bar with which the present invention is concerned.

Fig. 2 is a view in plan showing the head of the claw bar with the gripping jaws in place.

Fig. 3 is a view in side elevation showing the head of the claw bar and disclosing the formation of the progressively acting fulcrum face.

Fig. 4 is a view in section showing the relative positions of the parts of the claw bar head and the gripping jaws as seen on the line 4—4 of Fig. 3 and with the jaws in the position they will initially assume.

Fig. 5 is a view identical with Fig. 4 except that the jaws and the head are indicated in the positions they will assume during a prying operation, the original position of the jaws being indicated in dotted lines.

Fig. 6 is a view in transverse section through the head and gripping jaws as seen on the line 6—6 of Fig. 3, and as showing the relative formation of the gripping jaws and the operating faces of the head.

Fig. 7 is a view in central longitudinal section through the tool and between the jaws as seen on the line 7—7 of Fig. 6.

Referring more particularly to the drawing, 10 indicates the handle of the claw bar with which the present invention is concerned. The upper end of the handle is formed with a curved chisel-like member 11 which may be used for prying purposes and will also serve conveniently as a handle grip. The opposite end of the handle 10 is formed with a bifurcated head 12. The head 12 comprises a pair of spaced arm members 13 and 14. These arm members are formed with opposed inwardly inclined faces 15 and 16, respectively. The inclination of these faces from the vertical may be any desired amount, but in practice has proved to be preferably five degrees. The outer vertical faces of the arms 13 and 14 may be directly perpendicular, or if desired, they may incline inwardly slightly toward the bottom of the head. Disposed between these faces is a pair of gripping jaws 17 and 18. These jaws are complementary to each other and are pivoted to swing around a common horizontal axis as established by a pivot bolt 19 which passes through the jaws and through openings 20 and 21 in the arms 13 and 14 of the head. By reference to Figs. 2 and 3 it will be seen that each of the jaws comprises a relatively narrow rear extension 22 which represents substantially one half of the width of the space between the faces 15 and 16 of the arms 13 and 14, and which also are formed with a central opening 23 through which the pivot bolt 19 extends. A forward enlarged end 24 is formed as a part of each of the jaws and projects forwardly of the ends of the arms 13 and 14. These arms as particularly shown in Fig. 3 of the drawings, are formed with a lower compound arcuate fulcrum face 25 which terminates at its forward end in a straight angled face 26. The forepart of the compound arcuate fulcrum face 25 is struck upon a radius indicated by the dotted line "a" in Fig. 3 of the drawings,

and the heel of this member is struck from the relatively short radius indicated by the dotted line "b", for purposes which will be hereinafter set forth. The enlarged portions 24 of the jaws overhang the faces 26 of the arms of the head and in the extreme operating position of the head with relation to the jaws these overhanging faces indicated at 27 in the drawings, substantially coincide with the faces 26 at the ends of the arms of the head; thus after the gripping action has been performed by the tool, the structure will act as a unit, since there will be no relative movement between the gripping jaws and the head as the arm of the tool is forced downwardly toward the plane upon which the head rests. The outer sides of the enlarged portions 24 of the gripping jaws, as indicated at 28 in the drawings, curve inwardly and terminate in relatively blunt points 29. The inner faces of the enlarged portions 24 of the gripping jaws are each formed with an arcuate upper edge indicated at 30, a straight inwardly and downwardly receding edge 31, and an upwardly and rearwardly receding edge 32, which edges form the boundary of a face 34 substantially having the geometrical form of the segment of a sphere to accommodate the head of a nail or spike. It will be seen that the edges 31 will combine to form a V-shaped throat 35 through which the body of the member to be extracted may be placed, such for example, as the railway spike 36 shown by dotted lines in Fig. 7 of the drawings.

