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(54) Extendible scaffolding transom

(57) Device for use in scaffolding construction comprising a first scaffolding tube, interiorly provided with a second closed scaffolding tube profile which is polygonal in cross-section. Scaffolding tube and scaffolding tube profile are mutually telescopingly fitted. The interior circumference of the first scaffolding tube is in close contact with angle segments shaped between the mutually distantly positioned circumferential parts along the circumference of the second scaffolding tube profile. These angled segments are mutually enclosing an angle in a circumferential direction, the value of which is determined by 360° divided by the number of angle segments.

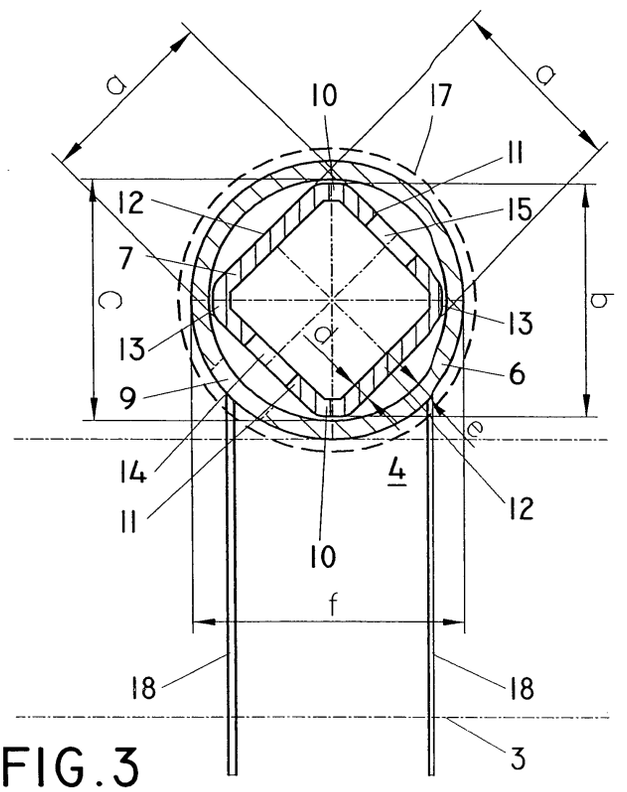

FIG.3

EP 1 489 248 A2

Description

[0001] This invention relates to a device for use in scaffolding construction comprising a first scaffolding tube wherein a telescopically second scaffolding tube profile is received. Such a device is also known as a so-called extendible scaffolding transom as described in GB2374895. In this document a second scaffolding tube profile is described that is lockable and longitudinally telescopically mounted slidably inside the first scaffolding tube. The first scaffolding tube, together with the positioned second scaffolding tube profile, may be used in scaffolding construction by mounting the first scaffolding tube in a horizontal plane. The known telescopic second scaffolding tube profile is provided with an open V-shaped profile in cross-section which comprises some disadvantages. The bending and shear strength of this profile is not great in its extended position, so that this V-shaped profile must be manufactured from rather thick material or even must be provided with support ribs. In scaffolding construction, where often the scaffolding constructions are manually assembled, preferably scaffolding elements are used, which are of lightweight and also comprise a high mechanical strength.

[0002] Object of the invention is to provide for an improved profile for the second tube profile, which comprises a high mechanical strength and a great resistance against bending and shear and which is lightweight and easily manufactured.

The device according to the invention is characterized in that a first scaffolding tube, interiorly provided with a second, in cross-section polygonally closed scaffolding tube profile longitudinally telescopically fitted mounted in such a way that the interior circumference of the first scaffolding tube is in touching contact with angle segments defined by shape between mutually distantly positioned circumferential parts along the outward circumference of the second scaffolding tube profile, these angle segments mutually enclosing an angle in a circumferential direction, the value of which is determined by 360° divided by the number of angle segments.

[0003] By using now a completely closed scaffolding tube profile for the second telescopic scaffolding tube profile a device is obtained that is light in weight and still comprises a high bending and shear strength, rendering this scaffolding tube profile extraordinary safe and making it possible to slidably extend the profile over a great distance before it is loaded with scaffolding planks.

[0004] An embodiment according to the invention is characterized in that each of the angle segments in a circumferential direction enclose an angle of 90°.

It appears that this shape of the second scaffolding tube profile may be easily and cheaply rolled, whereas this profile comprises a high bending and shear strength. Moreover this profile leaves enough space between the exterior of the second scaffolding tube profile and the interior of the first scaffolding tube, so that dirt drawn or blown, may be easily removed so that reliable stop and/or locking means may be mounted to lock the extendable part within the first scaffolding tube.

[0005] Another embodiment of the device for use in scaffolding construction is characterized in that the position of the second scaffolding tube profile inside the first scaffolding tube is suchlike that in a cross-section the diagonal connecting lines between each two opposite angle segments upon the second scaffolding tube profile are perpendicularly intersecting each other. A profile regularly configured this way may be easily telescopeble in and outward and in use is supported in a regular and stable manner with its angle segments against the interior of the first scaffolding tube.

[0006] Another embodiment of the device is characterized, in that in its mounted position of the first scaffolding tube for a scaffolding construction the first diametrically extending angle segments of the second scaffolding tube profile are extending along a vertical plane with respect to the interior circumference of the first scaffolding tube whereas the perpendicularly positioned second angle segments of the second scaffolding tube profile are extending diametrically along a horizontal plane. In this way the extended second scaffolding tube profile is less susceptible to become polluted during use e.g. on a construction site. Because an angle segment of the second scaffolding tube profile is pointing upwards, contamination like e.g. by dust or building mortar, will less easily stick and will slide downwards over the slanting side walls adjacent to the upwardly pointing angle segment of the second scaffolding tube profile.

[0007] In another embodiment the device is characterized in that the closed second scaffolding tube profile comprises in a cross-section a square tube profile having a substantially constant wall thickness and having rounded of angles. By applying at scaffolding construction a standard circular first scaffolding tube having therein a second square tube profile, a device is obtained which is manufactured at low cost and which may be used easily without the need of adaptation with standard connecting means like e.g. scaffolding clamps or like half clamps welded on the first scaffolding tube.

[0008] In another preferred embodiment the device is characterized in that the radius of curvature of the rounded off angles of the second scaffolding tube profile at the location of its contact nearly conforms to the interior radius of curvature of the first scaffolding tube. In this way a second scaffolding tube profile is obtained with flattened or rounded off angles having a greater interior diameter between two opposite sides, then when applying right angles. Increasing the exterior diameter at a constant material thickness does increase the bending and shear strength of the second scaffolding tube. By having the radius of curvature conform to the interior diameter of the first scaffolding tube an optimal rounding off or flattening is obtained of the second scaffolding tube profile so that it will posses an improved bending and shear strength.

[0009] A preferred embodiment is characterized in

that the ratio of the length of the interior diameter between two opposite angles in relation to the length of the interior diameter between two opposite sides of the second scaffolding tube profile is between about 1.40 and 1.05.

In a further preferred embodiment the ratio of the exterior diameters is between 1.3 and 1.2 and in a more preferred embodiment the ratio is 1.25. It appears that for this ratio there is an optimum in the bending and shear strength of the second scaffolding tube profile with respect to the free space between the first and the second scaffolding tube needed for the locking means and with respect to easy telescoping.

A preferred embodiment is characterized in that the wall thickness is about 3 mm, that the interior diameter between two opposite sides is about 32.3 mm and that the exterior diameter between two opposite angles is about 40.4 mm.

[0010] In an alternative embodiment the device is characterized in that the closed second scaffolding tube profile consists in a cross-section of a square, each opposite side comprises a vault in its cross-section in relation to the centre of the profile. For certain applications it may be advantageous, e.g. for certain locking means to be used, that the sides of the second scaffolding tube profile are completely or partially convexly or concavely curved.

[0011] In a further preferred embodiment the closed second scaffolding tube profile in cross-section consists of a square all sides of which are concavely curved. More preferably all sides are concavely curved. More preferably each two opposite sides are concavely curved and the other opposite sides are convexly curved

[0012] In an alternative embodiment the angle segments of the second scaffolding tube profile enclose an angle of 120° in circumferential direction. In a preferred embodiment the closed second scaffolding tube profile is a triangle with rounded angles in cross-section. With respect to the V-shape in GB2374895 an improved bending and shear strength is obtained.

[0013] A preferred embodiment is characterized in that the first scaffolding tube is provided at its end where the second scaffolding tube profile is mounted, with a fixing means for fixation of the direction of orientation of the angle segments of the second scaffolding tube profile.

