

The invention relates to a fastening clamp to connect the flanges of form panels together, the flanges being disposed at right angles to a forming surface, including two clamping jaws movable in opposite directions towards the surfaces averted from one another of the two flanges, and further including an operating element engaging the clamping jaws transversely to the abutment faces of the latter to press the clamping jaws and secure them against the flanges.

German Patent Specification No. 27 59 966 has already disclosed a clamp for connecting U-shaped sections which are open towards the edge of the form panels and have longitudinal flanges, the two clamping jaws being L-shaped and in the position for use one leg of the L in each case extending parallel to the forming surface and overlapping the corresponding, oppositely directed L-leg of the second part, the two L-legs having to be guided into each other.

This solution is elaborate in requiring there to be a special section at the edge of the form panels and in involving the production of two L-shaped clamping jaws with their reciprocal guide.

The object underlying the invention is to provide a fastening clamp of the kind mentioned at the outset, which can be simply applied and adjusted to the flanges of form panels and the component parts of which can be produced and assembled in a relatively simple and inexpensive manner.

To accomplish this object the fastening clamp of the kind mentioned at the outset is characterized in that the two clamping jaws take the form of arc members and are guided in an approximately circular housing having a radial opening for engaging over the flanges which belong to the form panels and are to be connected, that the arc members have abutment faces emerging inside said opening from guides of the housing and that in the housing area opposite the opening provision is made for an expanding device as an operating element for urging apart the clamping jaws at the ends or end faces thereof opposing the abutment faces of the clamping jaws.

An approximately circular housing can be produced relatively simply and provides good guidance for arc members disposed in its interior, so that the clamping jaws are not guided against each other and are not dependent on each other in their motion. The clamping jaws can be put into their clamping position very simply by means of an expanding element adapted to be driven inbetween their ends remote from the clamping points. It is to advantage here that these clamping jaws move virtually in synchronism and are automatically adjusted to the grasped flanges. The entire fastening clamp is thus very simple in design and operation.

A wedge adapted to be driven inbetween the clamping jaws at the two ends thereof averted from the clamping points may be provided as the expanding device. It is thereby very simple for the clamping jaws to be moved into their clamping position and this is enabled using a part frequently used in the formwork sector.

Advantageous configurations of the fastening clamp according to the invention form the subject matter of claims 3 to 13. Above all claim 6 contains a configuration which is especially convenient and appropriate, enabling a conjugate connection between the clamping jaws and the flanges of the form panels. Such a conjugate connection at least in the direction transverse to that in which the flanges and the longitudinal edges of the form panels extend would also be possible if, in the position for use, the clamping jaws were to engage over corresponding beads or the like of the flanges. Claims 10 to 13 contain configurations which are to advantage in enabling the clamping jaws to be opened with the aid of the expanding device primarily serving closing purposes, i.e. giving the latter a double function.

The invention with its leading features is described more closely below with reference to the drawings in which, partly in schematic form,

Fig. 1 is a top view, partly in section, of a fastening clamp according to the invention in the position for use, in which it urges together two flanges of adjacent form panels,

Fig. 2 is a view, partly in cross section, of the clamp according to Fig. 1 viewed from the direction of the form panel not shown in this case,

Fig. 3 is a side view of the clamp and

Fig. 4 is, on an enlarged scale, a view corresponding roughly to Fig. 1 with a wedge-shaped expanding device also suitable for retracting the clamping jaws.

A fastening clamp designated altogether as 1, referred to in short as "clamp 1" in the following, serves for connecting and clamping together flanges 3 of form panels not shown for the sake of simplicity, the flanges being disposed at right angles to a forming surface 2.

The fastening clamp 1 has two clamping jaws 4 movable in opposite directions towards the surfaces 3a averted from one another of the two flanges 3. The operating element for pressing and securing these clamping jaws 4 with their abutment faces 5 will be described more closely below.

Above all Fig. 1 shows that the two clamping jaws 4 take the form of circular arc members and are guided in an approximately circular housing 6. Under tension they will actually rest against the outside wall 7 of this housing, while in the interest of clarity a slight distance between the wall 7 of the housing and the clamping jaw 4 is shown in Fig. 1 for the clamping position.

Fig. 1 also shows the housing 6 to have a radial opening 8 for engaging over the flanges 3 which belong to the form panels and are to be connected, the flanges resting with their free ends or edges against the end 8a of the opening 8. According

to Fig. 1 the arc members serving as clamping jaws 4 have abutment faces 5 emerging inside the opening 8 from guides of the housing. In the housing 6 area opposite the opening 8 there is provided the expanding device already mentioned, in the exemplified embodiment a wedge 10 which is adapted to be driven inbetween the clamping jaws 4 at the two ends 9 thereof averted from the clamping points and serves to urge apart the clamping jaws 4 at the ends 9 opposing the abutment faces 5 of the jaws.

The clamp 1 is thus very simple to handle in that when the wedge 10 is loose the clamp is pushed with its opening 8 over the two flanges 3 resting against each other, after which the wedge just has to be driven in for the clamping jaws 4 to be brought along the guide walls 7 into the clamping position shown in Fig. 1.