Attention is directed to the fact that the contiguous faces of the two gripping jaws 17 and 18 are not parallel longitudinally, although vertically perpendicular. These faces each comprise a length 38 extending from the inner end of the face 31 to the crotch of a rear V-shaped opening 39 which occurs between oppositely and outwardly flaring faces 40 at the rear of each of the jaws as particularly shown in Fig. 2 of the drawings. The position of the jaws indicated by solid lines in Fig. 2 is the position assumed by these jaws when a gripping and prying operation is taking place. A full line position is indicated in Figure 5 showing the initial positions of these jaws at which time the faces 40 will be in contact to close the V-shaped space 39 between them, and the faces 38 will be separated to form a space indicated by dotted lines between these faces at 41. It will thus be seen that the gripping jaws 17 and 18 have relative lateral movement around a vertical fulcrum line 42, which forms the forward vertical boundary of faces 40 and the rear vertical boundary of faces 38. Just in advance of this vertical fulcrum line the faces 38 are formed with hemispherical recesses 43 which receive a ball 44 tending to hold the two jaws so that they will move in unison and will not have independent vertical movement with relation to each other.

As previously explained, the opposing faces 15 and 16 of the arms 13 and 14 of the tool head 12 are inwardly inclined toward their lower edges. The rear reduced portions 22 of the jaws are likewise inclined vertically, and since these faces indicated at 45 are in contact with the inner faces of the arms it will be evident that as the gripping jaws 17 and 18 stand relatively stationary during the initial portion of the downward swing of the handle 19, these inclined faces will work along each other to force the lower edges of the rear extensions 22 of the jaws together while permitting the upper edges to separate as shown in solid lines in Fig. 5 of the drawings, thus causing the jaws to pivot laterally around the vertical fulcrum line 42 and to force the biting edges 31 toward each other to contract the V-throat 35. A spring 46 is mounted in the pocket 47 in the crotch of the head 12 and rests against the ends of both of the gripping jaws to hold them against rattling movement although there is no particular other function for its use.

By referring to Fig. 3 of the drawings, it will also be seen that the upper edges of the faces of the jaws are formed on a relatively long radius to provide a slight curved face 48.

In operation of the present invention the tool is assembled as previously described, and when it is to be used it is swung to an upright position so that the forward portion of the curved fulcrum face 31' of the jaws 17 and 18 will be tangent with the surface upon which the tool rests, and the V-shaped throat 35 and its continuation 41 will be opened to receive the object to be gripped and pulled, such for example, as the spike 36. At this time pressure of the inclined faces 15 and 16 of the arms 13 and 14 will be exerted upon the faces 45 of the gripping jaws near the rear lower corners of these faces, since at this time the head 12 and the handle will be swung upwardly to their extreme vertical position. This will cause the pressure exerted by the faces 15 and 16 of the arms 13 and 14 to act upon the portions of the gripping jaws at the rear of the fulcrum line 42. As the handle is swung downwardly the head will swing around the axis of the fastening bolt 19 and will wedge against and along the sides of the faces 45 of the gripping jaws to apply force in advance of the fulcrum line 42. As the downward swinging motion of the handle continues with relation to the gripping jaws which are for the time being substantially stationary against vertical movement in a gripped position relative to the spike 36, the rear extensions 22 of the gripping jaws will tend to separate as indicated by solid lines in Fig. 2, and the forward V-shaped throat will tend to narrow as the throat 41 between the faces 38 closes, there will be a biting action against the spike and on opposite sides along the sharp edges 31 of the gripping jaws tending to securely grip the member to be moved. Before the handle and its head swing downwardly the contact of the tool with its supporting face is directly upon the curved under face 31' of the jaws. As the head swings downwardly the forward faces 26 of the arms of the head will coincide and contact with the rear faces 27 of the gripping jaws and the arcuate under face 31' of the gripping jaws will become coincident with the arc of the rear portion of the fulcrum face 25 of the head so that the fulcrum point will gradually recede along the lower curved faces of the gripping jaws and the head, which faces are now coincident. This will gradually increase the length of the mechanical lever arm defined by the distance from the member being lifted to the fulcrum contact point on the under face of the head and the jaws. The result will be that as this radius increases there will be compensation in the direction of thrust of the forward end of the tool so that the force will be continuously upward and at all times substantially longitudinal of the article being pulled, as for example, a bolt. When the bolt has been pulled to the limit of the swing of the tool another purchase may be taken on it by swinging the handle and head forwardly to release the grip upon the bolt and then engage it again at a point nearer the fulcrum surface.