[0014] Another embodiment is characterized in that the fixing means consists of a cover sheet extending in a radial plane of the first scaffolding tube, the cover sheet being provided with an opening, having a cross-sectional profile which is similar in shape and of a greater dimension then the cross-sectional profile of the second scaffolding tube profile, in such a way, that the second scaffolding tube profile is tightly enclosed by the cover sheet and is freely slidable in and out of the first scaffolding tube through the cover sheet. This cover sheet has the advantage that the amount of dirt drawn in or blown in is reduced strongly and that also on the second scaffolding tube profile the deposited dirt is scraped off during telescoping inwards of the second scaffolding tube profile. Moreover this cover sheet may be used as an abutment sheet to prevent the second scaffolding tube profile telescoping too far outside the first scaffolding tube.

[0015] A preferred embodiment is characterized in that the first scaffolding tube is provided with connecting means for interconnecting with the vertical leg members of the scaffold, which means are mounted in such a way that in its mounted position of the first scaffold tube a diagonal between opposite angle segments of the opening of the cover sheet is extending in a vertical plane. By mounting the connecting means in this way upon the first scaffolding tube with respect to the orientation of the opening of the cover sheet it is secured that the second scaffolding tube profile is always in an advantageous way telescoped out of the first scaffolding tube with an angle pointing upwards.

[0016] A preferred embodiment is also characterized in that the second scaffolding tube profile is provided on at least one side with a protruding catch, to such an extent protruding beyond this side, that the catch cannot be displaced past the cover sheet, thus giving protection against undesirable exceeding of the maximum extension length.

[0017] An alternative embodiment is characterized in that a stop catch or stop sheet is provided onto the telescoping part of the second scaffolding tube profile for determining a restriction of the telescoping distance of the second scaffolding tube profile into the first scaffolding tube.

[0018] A further embodiment is characterized in that as a connecting means there is a coupling device having a coupling housing that on its one side is provided with a first saddle element fixedly connected with the first scaffolding tube, and further at its opposite side being provided with a fixed second saddle element to be releasably connected by means of a wedge to a girder perpendicularly positioned thereto, whereby this second saddle element being provided with a hinging saddle clamp element hingeable mounted around a hinge pin in the coupling housing that together with the second saddle element spans over least 180° of the girder circumference whereas the coupling housing and the saddle clamp element are both provided with an abutting surface for a hollow wedge-shaped locking member the tapered end of which being movably connected to a recess which is located on a rib on the back side of the saddle clamp element, whereby the locking member along its whole length, except for each of its both ends, is provided with a continuous slot in which a bracket is positioned, mounted on said rib.

[0019] Further elucidation of the principles of the new device are given in the following description by means of the drawing and the claims.

Fig. 1 shows a side view of the a scaffolding con-

struction with the device according to the invention,

Fig. 2 shows a side view of the device according to the invention in extended position,

Fig. 3 shows a cross-sectional view of the device with both engaging scaffolding tubes,

Fig. 4a shows a cross-sectional view of the device with stop catch preventing telescoping too far outward,

Fig. 4b shows a front view of the cover sheet of the first scaffolding tube,

Fig. 5 shows an embodiment of the device with two coupling devices,

Fig. 6A shows a top view of the coupling device in closed position,

Fig. 6B shows a cross-sectional view A-A of the coupling device of Fig.6A,

Fig. 6C shows a rearward view of the of the coupling device of Fig.6A,

Fig. 7A shows a top view of the coupling device in opened position,

Fig. 7B shows a cross-sectional view A-A of the coupling device of Fig.7A,

Fig. 7C shows a rearward view of the of the coupling device of Fig.7A in stacked position,

Fig. 8A shows a top view of the second embodiment of the coupling device in closed position,

Fig. 8B shows a cross-sectional view A-A of the coupling device of Fig.8A,

Fig. 8C shows a rearward view of the of the coupling device of Fig.8A.

[0020] In Fig. 1 a scaffolding construction 1 is shown assembled in a well known manner from upright pole 2 and interconnected girders 3. Upon girders 3 are mounted transverse girder or transom 4 in a horizontal plane perpendicularly to the longitudinal axis through girders 3 by means of connecting means 18 like a separate scaffolding clamp or a connecting means fixedly mounted upon the first scaffolding tube like a bracket or a half scaffolding clamp. Parallel and at a certain distance in relation to this transom 4 more transoms may be mounted (not shown). Upon transoms 4 are positioned support planks 5 parallel to the longitudinal axis of girders 3 in a horizontal plane. The support planks are positioned closely adjacent to each other so that they form a floor whereupon safely may be walked or worked by a person. The transom 4 in this example is a so-called extendable scaffolding transom. An extendable scaffolding transom is a transom provided with an telescoping scaffolding tube. The extendable scaffolding transom so consists of two parts: a first scaffolding tube 6 and an in- and outwardly of this scaffolding tube telescoping second scaffolding tube profile 7. In Fig.1 this second scaffolding tube profile 7 is thus far telescoped out and extended outside the scaffolding construction that three support planks may be mounted parallel to the other support beams for forming a walking of working floor. The length y of the transom is about 1400 mm, the length x of the telescoping second scaffolding tube profile is about 850 mm.

[0021] In Fig.2 there is shown a detailed extendable transom 4 with a first hollow scaffolding tube 6 and a second hollow scaffolding tube profile 7. A portion 7' of the second scaffolding tube profile 7 is received in first scaffolding tube 6 and a portion 7" is positioned outside scaffolding tube 6. Second scaffolding tube profile 7 may be telescoped into first scaffolding tube 6 in the direction of arrow P, so that portion 7' increases within first scaffolding tube 6 and portion 7" decreases outside first scaffolding tube 6. In this example the length x of the second scaffolding tube profile is about 850 mm, the maximum telescoping length z is about 650 mm, so that the minimum length of the remaining portion 7' within the first scaffolding tube is about 200 mm.

At the other end of the second scaffolding tube profile 7 extending outside the first scaffolding tube 6 a strip 8 is attached which serves as a stop and so prevents that second scaffolding tube profile 7 is telescoped inwardly too far inside the first the scaffolding tube 6.

Additionally the first scaffolding tube 6 may be provided with locking means , like e.g. an opening 9, to prevent that second scaffolding tube profile 7 is telescoped outwardly too far. Opening 9 may be used for or cooperate with e.g. mounting or removing locking means in the second scaffolding tube profile like e.g. a stop catch 16. The first scaffolding tube 6 at its end, where the second scaffolding tube profile is positioned, is provided with cover sheet 17, having the functions of a stop sheet, a dirt scraper and protector against contamination.

[0022] In Fig.3 a cross-sectional view is shown of an extendable scaffolding transom 4 with first scaffolding tube 6 and an interiorly mounted second scaffolding tube profile 7. First scaffolding tube 6 is mounted upon girder 3 by means of connecting means 18. Second scaffolding tube profile 7 is oriented in such a way that in use in a scaffolding construction an angle 10 is pointing upwards and the opposite angle 10 is pointing downwards, while the two remaining angles 13 are positioned in an horizontal plane.

[0023] Fig.4B shows that the end of first scaffolding tube 6 is provided with cover sheet 17 (dotted line). The first scaffolding tube 6 has a thickness e of about 3.2 mm and may be a standard scaffolding tube with an exterior diameter f of about 48.3 mm. The interior diameter c is in this example about 41.9 mm. The second scaffolding tube profile 7 is having rounded off angles 10 and is e.g. manufactured by rolling from a piece material with a thickness d of about 3 mm into a closed scaffolding tube profile with thickness d of about 3 mm. The exterior diameter a between both opposite sides 11 and also between both opposite sides 12 amounts to about 32.3 mm in this example, so that the second scaffolding tube profile comprises a square shape.

The radius of curvature of the rounded off angles 10 and 13 corresponds to the interior radius of curvature of the

first scaffolding tube 6, as a result of which an optimal telescoping scaffolding tube is formed having a high bending strength, being telescopically far extendable and being easily inwardly telescopable. The external diameter b between both opposite angles 10 is in this example about 40.4 mm. The ratio between de exterior diameter between de opposite angles 10 and the exterior diameter a between the opposite sides 11 and 12 is in this example about 40.4:32.3 = 1.25. It is clear, that by providing the second scaffolding tube profile with rounded off angles a greater profile, in other words a profile with a greater exterior diameter a, can be applied, realising a higher bending and shear strength. The first scaffolding tube 6 is provided in this example with opening 9 and the second scaffolding tube profile 7 is provided with openings 14 and 15. These openings may be used for locking of the second scaffolding tube profile into the first scaffolding tube e.g. with stop catch 16 which may be mounted in the openings from the outside.

