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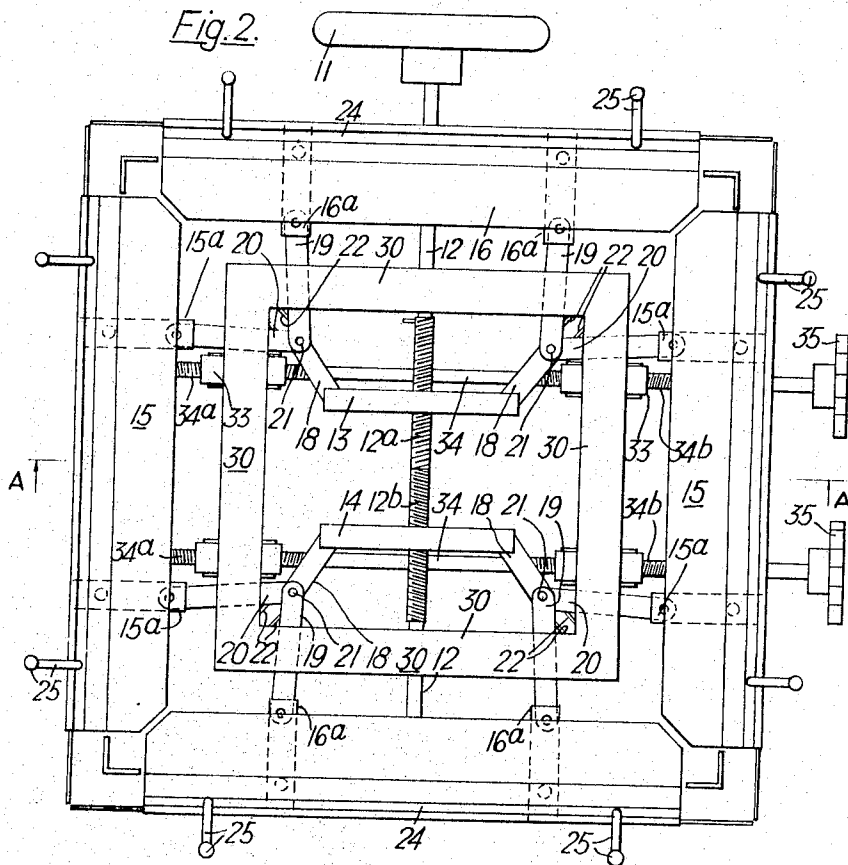
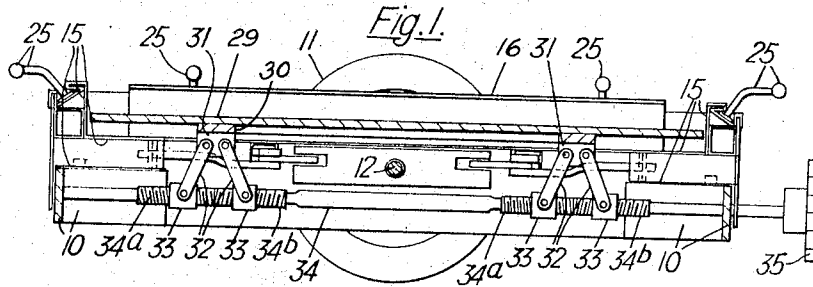
K. L. ELLIOTT