It will be understood that the angle of the throat **35** might be varied as good practice dictates, but in operation of the tool it has been found that a combined angle of 24 degrees operates most satisfactorily.

In the initial movement of the claw bar the fulcrum pin **19** will be subjected to considerable strain which might result in excessive wear upon the fulcrum pin **19**. In order to prevent excessive wear of this pin within the bearings attention is directed to the showing in Fig. 6 where it will be seen that the body of the pin fits at its opposite ends within the bores **20** and **21** of the arms, and that the entering end of the pin is reduced in diameter and threaded into the reduced threaded end of the bore **21**. Attention is directed to the fact that during the final period of movement of the fulcrum bar toward a horizontal position the arms **13** and **14** will tend to create pressure in advance of the fulcrum line **42** and will bind the jaws so that strain upon the fulcrum pin **19** will be substantially relieved. It would be further evident that when the faces **26** and **27** of the jaws and arms respectively contact, the bar and the jaws will be practically locked so that the prying force of the jaws will be directly transmitted to the bar at which time strain on the pin **19** will be eliminated.

Attention is also drawn to the fact that during this operation the length of lever arm will increase as the fulcrum face rolls along the fulcrum surface. This will insure that at the beginning of the prying operation a maximum amount of leverage will be obtained, and that as this operation continues, the lever arm will progressively increase in direct proportion to the outward movement of the spike, bolt or other member being pulled. The tool is so designed as to make it possible that the fulcrum head on the lever arm has sufficient angle to withdraw any ordinary railway spike at one setting, and may be made with certain degrees of angle to withdraw nails, etc., at one setting, but in the event longer objects are withdrawn, such for example as a stay bolt, it may be necessary to release and grip the bolt progressively as it is being extracted.

It will thus be seen that the structure here disclosed while comprising a few parts, at the same time provides a claw bar which is decidedly rugged as to its construction, affords a suitable leverage for applying enormous force in pulling or prying articles, and at the same time provides means which act automatically to positively grip and pull an article as the handle or bar portion swings, and which structure will continuously compensate itself so that the line of force delivered by the tool will be substantially longitudinal with relation to the object being acted upon.

While I have shown the preferred form of my invention, as now known to me, it will be understood that various changes may be made in combination, construction, and arrangement of parts by those skilled in the art without departing from the spirit of the invention as claimed.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. A claw bar or the like including a lever arm, a fulcrum head rigidly secured thereto, said fulcrum head being formed with a pair of substantially parallel vertically aligned arms, a pair of gripping jaws disposed between said arms and projecting forwardly thereof to terminate in wedge members between which a V-shaped throat occurs, a fixed pivot for said wedge members so that they may swing vertically with relation to the head, said gripping jaws being capable of lateral movement with relation to each other and their pivotal axis, a fulcrum point occurring between the contiguous faces of said gripping jaws at a point intermediate their lengths and between the fixed pivot and the apex of the throat whereby the jaws may swing laterally to narrow and widen the V-shaped throat between their forward ends, and means whereby downward swinging movement of the lever arm and the fulcrum head in an effort to produce a prying action by the outer ends of said gripping jaws will apply lateral force against the portions of the gripping jaws in advance of said fulcrum point tending to force said jaws together and reduce the angle of the V-shaped throat.

