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PLIERS OR THE LIKE

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My invention relates to pliers and analogous tools and pertains more particularly to implements of this general character improved structurally and functionally in such a manner that they can perform their work with greater efficiency in that they are adapted for satisfactory use with bodies varying greatly in size, and in that they can grasp and hold such articles of different dimensions with great strength and without danger of slipping or of releasing the bodies so held.

To this end, the two main members, of which the pair of pliers is composed, are so constructed and associated together that, in operating, their clamping jaws not only rock about a fulcrum, but one of them bodily approaches the other to secure the desired proper and firm hold on the body to be held.

A further feature of the invention is a safety means to prevent improper action of the tool employed in association with means provided to give it a wide range of capacity.

To the accomplishment of the above specified and other desirable aims and objects, I have devised the present, preferred embodiment of the invention illustrated in the accompanying drawing, and, for simplicity, like reference numerals in such drawing have been employed to designate the same parts in the several views of the drawing.

In this drawing, Figure 1 is a face view of the pair of pliers in a condition to grasp a body of relatively small size; Figure 2 is a similar view of the pliers arranged to clamp a body of comparatively large size; and Figure 3 is an edge view of the pair of pliers.

The improved and novel form or style of pliers comprises two main members more or less loosely connected together by a pin and slot construction to prevent their separation.

One of these elements 10 has a handle portion 11 at one end and a clamping or grasping jaw 12 at its other extremity, the intermediate part 13 of the member between the sections 11 and 12 being of one-half the thickness of the remainder of the member, such reduction in thickness being solely at one side of the element 10, as is clearly shown in the several views of the drawing.

Also between the parts 11 and 12, the thinner, intervening section 13, at one side of the tool, has an upstanding projection or lug 14 with a V-shaped inner surface 15 merging into a rounded cavity 16.

A cam dog 17, of the same thickness as the projection 14, is loosely hinged or fulcrumed on a pin 18, the dog being adapted to be swung into operative position, as depicted in Figure 1, or to be rocked into an inactive position, as presented in Figure 2.

Such dog has on one surface a flaring recess shaped to conform to and to receive the V-shaped part 15 of the companion or correlated projection 14, and its hinged or pivoted end is exteriorly rounded to agree with the shape of the cavity or recess 16 and to bear on the wall of the latter to remove all strain from the pin 18 with which it is loosely associated or mounted with a limited degree of play sidewise.

Thus, when the dog is in the position shown in Figure 1, all strain or pressure imposed on it is transmitted or transferred directly to the lug 14 and not to its hinge pin 18, thus avoiding any possibility of damage or injury to the pin connection.

This is also true for any position of the dog or cam, because in all of the positions which it may assume, its rounded end may bear on the wall of the associated lug rounded cavity, thus safeguarding the hinge pin against the imposition thereon of any substantial pressure.

The affiliated or combined tool member 21 has a handle section 22 at one end and a jaw 23 at its other end, in mating relation to the jaw 12.

The part of member 21 between the inner end 28 of jaw 23 and the end 29 of the handle portion is of half thickness which overlaps and crosses the reduced section 13 of the member 10, all as is clearly shown in Figure 3, so that the pair of pliers as a whole is roughly of substantially the same thickness throughout.

The reduced thickness section of the ele-
ment 21 has a curved cam edge 29, which, as explained hereinafter, is designed and arranged to co-operate either with the lug 14 or with the dog 17, as the case may be.

Member 21 has a transverse, flat end 24, positioned substantially at right-angles to the active or inner face of the jaw 23, adapted to co-operate with the end wall 25 of the other or complementary jaw 12, these two walls 24 and 25 sliding on one another and constituting a fulcrum for the two members 10 and 21 shiftable automatically crosswise of such pair of elements.

These two members 10 and 21 are held together or maintained in assembled relation against detachment by a pin 27 extended through a slot 19 in the part 10 and a slot 26 in the element 21, the pin having heads at both ends overlapping the adjacent faces 20 of the tool as portrayed in Figure 3.

It is to be borne in mind, that pin 27 occupying the two slots which are arranged at a suitable angle to one another does not really constitute a fulcrum for the two implements members, but it holds them in united relation, its purpose being to prevent such pair of elements from coming apart.

Assuming that the pliers are to be used to grasp a relatively small article, the cam dog 17 is swung around its pivot pin into engagement with the stop or abutment 14, as illustrated in Figure 1, and then, as the handle sections 11 and 22 are squeezed or pressed toward one another, the two members rock on one another around the points of contact of the two surfaces 24 and 25, which act as the fulcrum, but, at the same time, the rounded cam edge 29 of member 21 slides on the proximate surface of the adjacent cam dog 17, thereby pushing or forcing the member 21 over bodily laterally or sidewise, causing the surface 24 to slide outwardly automatically along the jaw surface 25.