[0024] In Fig.4A is shown in a cross-section a stop catch 16, which is mounted in de openings 14 and 15 of the second scaffolding tube profile 7. The stop catch protrudes beyond side 11, but is not extending beyond the interior circumference of the first scaffolding tube 6 so that the second scaffolding tube profile may be freely displaced by sliding in the first scaffolding tube.

The end of first scaffolding tube 6, where in the second scaffolding tube profile is located, may be provided with a fixing means for fixation of the direction of orientation of the angle segments and as a result of the position of the second scaffolding tube profile. In a first embodiment the fixing means is performed as a cover sheet.

[0025] In Fig.4B shows a cover plate 17 in a cross-sectional view. Cover plate 17 is mounted upon the end of first scaffolding tube 6. Cover plate 17 is provided with an opening which is similar in shape and dimensions to a cross-section of the second scaffolding tube profile 7, but in the dimension h between the opposite sides just somewhat greater then the exterior diameter a between de opposite sides 11 and 12, so that the cover sheet 17 closely encloses around the second scaffolding tube profile 7 and as a result of which blowing in of dirt from the outside is prevented and also the cover sheet removes dirt located on the portion of the second scaffolding tube profile 7" by scraping it off of during inward telescoping. Cover sheet 17 in Fig.4B is fixedly mounted upon the end of first scaffolding tube 6; as shown with a dotted line in Fig.3, so that in cooperation with the fixedly mounted connecting means 18 is secured that the second scaffolding tube profile 7 in its mounted position within the first scaffolding tube 6 always is telescoping outwards in its position with an angle pointing upwards. Moreover the cooperation of cover sheet 17 with stop catch 16 results in reducing the length portion of the second scaffolding tube profile which may be telescoped beyond the first scaffolding tube. Since stop catch 16 extends beyond the closely enclosed profile of the second scaffolding tube profile 7 the covered by cover plate 17 the stop catch 16 will make contact with cover plate 17 when second scaffolding tube profile is extended too far, so that as a result second scaffolding tube profile cannot be telescoped outwardly any further. The stop catch may also be mounted upon another side of the second scaffolding tube profile or if desired upon more sides. The stop catch may be e.g. mounted and removed by opening 9 provided for in first scaffolding tube 6. It is also possible for finger protection to provide a stop catch or stop sheet in the first scaffolding tube as a distance restriction to prevent telescoping inwardly too far of the second scaffolding tube profile and to prevent trapping of fingers. When telescoping inwardly too far, the end of the second scaffolding tube profile located inside the first scaffolding tube contacts the stop catch or stop sheet extending into the first scaffolding tube, thus leaving free space, e.g. corresponding to the thickness of a finger, between the ends of the first scaffolding tube and the second scaffolding tube profile.

[0026] In an alternative embodiment of the fixing means the end of the first scaffolding tube may be deformed into an end profile similar to the profile of the second scaffolding tube profile, so that in similarity with cover plate 17 the second scaffolding tube profile 7 is closely enclosed by the end profile and the second scaffolding tube profile is telescoped always with an angle pointing upwards in and out of the first scaffolding tube. The end of the first scaffolding tube may be provided with e.g. a square end profile by means of mechanical deformation of the scaffolding tube like by pressing or reduction by means of a by a mandrel during the pressing step brought into the hollow space of the first scaffolding tube.

[0027] In Fig.5 an embodiment of the transom 4 of the invention is shown comprising a first scaffolding tube 6 and a second scaffolding tube profile 7 with two coupling devices 100 which are provided upon the first scaffolding tube 6 for mounting transom 4 upon two girders 3. Coupling device 10 comprises at least one coupling housing 101, a saddle clamp element 106 and a wedge-shaped locking member 108. Preferably both coupling devices 100 are fixedly connected with first scaffolding tube 6 e.g. by means of welding. Preferably the coupling devices are mounted in such a way, that the sides of the coupling devices, provided with locking members 108, are facing each other, as shown in Fig.5. By positioning the locking members 108 in this way on the inside of the coupling devices they are less easily accidentally driven out or they are less easily polluted with building products like mortar and the like.

[0028] In Figs.6A,B,C and 7A,B,C the coupling devices 100 are shown in detail in an open and closed position. Fig.6A and 6B show a first saddle element 102 on the top side of the coupling housing 101 provided for connecting the coupling device 100 with scaffolding tube 6. This saddle element 102 in this example consists of a coupling housing 101 comprising two parallel side sheets 112, which are flat and straight at their top sides

and which are interconnected by means of a transverse connection forming turned over parts of the side sheets 112 welded together forming connecting sheet 113. Preferably connecting sheet 113 is not extending completely until the top side of the side sheets in order to leave an opening free for receiving the circular profile of scaffolding tube 6.

In this example on the opposite side no transverse connection is provided, instead both side sheets are turned over into two turned over parts 114. The coupling housing 101 is on its opposite side of the first saddle element 102 provided with a second saddle element 103 for receiving girder 3. This second saddle element 103 consists in this embodiment of a circular recess 116 and a saddle clamp element 106 which together span at least 180° of the girder circumference. Coupling housing 101 is provided with hinge pin 105 which is extending parallel to the girder 3 to connect there to. Over this hinge pin 105 saddle clamp element 106 is hingedly mounted by means of a hinge opening. The saddle clamp element 106 is further provided with a recess or opening 109 wherein a wedge-shaped locking member 108 is mounted by means of bracket 111. Recess 109 forms on its bottom side abutting surface 117 of saddle clamp element 106. On the bottom side of the side sheets 112 of the coupling housing 101 are also abutting surfaces 107 formed adjacent to abutting surface 117 of saddle clamp element 106. The wedge-shaped locking member 108 in this embodiment is shaped as a hollow wedge-shaped body provided with a slot 110. Fig. 7C shows that locking member 108 has a U-shaped profile, whereas Fig.7B shows that in side view the locking member is provided with a tapered end 115 and that this small end 115 is not releasably connected to saddle clamp element 106 by means of a welded bracket 111 on the saddle clamp element 106. The coupling housing 101 is further provided with a spread spring 118, which in this embodiment engages scaffolding tube 6 with one leg and which engages saddle clamp element 106 with its other leg in such a way, that when saddle clamp element 106 is not fixed by means of locking member 108, the spread spring will freely move and retain the saddle clamp element into its open position.

The coupling device is operated as follows:

Fig.7C shows that preceding the coupling operation with girder 3 locking member 106 is locked up between the turned over parts 114 of side sheets 112 when the transoms are in their stacked position, the coupling device being on the top side and the scaffolding tube 6 being on the bottom side. Fig.7C shows that the legs of the U-shape of the wedge-shaped locking member are pointing downward and are locked up between the turned over parts 114. By stacking and storing the transoms with the coupling devices 100 pointing upwards in this way the locking members 108 are not protruding beyond the transom and the coupling device, so that the locking members are not hanging free and are not disrupting the stack. Moreover the locking members will less easily bend or deform because they are well protected and locked up in stacked position during e.g. transport. In order to mount the transom it is firstly turned over from its stacked position into the coupling position with the coupling pointing downwards. The locking member 108 will now hang free downwardly as shown in Fig.7B. Because locking member 108 is not inserted between the abutting surfaces 107, 117 of the saddle clamp element 106 and the side sheets respectively, the saddle clamp element 106 is retained in the open position by spread spring 118; see Fig.7B. The open saddle clamp element 106 allows easy mounting of the transom upon the girders of a scaffold construction. Additional actions of a person are not needed for opening the coupling or for preparing the transom for connection with the girder 3, while the correct open position of the saddle clamp element 106 is maintained by the spread spring 118. Subsequently the locking member is rotated over 90° into a position perpendicular to the plane of the drawing in Fig. 6B pointing upwards or downwards. Top views of Fig. 6A and 7A shows, that the locking member 108 must be rotated over 90° in the plane of the drawing in order to enable the locking member to be inserted between the abutting surfaces respectively. Subsequently the tapered end 115 of the locking member 108 is now inserted between abutting surfaces 107 and 117 respectively of side sheets 112 and saddle clamp element 106 respectively. As a result the saddle clamp element 106 is moved to girder 3, against the spring pressure of spread spring 118, see Fig.7B and 6B. By inserting the locking member 108 further between abutting surfaces 107 and 117, e.g. by hitting it with a hammer on the broad end 119 for further driving the member in the direction of arrow I in Fig.6C, the saddle clamp element 106 will clamp together the girder 3 into second saddle element 103. By means of the lever arm formed between hinge point 105 and abutting surface 117 a great clamping force is exerted by the wedge-shaped locking member on girder 3.