2. A claw bar or the like including a lever arm, a fulcrum head rigidly secured thereto, said fulcrum head being formed with a pair of substantially parallel vertically aligned arms, a pair of gripping jaws disposed between said arms and projecting forwardly thereof to terminate in wedge members between which a V-shaped throat occurs, a fixed pivot for said wedge members so that they may swing vertically with relation to the head, said gripping jaws being capable of lateral movement with relation to each other and their pivotal axis, a fulcrum point occurring between the contiguous faces of said gripping jaws at a point intermediate their lengths and between the fixed pivot and the apex of the throat whereby the jaws may swing laterally to narrow and widen the V-shaped throat between their forward ends, and means whereby downward swinging movement of the lever arm and the fulcrum head in an effort to produce a prying action by the outer ends of said gripping jaws will apply lateral force against the portions of the gripping jaws in advance of said fulcrum point tending to force said jaws together and reduce the angle of the V-shaped throat, and whereby swinging movement of the fulcrum head and its lever arm in an opposite direction will shift the application of lateral pressure to the jaws at a point at the rear of said fulcrum point between the jaws, and will tend to increase the V-shaped throat occurring between the forward end of said jaws.

3. A claw bar or the like including a lever arm, a fulcrum head rigidly secured thereto, said fulcrum head being formed with a pair of substantially parallel vertically aligned arms, a pair of gripping jaws disposed between said arms and projecting forwardly thereof to terminate in wedge members between which a V-shaped throat occurs, a fixed pivot for said wedge members so that they may swing vertically with relation to the head, said gripping jaws being capable of lateral movement with relation to each other and their pivotal axis, a fulcrum point occurring between the contiguous faces of said gripping jaws at a point intermediate their lengths and in advance of their fixed pivot whereby the jaws may swing laterally to narrow and widen the V-shaped throat between their forward ends, means whereby downward swinging movement of the lever arm and the fulcrum head in an effort to produce a prying action by the outer ends of said gripping jaws will apply lateral force against the portions of the gripping jaws in advance of said fulcrum point tending to force said jaws together and reduce the angle of the V-shaped throat, and

means interlocking the gripping jaws at a point in advance of their pivotal axis of rotation with relation to the fulcrum head whereby said jaws will swing in unison relative thereto.

4. A claw bar or the like comprising a pair of gripping jaws terminating at their forward ends in vertically tapering wedges between which an outwardly spreading V-shaped throat occurs, the remaining contiguous vertical faces of said jaws being divided into two pressure faces separated by a fulcrum line which line contacts on the two jaws, a fulcrum head carrying a fixed pivot disposed rearwardly of the said fulcrum line and around which said jaws swing vertically and with relation to which they may swing laterally as they rock on their fulcrum faces, means whereby when the fulcrum head and the jaws are in an initial prying position said head will exert pressure at one side of the fulcrum between the jaws to separate the forward ends of the jaws and increase the angle of the V-shaped throat and whereby when the head is moved incident to a prying operation it will impose pressure upon the opposite side of the fulcrum of said jaws to tend to force the forward ends of the jaws together and decrease the angle of the V-shaped throat therebetween.

5. A claw bar or the like comprising a pair of gripping jaws terminating at their forward ends in vertically tapering wedges between which an outwardly spreading V-shaped throat occurs, the remaining contiguous vertical faces of said jaws being divided into two pressure faces separated by a fulcrum line which line contacts on the two jaws, a fulcrum head carrying a fixed pivot disposed rearwardly of the said fulcrum line and around which said jaws swing vertically and with relation to which they may swing laterally as they rock on their fulcrum faces, means whereby when the fulcrum head and the jaws are in an initial prying position said head will exert pressure at one side of the fulcrum between the jaws to separate the forward ends of the jaws and increase the angle of the V-shaped throat and whereby when the head is moved incident to a prying operation it will impose pressure upon the opposite side of the fulcrum of said jaws to tend to force the forward ends of the jaws together and decrease the angle of the V-shaped throat therebetween, and means interlocking the jaws to prevent their independent vertical movement around the pivot of the head.

