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PINCH CLAMP

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PINCH CLAMP

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This invention relates to adjustable pinch clamps, such as are used with laboratory apparatus, for controlling the flow of fluid through flexible tubing.

Pinch clamps that have been used heretofore have had a number of disadvantages. For instance, with all prior types known to me it has been difficult to maintain the pinch clamp in an upright position because the flexible tubing is not of sufficient rigidity to prevent the clamp from overturning. A major disadvantage of one type of pinch clamp has been the necessity for disconnecting the tubing in order to remove the pinch clamp when the latter was no longer desired. Pinch clamps constructed in previous attempts to remedy the latter defect have been unsatisfactory, chiefly for mechanical reasons.

A major object of the present invention is to provide pinch clamps which are easily placed on and removed from the flexible tubing without disturbing its connections, are rigidly constructed and can not open up in use, are of simple and inexpensive construction, and which overcome or minimize other disadvantageous features of the clamps known heretofore.

A particular object is to provide a clamp embodying the beneficial features just recited, which is also adapted to maintain itself upright when in clamping position.

A further object is to provide a clamp of the type described which is provided with simple means for easily fastening it in fixed position on a supporting structure.

The pinch clamp provided by the invention comprises a rectangular frame composed of top and bottom members, and side members which serve as guides for the ends of a clamping bar movable toward and from the bottom member of the frame. The top, bottom and one side member are rigidly connected, for example in the form of a C-frame, and the other side member is adapted to securely close the fourth side of the frame and to be moved relative thereto to open the side for insertion and withdrawal of the tubing to be clamped without the necessity of disturbing the connections of the tubing.

The details of the invention will be described in connection with the accompanying drawing, in which Fig. 1 is a front elevation of a pinch clamp constructed in accordance with the preferred embodiment of the invention; Fig. 2 an end elevation of the clamp of Fig. 1; Fig. 3 a plan view of the pinch clamp, showing also in broken lines the use of the means shown in Figs. 5 and 6 for fixing the clamp to a support; Fig. 4 a view

in vertical transverse section taken on line IV—IV of Fig. 1; Fig. 5 a plan view of a device for rigidly supporting the clamp in an upright position; and Fig. 6 is an end elevational view of the device of Fig. 5.

Referring particularly to Figs. 1 to 4, the pinch clamp comprises a rectangular frame 1 consisting of a top member 2, a base member 3 and side members 4 and 5. The members 2, 3 and 4 are rigidly connected to form a structure of substantial C-shape, the open end of which is closed by member 5 which is movably associated with top and bottom members 2 and 3. Member 5, which is in the form of a cylindrical rod or post, is provided at its lower end with screw-threads 5a which cooperate with a threaded opening in the extended end of base member 3, and it projects loosely through an opening 6 in the extended end of top member 2, its upper end being provided with a thumb screw 7.

Top member 2 is provided with a substantially central boss 9 having a screw-threaded opening through which extends an adjusting screw 10 to the lower end of which is connected a clamping bar 11. The latter is provided at its right-hand end, as viewed in Fig. 1, with a projection or tongue 12 slidably mounted in a vertical groove 13, Fig. 4, in side member 4. The other end of clamping bar 11 is suitably curved to conform to post 5, whereby clamping bar 11 is guided at both ends in its vertical movements in accordance with the adjustment of the screw 10. Thus side member 5 may be held in fixed position to close the frame and provide a rigid side guide for the clamping bar, and it may be easily moved vertically to open the frame for slipping it over rubber tubing, by rotating it with thumb screw 7 to disengage threaded portion 5a, whereupon the post may be raised in the frame.

It is preferred to construct post 5 so that it can not be taken out of the frame. To this end threads 5a are rolled on one end of the post, which upsets that end somewhat, as shown in the drawing. The post is inserted upwardly through the screw threaded opening in the base and through opening 6, and thumb screw 7 is then driven into place, this end of the post having been previously knurled for locking the thumb screw in place.

In the assembly of the clamp adjusting screw 10, it is inserted through the threaded opening in boss 9 and its lower end is inserted in a bore in the clamping bar. The reduced end portion of the adjusting screw is then upset, or riveted, as indicated at 16, Fig. 1, in the countersunk lower end of the bore. This provides for relative rota-

tive movement between screw and bar, but prevents canting of the bar relative to the screw.