[0029] When the connection of the transom and the girder should be released firstly the locking member 108 is removed from its clamping position between abutting surfaces 107 and 117. This may be done by hitting it with a hammer on the small tapered end 115 , in the direction of arrow V in Fig.6C, so that the locking member 108 is driven out. When the locking member 108 is completely released from the abutting surfaces 107 and 117 the locking member 108 will rotate over 90° and will hang free downwardly, as shown in Fig 7B. As a result the spread spring 118 will move the saddle clamp element 106 away from the girder, so that the transom 4 may be easily removed from the girders 3. By subsequently turning the transom over, with coupling device 100 pointing upwards, as shown in Fig.7C, the hanging free locking member is locked up between the turned over parts 114, so that the locking member is not protruding outside the transom making the transoms easily stackable.

[0030] In Fig.8A,B,C, an alternative embodiment is

shown of the coupling device 100. The coupling device in Fig.8A,B,C has been given reference number 200, all other features have been given reference numbers in the 200 series corresponding to the reference numbers of Fig.6A,B,C. In the embodiment shown in Fig.8A the locking member 208 is rotated over 90° with respect to the locking member 108 shown in Fig.6A causing the legs of the U-shaped locking member to extend in the reversed direction with respect to girder 3. In Fig.8A is shown, that bracket 211 is principally U-shaped and may be easily mounted, e.g. by welding, onto saddle clamp element 206. In this embodiment abutting surface 217 is formed by a protruding element provided in the centre of saddle clamp element 206, in this example in the shape of a cubical body, as a result of which a vertical abutting surface 217 is formed. The abutting surfaces 207 on side sheets 212 are also parallelly extending to abutting surface 217 in a vertical direction, so that by means of inserting the locking member 208 between the abutting surfaces 207 and 217 the saddle clamp element 206 is moved in the direction of girder 3, against the spring pressure of spread spring 218. In Fig.8C arrow I indicates the direction of driving in or hitting of the wedge-shaped locking member; arrow V indicates the direction of driving in or hitting out.
The broadening of the wedge-shaped locking member 208 during driving in causes a direct displacement of the saddle clamp element 206 in the direction of girder 3 so that with this embodiment a higher clamping force more easily is exerted on girder 3. Moreover the lever arm formed between hinge point 205 and the abutting surface 217 is greater than in Fig.6A,B,C so that by means of the wedge-shaped locking member 208 more easily a higher clamping force is exerted on girder 3. Other variations in the orientation of the abutting surfaces 107, 207, 117, 217 and of the locking member 108, 208 fall within the scope of the invention.

Claims

1. Device for use in scaffolding construction comprising a first scaffolding tube, interiorly provided with a second, in cross-section polygonally closed scaffolding tube profile longitudinally telescopically fitted mounted in such a way that the interior circumference of the first scaffolding tube is in touching contact with angle segments defined by shape between mutually distantly positioned circumferential parts along the outward circumference of the second scaffolding tube profile, these angle segments mutually enclosing an angle in a circumferential direction, the value of which is determined by 360° divided by the number of angle segments.

2. Device according to claim 1, **characterized in that** each of the angle segments in a circumferential direction along the second scaffolding tube profile enclose an angle of 90°.

3. Device according to anyone of the preceding claims 1-2, **characterized in that** the position of the second scaffolding tube profile inside the first scaffolding tube is suchlike that in a cross-section the diagonal connecting lines between each two opposite angle segments upon the second scaffolding tube profile are perpendicularly intersecting each other.

4. Device according to anyone of the preceding claims 1 - 3, **characterized in that** in its mounted position of the first scaffolding tube for a scaffolding construction the first diametrically extending angle segments of the second scaffolding tube profile are extending along a vertical plane with respect to the interior circumference of the first scaffolding tube whereas the perpendicularly positioned second angle segments of the second scaffolding tube profile are extending diametrically along a horizontal plane.

5. Device according to anyone of the preceding claims 1-4, **characterized in that** the closed second scaffolding tube profile comprises in a cross-section a square tube profile having a substantially constant wall thickness and having rounded off angles.

6. Device according to claim 5, **characterized in that** the radius of curvature of the rounded off angles of the second scaffolding tube profile at the contact location nearly conforms to the interior radius of curvature of the first scaffolding tube.

7. Device according to claim 6, **characterized in that** the ratio of the length of the exterior diameter between two opposite angles in relation to the length of the exterior diameter between two opposite sides of the second scaffolding tube profile is between about 1.40 and 1.05.

8. Device according to claim 7, **characterized in that** the ratio of the exterior diameters is between about 1.3 and 1.2.

9. Device according to claim 7, **characterized in that** the ratio of the exterior diameters is about 1.25.

10. Device according to claim 7, **characterized in that** the wall thickness is about 3 mm, the exterior diameter between two opposite sides is about 32.3 mm and the external diameter between two opposite angles is about 40.4 mm.

11. Device according to claim 5, **characterized in that** the closed second scaffolding tube profile in a cross-section consists of a square whereby each opposite side comprises a vault in its cross-section

in relation to the centre of the profile.

12. Device according to claim 11, **characterized in that** the closed second scaffolding tube profile in a cross-section consists of a square, all sides are concavely curved.

13. Device according to claim 11, **characterized in that** all sides are concavely curved.

14. Device according to claim 11, **characterized in that** each time two opposite sides are concavely curved whereas the other confronting sides are convexly curved.

15. Device according to claim 1, **characterized in that** the angle segments enclose an angle of 120° in a circumferential direction.

16. Device according to claim 15, **characterized in that** the closed second scaffolding tube profile in a cross-section is a triangle with rounded off angels.

17. Device according to anyone of the preceding claims 1 - 4, **characterized in that** the first scaffolding tube is provided at its end where the second scaffolding tube profile is mounted, with a fixing means for fixation of the direction of orientation of the angle segments of the second scaffolding tube profile.

18. Device according to claim 17, **characterized in that** the fixing means consists of a cover sheet extending in a radial plane of the first scaffolding tube, the cover sheet being provided with an opening, having a cross-sectional profile which is similar in shape and of a greater dimension then the cross-sectional profile of the second scaffolding tube profile, in such a way, that the second scaffolding tube profile is tightly enclosed by the cover sheet and is freely slidable in and out of the first scaffolding tube through the cover sheet.

19. Device according to claim 18, **characterized in that** the fixing means consists of a final profile provided at the outward end of the first scaffolding tube, which final profile being shaped by deformation of the first scaffolding tube.

20. Device according to anyone of the preceding claims 17 - 19, **characterized in that** the first scaffolding tube is provided with connecting means to interconnect with the leg members of a scaffolding construction, which means are mounted in such a way that in its mounted position of the first scaffold tube a diagonal between opposite angle segments of the opening in the cover sheet extends in a vertical plane.

21. Device according to claim 18, **characterized in that** the second scaffolding tube profile on at least one side is provided with a protruding catch, protruding beyond this side, so that it cannot be slided past the cover sheet, thus giving protection against undesirable exceeding of the maximum extension length.

22. Device according to anyone of the preceding claims 1 - 6 and 17 - 21, **characterized in that** a stop catch or stop sheet is provided onto the telescoping part of the second scaffolding tube profile for determining a restriction of the telescoping distance of the second scaffolding tube profile into the first scaffolding tube.

23. Scaffolding tube for use as extendable scaffolding transom shaped according to anyone of the preceding claims 5 - 22.

24. Device according to claim 20, **characterized in that** as a connecting means there is a coupling device having a coupling housing that on its one side is provided with a first saddle element fixedly connected with the first scaffolding tube, and further at its opposite side being provided with a fixed second saddle element to be releasably connected by means of a wedge to a girder perpendicularly positioned thereto, whereby this second saddle element being provided with a hinging saddle clamp element hingeable mounted around a hinge pin in the coupling housing that together with the second saddle element spans over least 180° of the girder circumference whereas the coupling housing and the saddle clamp element are both provided with an abutting surface for a hollow wedge-shaped locking member the tapered end of which being movably connected to a recess which is located on a rib on the back side of the saddle clamp element, whereby the locking member along its whole length, except for each of its both ends, is provided with a continuous slot in which a bracket is positioned, mounted on said rib.

25. Device according to claim 24, **characterized in that** the coupling housing is provided with a spread spring, that moves the saddle clamp element into its open position when the locking member is removed from the abutting surfaces.

26. Device according to anyone of the preceding claims 24 - 25, **characterized in that** the wedge-shaped locking member is positioned between the abutting surfaces parallel to the girder, so that a lever arm is formed between the hinge point and the abutting surface of the saddle clamp element in order to clamp the saddle element tightly against the scaffolding tube.

27. Device according to anyone of the preceding claims 24 - 26, **characterized in that** on its one side the coupling housing comprises partially turned over parts, in such a way that the wedge may be locked in the intermediate space between both turned over parts, when the transom for stacking purposes is turned into a position wherein the coupling is located upwardly.