6. A claw bar or the like comprising a pair of gripping jaws terminating at their forward ends in vertically tapering wedges between which an outwardly spreading V-shaped throat occurs, the remaining contiguous vertical faces of said jaws being divided into two pressure faces separated by a fulcrum line which line contacts on the two jaws, a fulcrum head carrying a fixed pivot disposed rearwardly of the said fulcrum line and around which said jaws swing vertically and with relation to which they may swing laterally as they rock on their fulcrum faces, means whereby when the fulcrum head and the jaws are in an initial prying position said head will exert pressure at one side of the fulcrum between the jaws to separate the forward ends of the jaws and increase the angle of the V-shaped throat and whereby when the head is moved incident to a prying operation it will impose pressure upon the opposite side of the fulcrum of said jaws to tend to force the forward ends of the jaws together and decrease the angle of the V-shaped throat therebetween, means interlocking the jaws to prevent their independent vertical movement around the pivot of the head, and yieldable means normally holding the jaws with their forward ends in their extreme operating position.

7. A claw bar or the like comprising a lever arm, a fulcrum head at the lower end thereof, a pair of gripping jaws pivoted around a common axis on said fulcrum head, said gripping jaws terminating in outwardly extending wedge shaped claws, the under faces of said claws and the under face of the fulcrum head being substantially in the same plane to form a volute fulcrum face, the claw portions of said jaws having a V-shaped throat between them, said throat being defined by a substantially wedge shaped edge occurring at the juncture of the lower faces of the claws with their inner tapered faces, the remaining contiguous faces of the claws being divided at a point intermediate their ends and in advance of their point of pivot to the head by a fulcrum line of contact extending substantially vertically and transversely of said faces and with relation to which fulcrum the gripping jaws may have limited lateral swinging movement, and means operating between the gripping jaws and the fulcrum head whereby relative swinging movement between the jaws and the head will when in one position apply lateral force to the jaws on one side of their fulcrum line and will shift the application of said force to the opposite side of said fulcrum line while moving to its other position.

8. A claw bar or the like comprising a lever arm, a fulcrum head at the lower end thereof, a pair of gripping jaws pivoted around a common axis on said fulcrum head, said gripping jaws terminating in outwardly extending wedge shaped claws, the under faces of said claws and the under face of the fulcrum head being substantially in the same plane to form a volute fulcrum face, the claw portions of said jaws having a V-shaped throat between them, said throat being defined by a substantially wedge shaped edge occurring at the juncture of the lower faces of the claws with their inner tapered faces, the remaining contiguous faces of the claws being divided at a point intermediate their ends by a fulcrum line of contact extending substantially vertically and transversely of said faces at a point between the apex of said throat and the common pivot for the jaws and with relation to which fulcrum the gripping jaws may have limited lateral swinging movement, and means operating between the gripping jaws and the fulcrum head whereby relative swinging movement between the jaws and the head will when in one position apply lateral force to the jaws on one side of their fulcrum line and will shift the application of said force to the opposite side of said fulcrum line while moving to its other position, said line of fulcrum being disposed at an angle less than a right angle to the wedge shaped edges of the throat between the jaws whereby said edges will be forced inwardly and upwardly against an object being gripped.

9. A claw bar or the like comprising a substantially straight handle serving as a lever arm, a fulcrum head at the lower end of said handle, a pair of gripping jaws disposed substantially parallel to each other between parallel shoulders on said fulcrum head and terminating at their forward ends in wedge shaped claws, means pivotally mounting said gripping jaws between said arms whereby the jaws may have limited swing-

ing movement in the plane of the longitudinal axis of the handle, the under faces of said jaws and fulcrum head being substantially in continuation in a volute curve, and shoulders on said jaws engaged by the ends of the arms of said fulcrum head at one extreme of the rear swinging movement between the jaws and the head in order to cause the jaws and the head to lock with relation to each other in a prying action.