All of the pinch clamps known to me prior to the invention have tended to drop over onto their side when in clamping position on rubber and the like flexible tubing. A feature of particular importance resides in my discovery of means for overcoming that disadvantageous feature. In all prior clamps the cooperating faces of the clamping bar and base member have been flat, or substantially so. I have discovered that by making those faces complementarily arcuate, i. e. one face concave and the other face convex, the clamp will maintain itself upright when clamped on rubber tubing. For ease of construction the base member is preferably given the concave clamping face, as shown at 14, Fig. 4, the adjacent cooperating clamping face 15 of bar 11 being convex. The clamps provided by the invention preferably embody this feature, although it is applicable to laboratory pinch clamps of other constructions. Such shaping of these faces causes the clamp to remain upright even with pure gum tubing.

In the use of the pinch clamp, post 5 may be disconnected by unscrewing it from base 3 whereupon it may be lifted upwardly to permit the clamp being placed over the tubing to be controlled thereby, whereupon the post may be returned to its illustrated position. Clamping bar 11 may then be lowered by means of adjusting screw 10 to firmly clamp the tubing against base 3. The tubing is then caused to assume such shape by reason of the curved clamping surfaces that it is sufficiently rigid to resist the overturning of the clamp from its upright position, which is a feature of substantial advantage and novel in this art.

When it is desired to remove the pinch clamp from the tubing, clamping bar 11 is released by means of the adjusting screw and the post 15 is disconnected and moved upward to open the side of the frame 1 whereupon the pinch clamp may be removed from the tubing without disturbing the connections of the latter.

During the operation of the pinch clamp, clamping bar 11 is provided with suitable guiding means during its movements whereby its alignment with the cooperating base member is assured. Moving the detachable post 5 does not in any way interfere with the cooperative relations of the several parts but permits the easy insertion and withdrawal of the tubing from the frame of the clamp.

It may be desirable under certain circumstances that the pinch clamp be firmly anchored in position, and I have provided simple and effective means for such purpose. Base 3 is provided at the bottom portion thereof with two lateral flanges or projections 17, on opposite sides thereof. A plate member 18 is provided with a slot 19 open at one end and of such size and shape as to permit the plate to be passed over the end of base 3. Plate 18 is provided with recesses 20 on opposite sides thereof for receiving the respective flanges 17 and thereby permitting the bottom of the plate and the bottom of the base 3 to be in alignment upon any suitable support, such as a laboratory bench or a wall. Plate 18

may then be fastened to the support by means of screws 21, for which holes 22 are provided, and thereby the pinch clamp will be rigidly maintained in upright position.

Among the advantages of the pinch clamp constructed in accordance with my invention are that it may be easily and conveniently placed in operative position or removed therefrom without disturbing the connection of the tubing that it is adapted to control. It is of few and simple parts that may be easily assembled. The clamp in its preferred embodiment is provided with cooperating surfaces for engaging the tubing that secure a new and beneficial result in that the tubing is caused to be of such form and shape as to resist the overturning of the pinch clamp. The foregoing and other advantages will be apparent to those skilled in the art relating to pinch clamps and similar devices.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A pinch clamp comprising a rigid C-frame, a movable side member for closing the open side of said frame extending through an opening in the top member of the frame and having a screw-threaded connection to the base of the frame, said side member having at its upper end a knob of larger diameter than the opening in the top of the frame through which said member passes and having the screw-threads at its lower end of larger diameter than said opening, whereby to limit movement of said side member in the frame, and a clamping bar connected to a shaft making screw-threaded engagement with the top of the frame for adjustable movement of the clamping member toward and from the bottom of the frame, the side of the frame and said movable side member acting as guides for the ends of the clamping bar, and said movable side member being movable vertically to open the side of the frame.

2. A pinch clamp comprising a rigid C-frame having a top member, a side member, and a bottom member provided on opposite sides with lateral projections; a movable side member for closing the open side of said frame extending through an opening in said top member and having a screw-threaded connection to said bottom member, and a clamping bar connected to a shaft making screw-threaded engagement with said top member for adjustable movement of the clamping member toward and from the bottom of the frame, said side members acting as guides for the ends of said clamping bar, said movable side member being movable vertically to open the side of the frame, and a locking member having spaced sides for receiving said bottom member therebetween and having recesses therein for engaging said projections and being adapted to be rigidly connected to a support for holding the clamp upright.

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