3,339,594

TENSIONING OF SIEVES, SCREENS AND THE LIKE

Filed July 28, 1964

3 Sheets-Sheet 1



Inventor  
KENNETH L. ELLIOTT

By *Trinity & Family*

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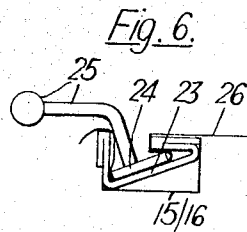
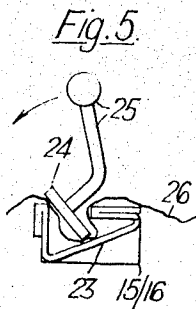
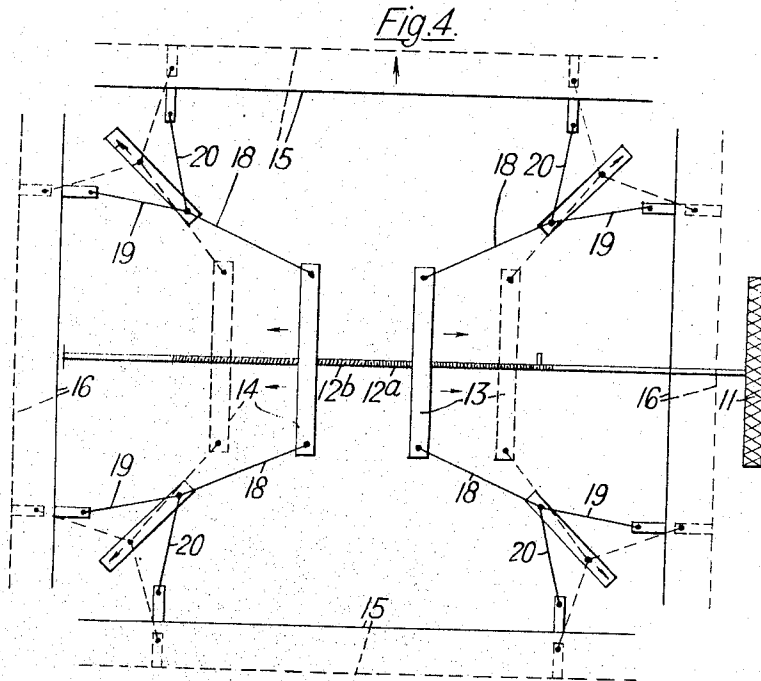
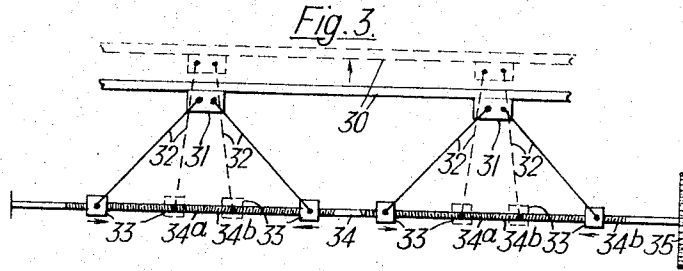
K. L. ELLIOTT

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TENSIONING OF SIEVES, SCREENS AND THE LIKE

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3 Sheets-Sheet 2



Inventor  
KENNETH L. ELLIOTT

By  
*Miriam Bailey*



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3,339,594

**TENSIONING OF SIEVES, SCREENS AND THE LIKE**

**Kenneth L. Elliott, Cranford, Castle Donington, near Derby, England, assignor to Cranco Engineering Limited, Long Eaton, England, a company of Great Britain**

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8 Claims. (Cl. 140—109)

This invention relates to the tensioning of sieves, screens and the like for use in connection with the making up of sieves, for example for the flour industry, or in screen printing equipment, and generally where cloth or gauze-like members are to be held taut.

In such equipment it is necessary to stretch the material constitutes the sieve, screen or like element, and secure the tightly stretched material on to a frame. These operations are laborious and it is extremely difficult to ensure that the material is stretched evenly over the whole area and in all directions.

The invention provides means for securing the material to be tensioned to gripping members, effecting the tensioning by moving the gripping members outwards, bringing the tensioned material and a frame into contact with each other, and securing the material to the frame by an adhesive.

The invention also consists in an apparatus provided with a bed or surface on which a sieve, screen or like frame can be placed, and the bed or surface is bounded by gripping members in which the margins of the sieve, screen or like material can be securely gripped, means being provided for moving the gripping members outwards in unison so that the material will be progressively stretched to the appropriate degree of uniform tautness, means being also provided for lifting the bed or surface and hence the frame up to such a level that the material is in intimate contact with the upper surface of the frame, to which it can then be secured.

For securing the material the upper surface of the frame is preferably treated with an adhesive medium of such a nature that it is normally in a non-adhesive condition and requires to be activated by a solvent or heat application through the material in order to cause the latter to adhere to the frame.