10. A claw bar or the like comprising a handle serving as a lever arm and at the end of which is a fulcrum head terminating in a pointed toe and a rounded heel, the intermediate fulcrum surface being swung on a volute curve of such arcuate length and radii as to permit the head to extract a railway spike at one setting.

11. A claw bar or the like comprising a substantially straight handle serving as a lever arm, a forked head at the lower end of the handle and formed as a part thereof, said head having a curved under face offset from one side of the handle, the opposing faces of the forks being inclined inwardly and downwardly, a pivot pin extending transversely of said forks, its longitudinal axis substantially intersecting the longitudinal axis of the handle, the head having a forwardly extending portion in advance of the pivot, said portion terminating in square end faces, a pair of gripping jaws disposed between said forked portions of the head and through which the pivot pin passes, said jaws having lateral and rotational movement with relation to said pin, the inner faces of said jaws being formed with a vertical crown intermediate their lengths, the faces being relieved at each side of said crown whereby the jaws may have lateral swinging movement with relation to each other, the crown occurring at a point in advance of the pivot pin, the outer faces of said jaws being inclined to correspond to the inclination of the inner faces of the forks of the head whereby when the handle with its head is rotated relative to the jaws in alternate directions the inclined faces of the fork will alternately press against the inclined faces of the jaws in the rear of and in advance of the crown to swing the jaws in correspondingly alternate directions.

12. A claw bar or the like comprising a substantially straight handle serving as a lever arm, a forked head at the lower end of the handle and formed as a part thereof, said head having a curved under face offset from one side of the handle, the opposing faces of the forks being inclined inwardly and downwardly, a pivot pin extending transversely of said forks, its longitudinal axis substantially intersecting the longitudinal axis of the handle, the head having a forwardly extending portion in advance of the pivot, said portion terminating in square end faces, a pair of gripping jaws disposed between said forked portions of the head and through which the pivot pin passes, said jaws having lateral and rotational movement with relation to said pin, the inner faces of said jaws being formed with a vertical crown intermediate their lengths, the faces being relieved at each side of said crown whereby the jaws may have lateral swinging movement with relation to each other, the crown occurring at a point in advance of the pivot pin, the outer faces of said jaws being inclined to correspond to the inclination of the inner faces of the forks of the head whereby when the handle with its head is rotated relative to the jaws in alternate directions the inclined faces of the fork will alternately press against the inclined faces of the jaws in the rear of and in advance of the crown to swing the jaws in correspondingly alternate directions, and lateral shoulders on the jaws adapted to be engaged by the end faces of the head to apply direct force from the head to the jaws at the conclusion of the gripping and prying action.

13. A claw bar or the like comprising a substantially straight handle serving as a lever arm, a forked head at the lower end of the handle and formed as a part thereof, said head having a curved under face offset from one side of the handle, the opposing faces of the forks being inclined inwardly and downwardly, a pivot pin extending transversely of said forks, its longitudinal axis substantially intersecting the longitudinal axis of the handle, the head having a forwardly extending portion in advance of the pivot, said portion terminating in square end faces, a pair of gripping jaws disposed between said forked portions of the head and through which the pivot pin passes, said jaws having lateral and rotational movement with relation to said pin, the inner faces of said jaws being formed with a vertical crown intermediate their lengths, the faces being relieved at each side of said crown whereby the jaws may have lateral swinging movement with relation to each other, the crown occurring at a point in advance of the pivot pin, the outer faces of said jaws being inclined to correspond to the inclination of the inner faces of the forks of the head whereby when the handle with its head is rotated relative to the jaws in alternate directions the inclined faces of the fork will alternately press against the inclined faces of the jaws in the rear of and in advance of the crown to swing the jaws in correspondingly alternate directions, pockets formed in the contiguous faces of the jaws in advance of the crown, and a ball member fitting into said pockets to constantly maintain the jaws in relation to each other whereby they will swing in unison around the pivot pin.

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