28. Device according to claim 24, **characterized in that** the scaffolding tube is provided with two coupling devices welded thereupon, whereby the sides of the coupling housing where the saddle clamp element and the locking member are mounted are facing each other.

29. Coupling device for interconnecting of scaffolding tubes to perpendicularly positioned girders comprising the following elements: a coupling housing which is on one side provided with a first saddle element being in fixed connection with the first scaffolding tube, whereas further on the opposite side there is provided a fixed second saddle element that may be releasably being connected by means of a wedge to a perpendicularly positioned girder, the second saddle element being provided with a saddle clamp element hingedly, by means of a hinge pin, mounted in the coupling housing, said first saddle element together with the second saddle element enclosing at least 180° of the girder circumference, the coupling housing and the saddle clamp element both being provided with an abutting surface for a hollow wedge-shaped locking member, whereof the tapered end of which being movably connected to a recess which is provided on a rib on the back side of the saddle clamp element, the locking member being provided along its whole length, except for each of its ends, with a continuous slot wherein a bracket is positioned mounted upon said rib.

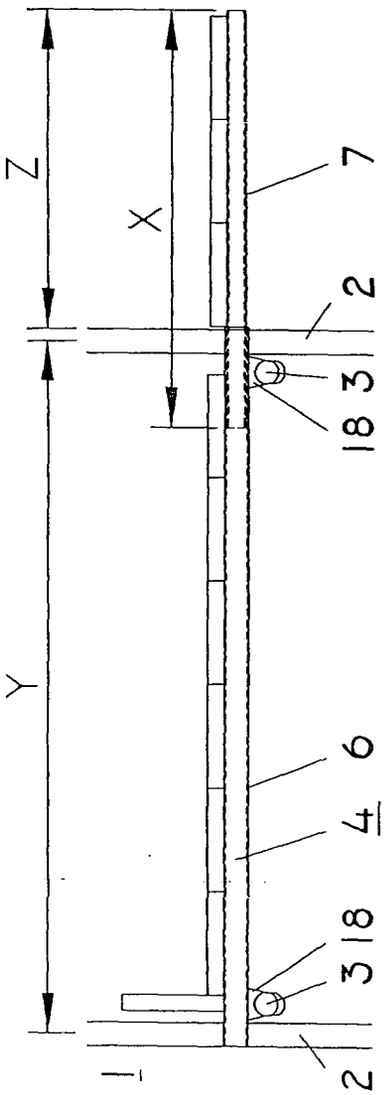

FIG.1

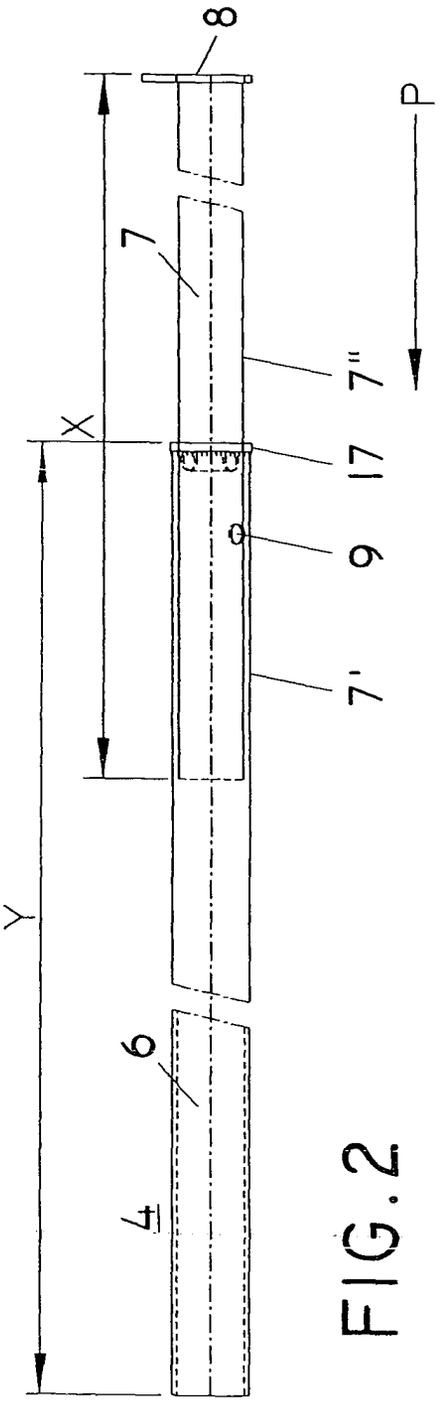

FIG.2

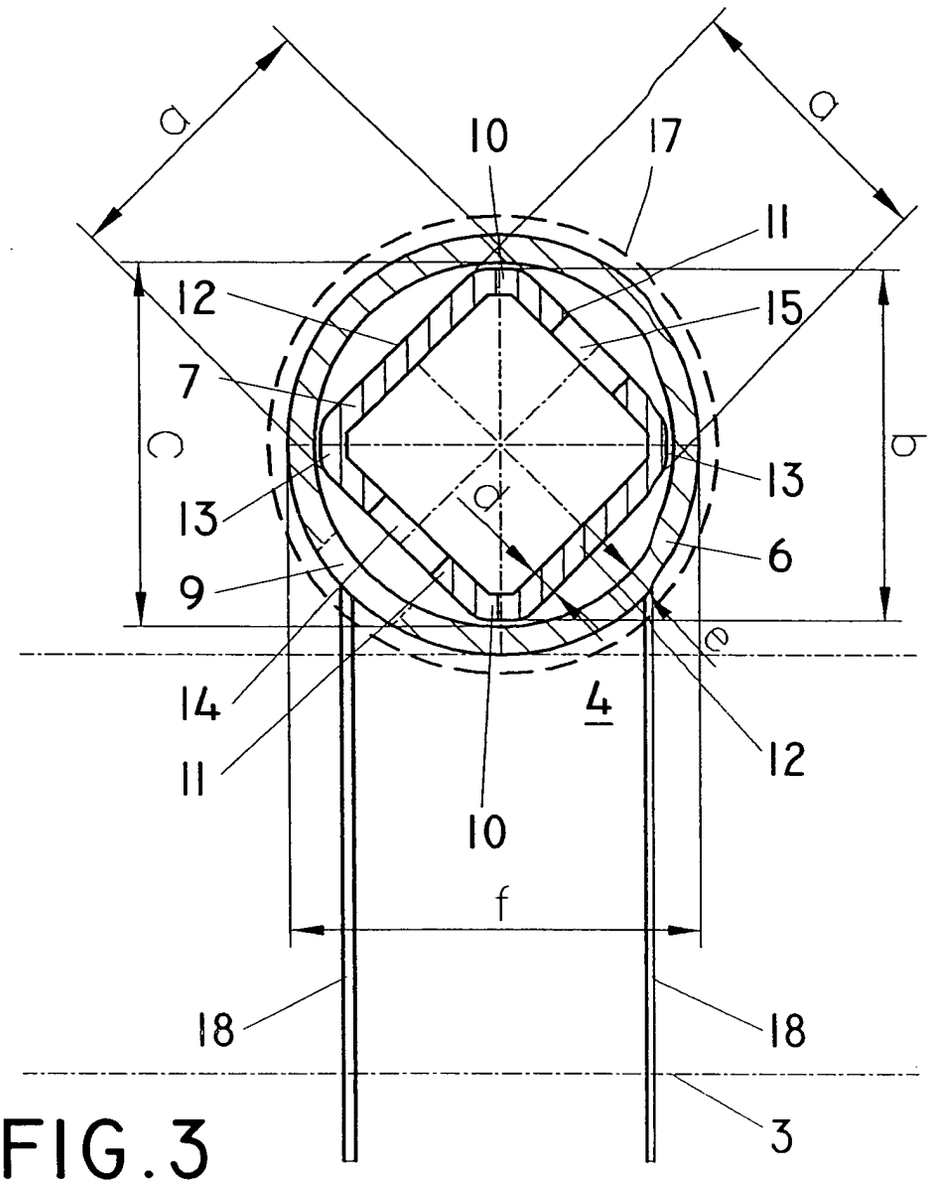

FIG.3

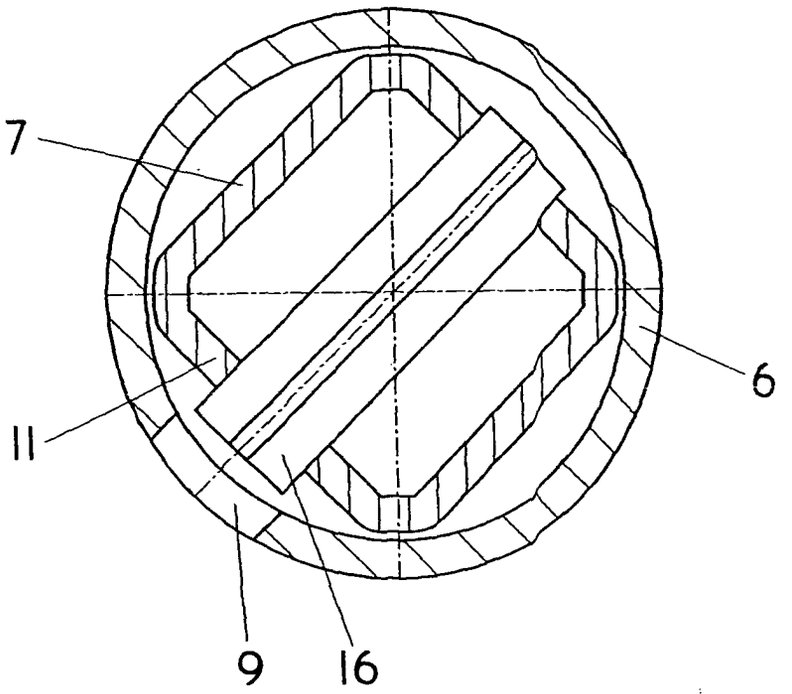

FIG.4A

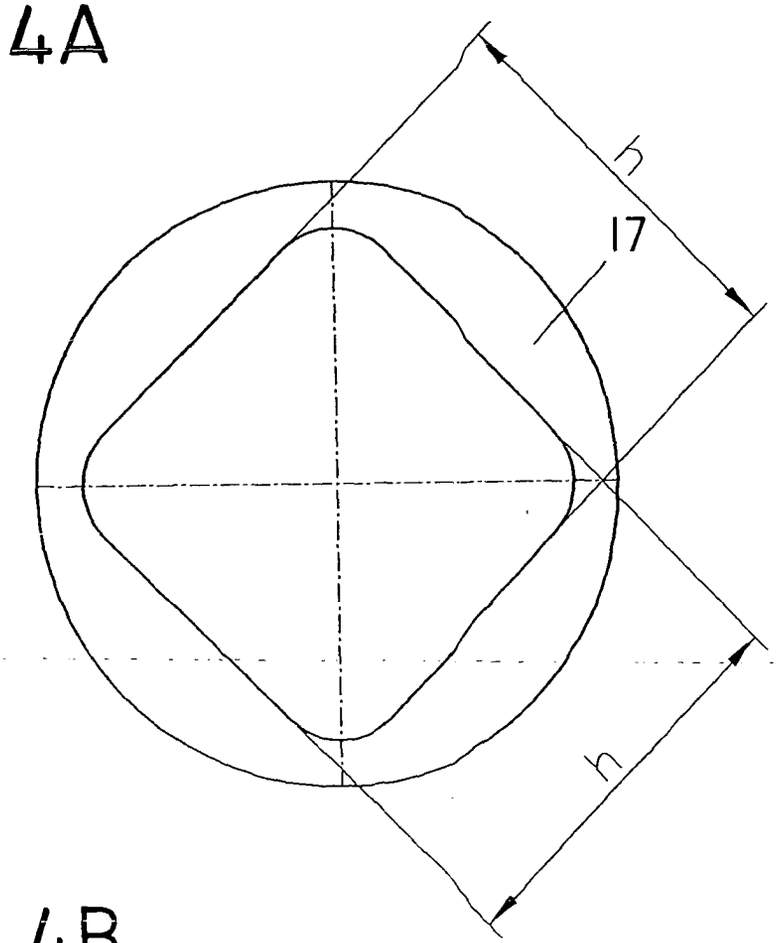

FIG.4B

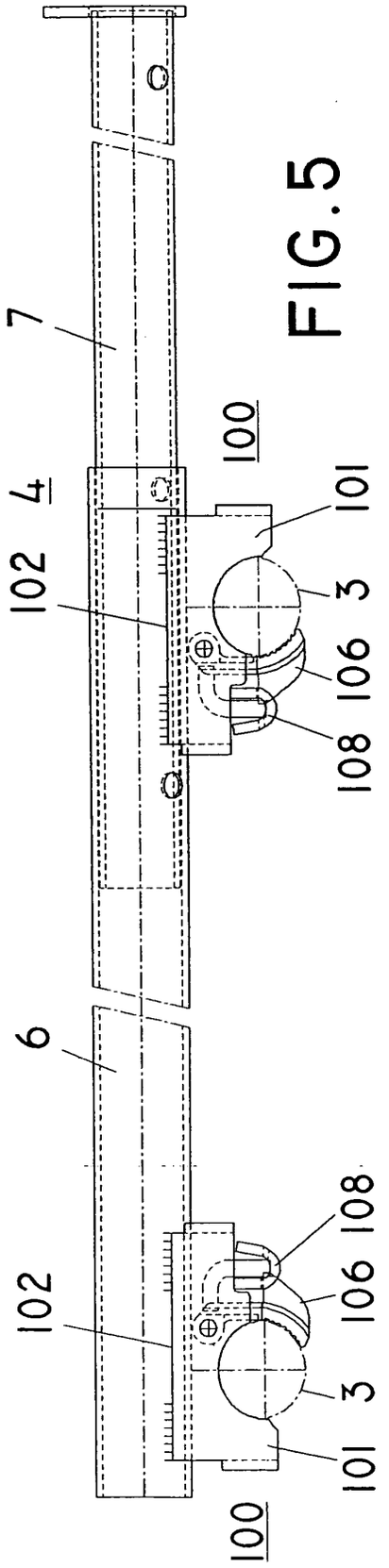

FIG.5

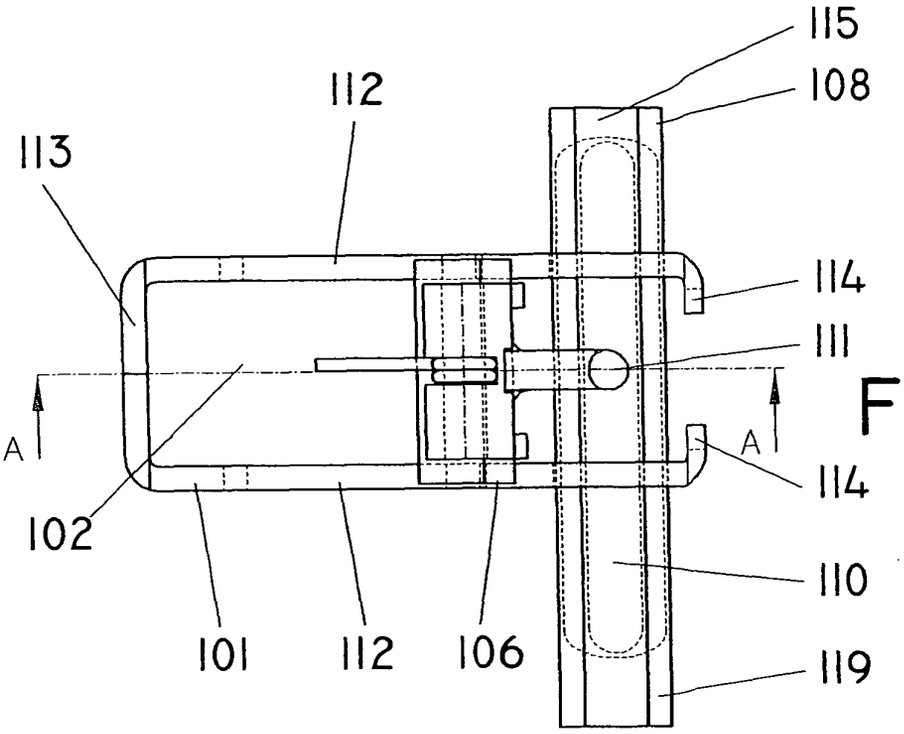
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FIG.6A