Thus it will be seen that the surfaces 24 and 25 constitute a fulcrum about which the two members of the pliers rock to perform their gripping action through their complementary jaws. The abutment 17 cooperates with the cam or wedge surface 29 of the companion member to force the latter in the direction of the shoulder 25. Thus the parts 17 and 29 constitute a wedge causing a thrust between the surfaces 24 and 25, which necessarily slide on one another at the same time that they are performing the function of the fulcrum. The parts 17 and 29 come into contact first when there is an object between the jaws, and then the two parts having the surfaces 24 and 25 are thrust together and the jaws rock around their line of contact. It is well in this connection to bear in mind that the surfaces 24 and 29 constitute a wedge which, during the rocking of the members, is forced into the space between the surfaces 17 and 25, but the ultimate rocking action seemingly occurs around the shoulder 25.

The result of such peculiar or combined movement of the jaw 23 causes it to grasp the body between the jaws with an especially strong and effective clamping and holding action.

During this operation, the pin 27 floats, so to speak, in its two slots 19 and 26 without performing any portion of the useful work, except to prevent separation of the tool members which it holds loosely together.

When the pair of pliers is to be applied to a larger body, the dog 17 is swung out of the way, as presented in Figure 2, and then the cam edge 29 of member 21 co-acts or co-ordinates directly with the abutment 14.

In this case, the operation of the implement is substantially the same as described above, but the relative positions of the parts are materially changed due to the greater opening between the jaws.

In both instances, member 21 rocks around the travelling or shifting fulcrum provided by the contacting surfaces 24 and 25, and the automatic lateral movement of the fulcrum is brought about by the cam edge of member 21 acting on an abutment or stop on the other member 10, such abutment in the one instance being the lug 14 and in the other case the dog 17.

Those acquainted with this art will readily understand that the invention as presented in and defined by the appended claims is not necessarily limited or confined to the precise structural features illustrated and described, and that these may be modified within comparatively wide limits without departure from the heart and essence of the invention or the loss or sacrifice of any of its material or substantial benefits and advantages.

I claim:

1. In a pair of pliers or the like, the combination of a member having a handle at one end and a jaw at its other end, both said handle and said jaw being disposed substantially lengthwise of said member, a second member crossing said first member and having a handle at one end, a jaw at its other end, and said jaw being disposed at a substantially right-angle to the active face of said jaw and adapted to bear on and to slide transversely of the pliers on the surface of the inner end of said first jaw, both said handle and said jaw of said second member being disposed substantially lengthwise of said second member means to hold said members loosely together, an abutment on said first member, and a cam face on said second member co-operating with said abutment, whereby presssing of said handles toward one another causes said transverse end surface to rock on said inner jaw surface as a fulcrum, the co-action of said cam face on...
said abutment automatically shifting said fulcrum bearing of said transverse surface on said jaw surface, whereby said second jaw rocks on said fulcrum and also travels bodily toward said first jaw to clamp the article between them.

2. In a pair of pliers or the like, the combination of a member having a handle at one end and a jaw at its other end, both said handle and said jaw being disposed substantially lengthwise of said member, a second member crossing said first member and having a handle at one end, a jaw at its other end, and a transverse end surface disposed at a substantially right-angle to the active face of said jaw and adapted to bear on and to slide transversely of the pliers on the surface of the inner end of said first jaw, both said handle and said jaw of said second member being disposed substantially lengthwise of said second member, said first and second members each having a slot therethrough, a pin occupying both slots and holding said members loosely in assembled relation, an abutment on said first member, and a cam face on said second member co-operating with said abutment, whereby pressing of said handles toward one another causes said transverse end surface to rock on said inner jaw surface as a fulcrum, the co-action of said cam face on said abutment automatically shifting said fulcrum bearing on said transverse surface on said jaw surface, whereby said second jaw rocks on said fulcrum and also travels bodily toward said first jaw to clamp the article between them.

3. In a pair of pliers or the like, the combination of a member having a handle at one end and a jaw at its other end, a second member having a handle at one end complementary to said first handle and a jaw at its other extremity complementary to said first jaw, means securing said members together loosely, a sliding fulcrum between said members, an abutment on one of said members, and a dog hinged on a pin on said latter member and adapted to be swung on said pin into operative position against said abutment or to be rocked into an inoperative position away from said abutment, said member without the abutment having a cam surface adapted to bear and ride either on said abutment or on said dog when the latter is against said abutment to cause the automatic shifting of said fulcrum during the rocking of the members relatively to one another on said fulcrum, said abutment having a rounded recess, said dog being loosely mounted on said pin and having a rounded surface substantially concentric with the wall of and occupying said abutment recess and adapted to bear on said recess wall and when so doing the dog is sufficiently loose on its hinge-pin so that the strain imposed on the dog is transmitted directly to said abutment and not to said hinge-pin.

In witness whereof I have hereunto set my hand.

ALLEN C. ALLAN.