According to Figs. 2 and 3, the guides for the clamping jaws 4 are closed on both sides by cover plates or cover walls 11, in particular are covered over, the cover plates or cover walls also covering over the interior 12 of the housing 6 except for the opening 8 for the flanges 3. In the region where the arcuate clamping jaws 4 have ends 9 averted from the clamping points, these cover plates 11 have slot-shaped recesses 14 for the passage of the wedge 10.

Figs. 1 and 2 also show that the interior 12 of the housing 6 is separated from the clamping jaws 4 by an arcuate partition 13. Therefore the clamping jaws are unable to assume a position inside the housing 6 where their ends 9 are no longer engaged by the wedge 10, not even in the loose position. In effect the clamping jaws 4 are in this manner inside a circular guide channel.

The wedge 10 and the slots 14 (Fig. 1) provided for its passage are curved and have a radius of curvature corresponding to that of the clamping jaws 4 in the region of the engaging points of the wedge 10. Hence - as shown in Fig. 1 - the narrow side of the wedge 10 of arcuate curvature in cross section can rest flat against the front ends 9 of the clamping jaws 4. It is appropriate for this purpose if the front faces 9 turned towards each other of the clamping jaws 4 are slanted at the same angle and in the same direction as the wedge faces 15 impacting them.

The exemplified embodiment contemplates that the abutment faces 5 of the clamping jaws 4 have recesses, namely in each case a concave depression 16 matching a corresponding convexity 17 on the flanges of the form panels in the area contacted by the clamping jaws. Hence there is a conjugate connection established in the clamping area even in the direction in which recess 8 extends.

In the release position of the clamping jaws 4, when the wedge 10 is raised, the narrow side of the wedge can still project from the underside of the housing 6 of the clamp 1 in accordance with Figs. 2 and 3. The clamp 1 is hence operable at all times and the wedge 10 does not first have to be put into an appropriate starting position. In the region of the projection 18 the wedge might be provided with a widening protruding beyond the passage provided there, a transverse pin or similar means to prevent the wedge from being removed, so that wedge 10 would be undetachable.

According to Fig. 2, the cross section of the arcuate clamping jaws 4 and the annular channels receiving them as a guide is rectangular but it could also be square. In each case two limits of the contacting faces of the clamping jaws 4 are parallel to the forming surface 2 and to the flanges 3, while in the position for use the upper and lower closing plate 11 is oriented at right angles to the grasped flanges 3.

This altogether results in a clamp 1, the two clamping jaws 4 of which are guided independently of one another but can nevertheless be brought into their clamping position in synchronism or simultaneously with the aid of a single wedge, without their having to be guided against each other. The arcuate shape selected lends itself to being inexpensively produced and operated well.

Fig. 4 shows a modified embodiment of the fastening clamp 1, in which the parts serving to expand the clamping jaws 4 against the flanges 3 tally with those of the embodiment described above and therefore have tallying reference numbers. It is hence unnecessary to describe these parts and their function again because the above description still applies. Mention is just made that in this Fig. 4 the right-hand clamping jaw 4 is shown in the closed position but the left-hand clamping jaw 4 is shown in the open position.

This embodiment now contemplates that the expanding device also serves to retract the clamping jaws 4 into their open position and therefore engages the clamping jaws 4 in a

in a conjugate fashion. Fig. 4 clearly shows that the wedge 10 which forms the expanding device has a cross section curved according to the curvature of the clamping jaws 4 and the guide housing thereof and fits and engages with its wedge faces 15 in grooves 19 in the ends 9 of the clamping jaws 4, the grooves 19 extending at a slant from the top to the bottom in accordance with the wedge angle. This leads to improved co-operation of the wedge 10 with the clamping jaws 4 as the latter are moved into their closed position, because the wedge 10 is guided better, hence avoiding canting and jamming before the clamping jaws 4 are finally pressed against the flanges 3 to be connected.

According to Fig. 4 it is also contemplated that the wedge 10 has along its two wedge faces 15 in each case a thickening or guide of a cross section enlarged relative to the cross sectional thickness of the wedge and in the exemplified embodiment taking the form of a bead 20. The grooves 19, also slightly arcuate in cross section, have a cross section widening accordingly in the interior of the grooves and forming undercuts 21. It is apparent that as this wedge 10 is driven in perpendicular to the plane of the drawing, the two clamping jaws 4 are driven with their abutment faces 5 against the flanges 3 in the manner already described in the preceding exemplified embodiment. If, conversely, the wedge is moved upwardly relative to the plane of the drawing, an oppositely directed force is exerted on the clamping jaws 4 at the undercuts 21 by the beads 20 inside the widenings 22, so that the abutment faces 5 of the clamping jaws withdraw from the flanges 3, while the opposite ends 9 of the jaws are forced to approach one another.

Whereas one can see in the right-hand part how the bead 20 rests firmly against the inside contour of the widening 22, because the wedge 10 presses the clamping jaw 4 against the flange 3, it is shown in the left-hand part how the bead 20 now rests against the undercuts 21, while the clamping jaw 4 is retracted by raising the wedge 10. This can be effected quite simply by exerting force onto or by striking the lower projection of the wedge 10.