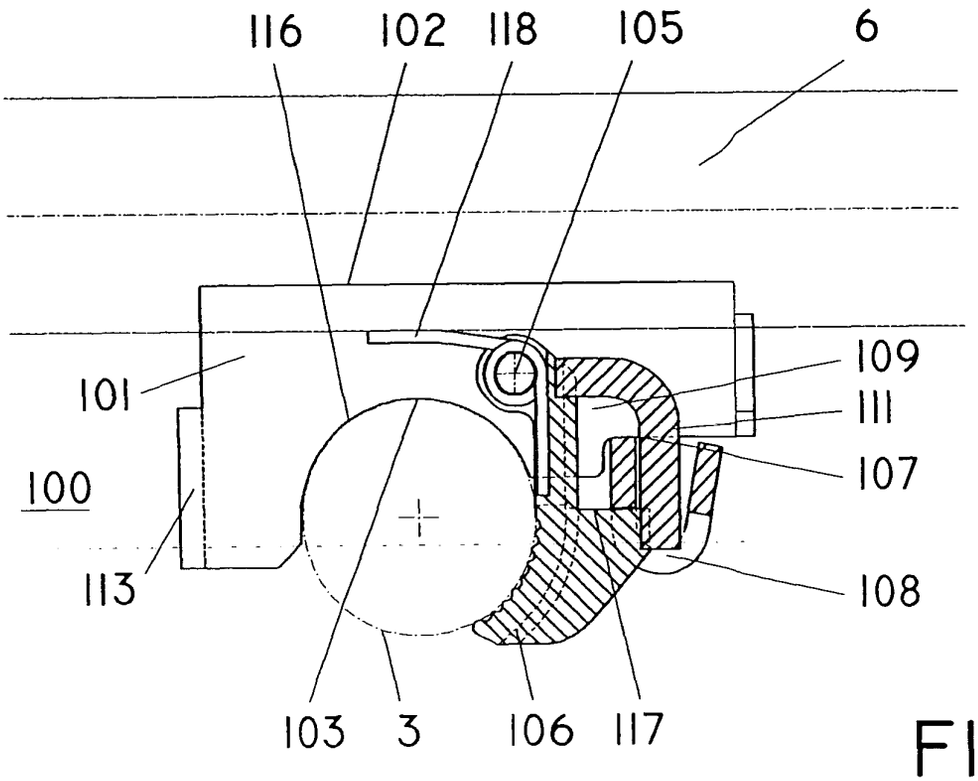
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FIG.6B

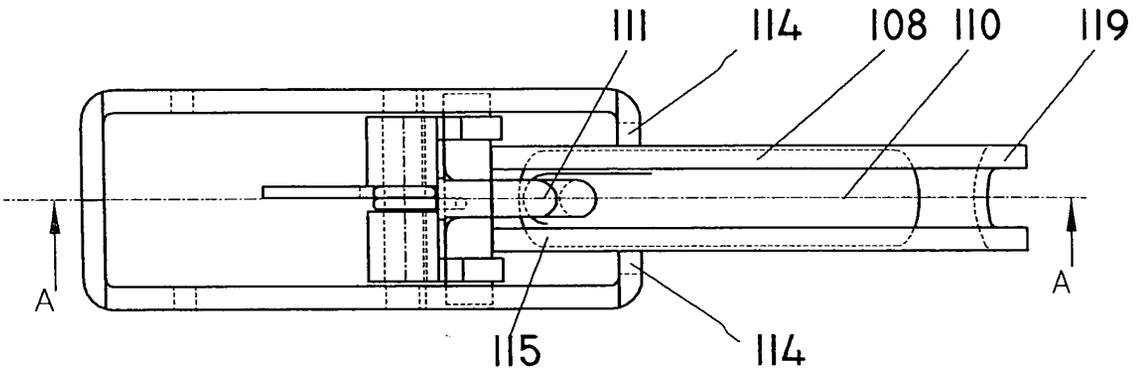

FIG.7A

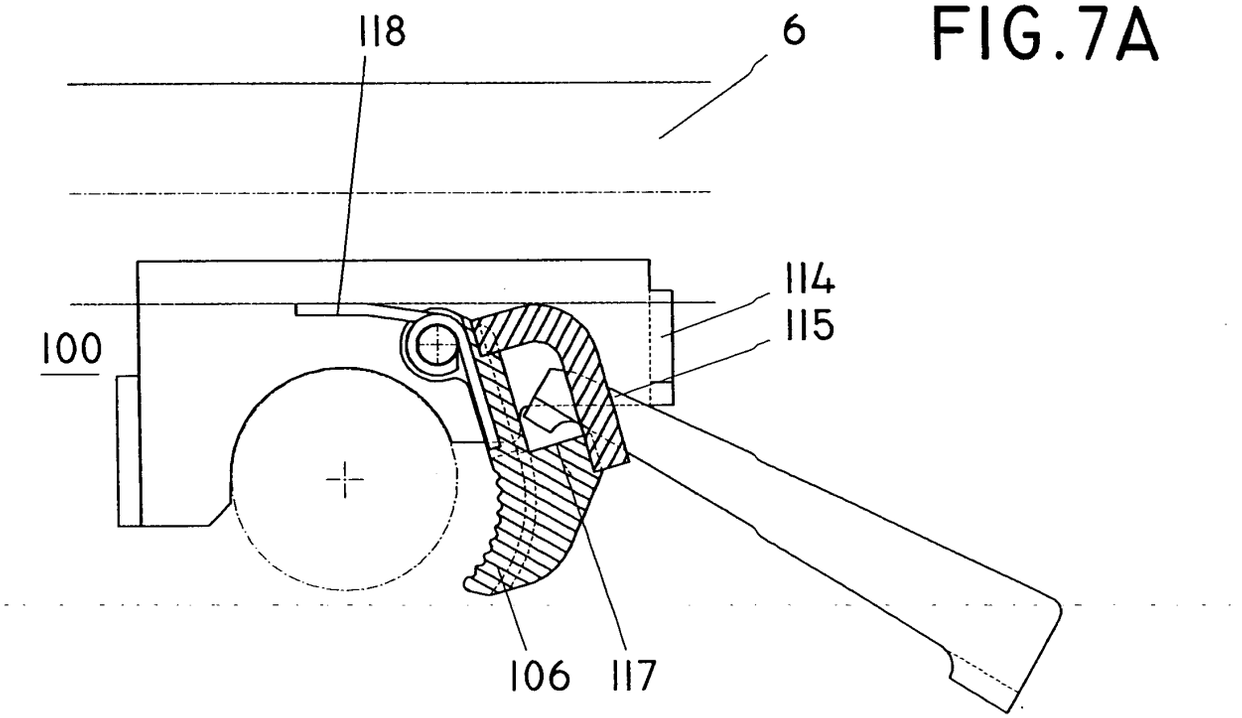

FIG.7B

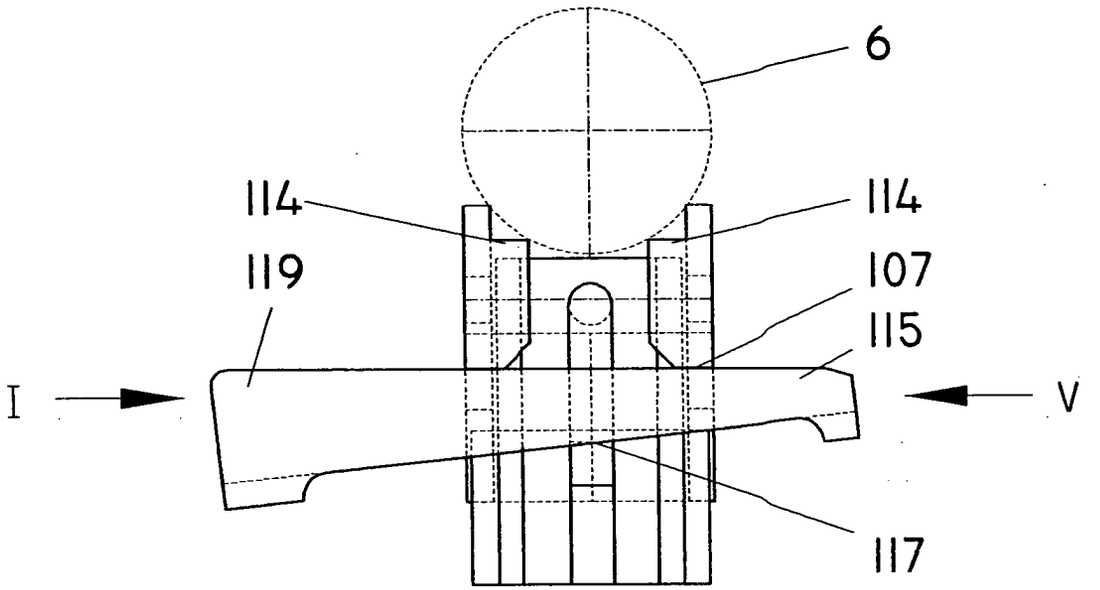

FIG.6C

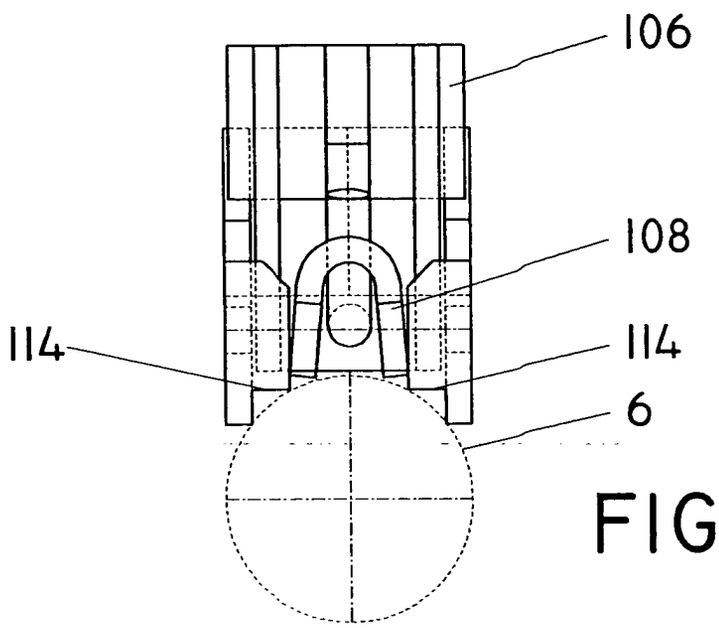

FIG.7C

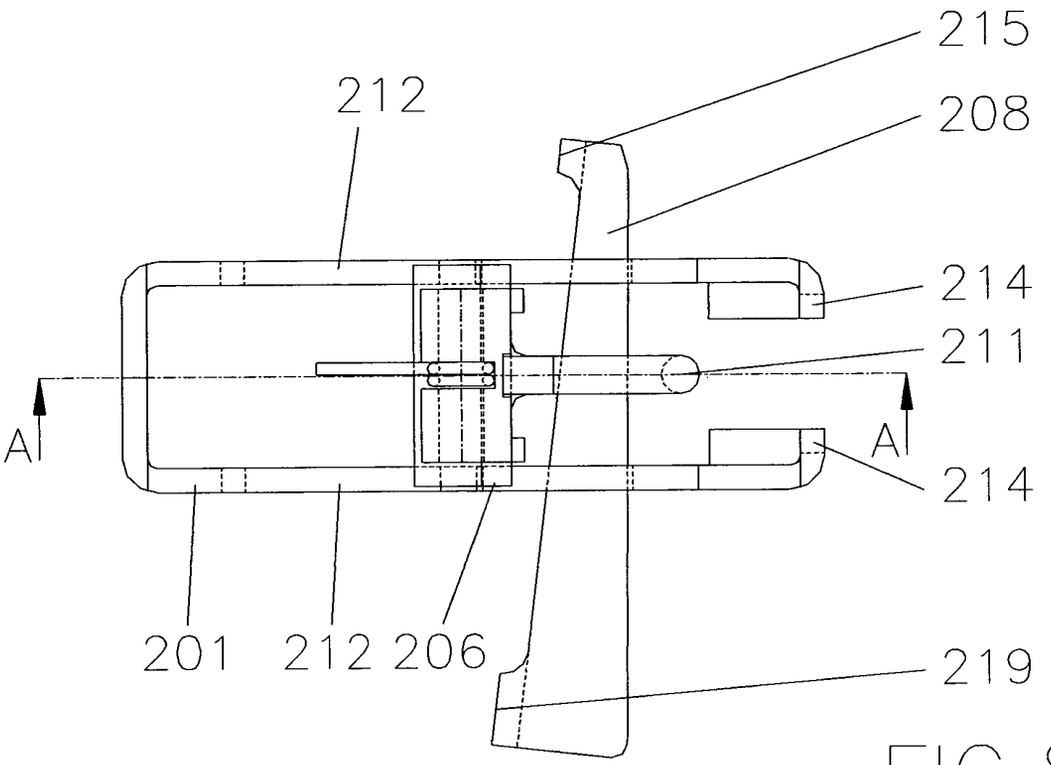
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FIG.8A

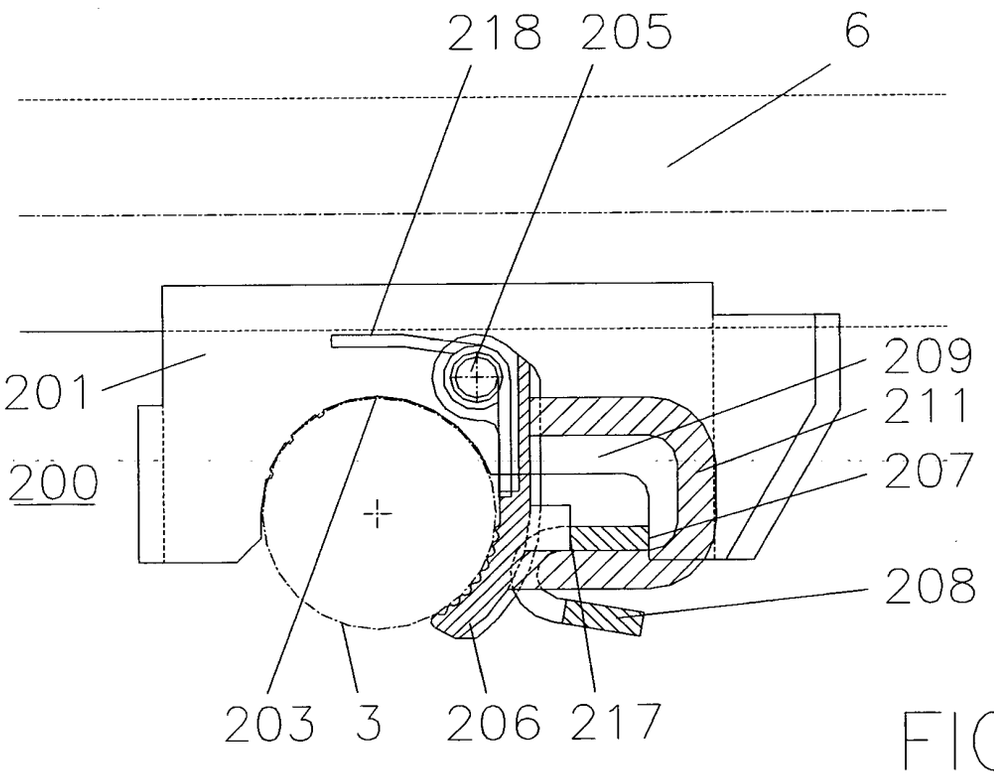
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FIG.8B

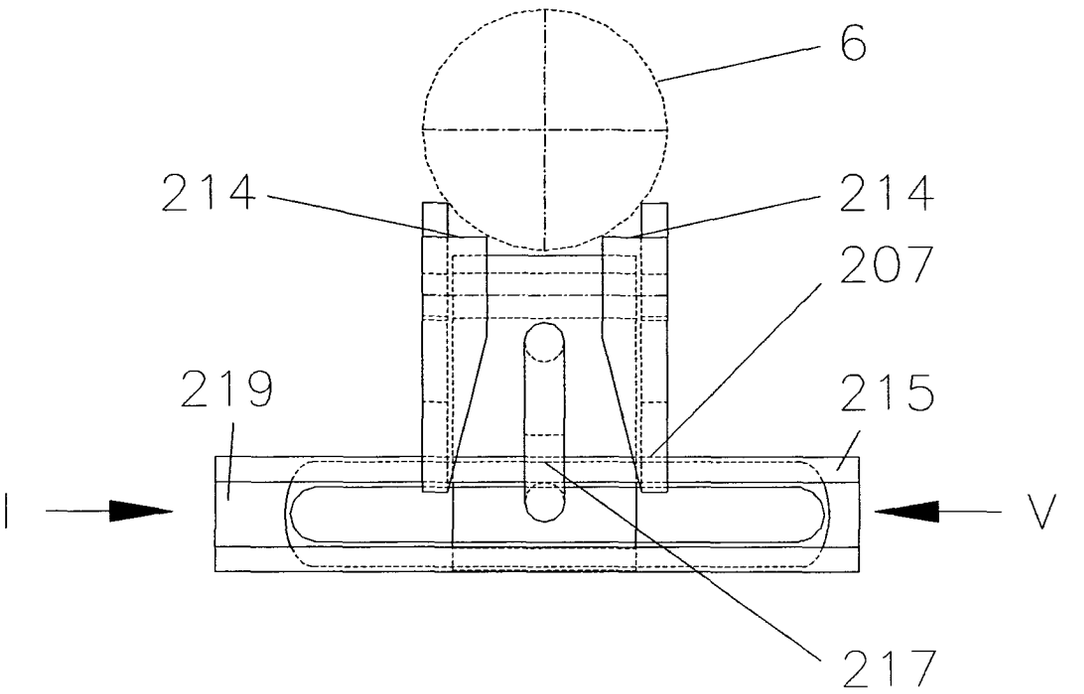

FIG.8C