The cross section of the beads 20 on the wedge 10 and the cross section of the widenings 22 in the interior of the grooves 19 is approximately circular in the exemplified embodiment, this permitting simple manufacture. One can see that the beads 20 engage in the widenings 22 with play because close tolerances are naturally not necessary here. At the same time one can see that the undercuts 21 and the widenings 22 of the grooves 19 are disposed inside the clamping jaws 4 at a slight distance from the ends 9. Therefore the partial surface which is not thickened is also guided well and the forces encountered as the clamping jaws 4 are retracted can be applied without any danger of deformation to the grooves 19.

Patent Claims

1. A fastening clamp (1) to connect flanges (3) of form panels together, the flanges being disposed at right angles to a forming surface (2), including two clamping jaws (4) movable in opposite directions towards the surfaces (3a) averted from one another of the two flanges (3), and further including an operating element (10) engaging the clamping jaws (4) transversely to the abutment faces (5) of the latter to press the clamping jaws (4) and secure them against the flanges (3),
c h a r a c t e r i z e d i n t h a t t h e t w o clamping jaws (4) take the form of arc members and are guided in an approximately circular housing (6) having a radial opening (8) for engaging over the flanges (3) which belong to the form panels and are to be connected, that the arc members have abutment faces (5) emerging inside said opening (8) from guides (7) of the housing (6) and that in the housing (6) area opposite the opening (8) provision is made for an expanding device (10) as an operating element for urging apart the clamping jaws (4) at the ends (9) thereof opposing the abutment faces (5) of said clamping jaws.
2. The clamp as claimed in claim 1, characterized in that a wedge (10) adapted to be driven inbetween the clamping jaws (4) at the two ends (9) thereof averted from the clamping points is provided as the expanding device.



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3. The clamp as claimed in claim 1 or claim 2, characterized in that the guides (7) for the clamping jaws (4) are preferably closed on both sides by cover plates or cover walls (11), in particular are covered over, said cover plates or cover walls also covering over the interior (12) of the housing (6) except for the opening (8) for the flanges (3), and that in the region where the arcuate clamping jaws (4) have ends (9) averted from the clamping points said cover plates (11) have slot-shaped recesses for the passage of the wedge (10).
4. The clamp as claimed in any one of claims 1 to 3, characterized in that the wedge (10) and the slots provided for its passage are curved and have a radius of curvature corresponding to that of the clamping jaws (4) in the region of the engaging points of the wedge (10), and that the narrow sides of the wedge (10) of arcuate curvature in cross section preferably rest flat against the front ends (9) of the clamping jaws (4).
5. The clamp as claimed in any one of claims 1 to 4, characterized in that the front faces (9) turned towards each other at the ends of the clamping jaws (4) averted from the clamping points thereof are slanted at the same angle and in the same direction as the wedge faces (15) impacting them.
6. The clamp as claimed in any one of the preceding claims, characterized in that the abutment faces (5) of the clamping jaws (4) have recesses, preferably a concave depression (16) matching a corresponding convexity (17) or the like



on the flanges (3) of the form panels in the area contacted by the clamping jaws.

7. The clamp as claimed in any one of claims 1 to 6, characterized in that in the release position of the clamping jaws (4), when the wedge (10) is raised, the narrow side of said wedge projects from the underside of the housing (6) of the clamp (1) or clamping device and in the region of the projection (18) may have a widening protruding beyond the passage provided there, a transverse pin or similar means to prevent the wedge from being removed.
8. The clamp as claimed in any one of claims 1 to 7, characterized in that the cross section of the arcuate clamping jaws (4) and the annular channels receiving them as a guide is preferably rectangular or square and that in each case two limits of the contacting faces of the clamping jaws (4) are oriented parallel to the forming surface (2) and to the flanges (3) of the form panels and that in the position for use the upper and lower closing plate of the clamp is oriented at right angles to the grasped flanges.
9. The clamp as claimed in any one of claims 1 to 8, characterized in that the interior (12) of the housing (6) is separated from the clamping jaws (4) by an arcuate partition (13).
10. The clamp as claimed in any one of claims 1 to 9, characterized in that the expanding device engages the



clamping jaws (4) in a conjugate manner to retract them into their open position.

11. The clamp as claimed in any one of claims 1 to 10, characterized in that the wedge (10) which forms the expanding device fits and engages with its wedge faces (15) in grooves (19) in the ends (9) of the clamping jaws (4), said grooves preferably extending at a slant in accordance with the wedge angle.
12. The clamp as claimed in any one of claims 1 to 11, characterized in that the wedge (10) has along its two wedge faces (15) in each case a thickening, a bead or a similar guide of a cross section enlarged relative to the cross sectional thickness of said wedge, and the grooves (19) have a cross section widening accordingly in the interior and forming undercuts (21).
13. The clamp as claimed in any one of the preceding claims, characterized in that the cross section of the beads (20) on the wedge (10) and of the widenings (22) in the grooves (19) is approximately circular and that the beads (20) engage in the widenings (22) with play.