In order to cause the several gripping members to move outwards to tension the material they are preferably connected by linkages with an operating shaft, for instance the shaft may have left and right-hand screw-threads operating a pair of brackets which are thereby made to move axially along the shaft, the brackets in turn being arranged to actuate the linkages.

Preferably the frame supporting bed or surface is similarly raised and lowered by linkages connected with brackets moving along one or more right- and left-hand screw thread shafts.

One or a number of sieves, screens, or the like can be mounted on frames on a single bed or surface as indicated and cut out therefrom.

Constructional forms of the invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a section on line A—A of FIGURE 2.

FIGURE 2 is a plan with a top frame omitted.

FIGURE 3 is a diagram showing a plate raising operation.

FIGURE 4 is a diagram showing a tensioning operation.

FIGURES 5 and 6 are details showing gripping devices.

FIGURE 7 is a similar view to FIGURE 4 showing a modification.

The apparatus comprises a base 10 of any suitable

shape, for instance rectangular. A handwheel 11 is mounted on a shaft 12 extending centrally along this base, see FIGURES 1, 2 and 4. The shaft 12 is carried in suitable bearings at each end and can be rotated by the handwheel 11. The shaft has two screw-threaded portions 12<sup>a</sup>, 12<sup>b</sup>, one near each end, one having left-hand threads and the other right-hand threads. The shaft has an internally screw-threaded bracket or yoke fitted on to it near each end, so that when the shaft is rotated in one direction the two brackets or yokes 13, 14 move further apart under the action of the screw-threads, and when the shaft is rotated in the opposite direction the two brackets or yokes move closer together. Along each side of the base a gripping member 15 is carried and a further gripping member 16 along each end, these members having depending pairs of feet 15<sup>a</sup>, 16<sup>a</sup> which engage in slides. Each bracket or yoke on the shaft 12 projects at right angles from the shaft in both directions and each end has connected to it the outer end of one arm 18 of a three armed linkage 18, 19, 20, the three arms radiating from a common pivot 21. The area defined by the gripping members shown is square but if it were oblong the end adjustment would probably need to be greater than the side ones and in this case provision is made for allowing the pivots 21 to be moved diagonally outwards in guides 22. The outer ends of the other two arms in each set are connected to the end gripping member 16 and to one of the side gripping members 15. Thus when the bracket moves further apart along the shaft each bracket operates its own three-armed linkages 18, 19, 20 with the result that a toggle action is exerted on the gripping member, all four of which move outwards to stretch a sheet of flexible material such as a sieve or silk gripped by them. The gripping members 15, 16 are formed with channels, see especially FIGURES 5 and 6, having upwardly-inclined rubber or similar seatings 23. Loose rails or bars 24 provided with handles 25 are inserted into these channels and turned around so that they are jammed in place and trap the flexible material 26 tightly in position in the channels so that it is firmly gripped and cannot slip during stretching. A suitably shaped underframe 30, for instance rectangular, supports a working bed or table 29, FIG. 1 (which is omitted from FIG. 2 in order to show the parts below), at a level below the material 26 so that the tensioned material will be well clear of the bed or table. In use the loose screen frames will be placed on the bed 29 and these screen frames are usually coated with a thermoplastic or other medium having strong adhesive properties when activated. The underframe 30 is provided with blocks or lugs 31 on its underside to which links 32 are pivotally connected and the links are in turn connected to collars 33, for instance there may be one of these linkages near each of the four corners of the bed. Two shafts 34 are mounted in bearings in the base of the machine under the bed, each shaft having left and right-handed screw-threaded portions 34<sup>a</sup>, 34<sup>b</sup> on which the collars are fitted. Rotation of the shafts in one direction moves the collars further away from each other and rotation of the shafts in the other direction moves the collars towards each other, by which means their linkages are caused to raise or lower the bed on which the screen frame, or table 29 rests. These two shafts may each have its own handwheel 35 or they may be geared together to work in unison. Thus when the material 26 has been properly stretched tight as already described the underframe 30 and the table 29 carried by it can be raised up into contact with the underside of the material. The prepared upper surface of the frame can now be activated by heat or a solvent applied through the material 26 and the material will be firmly stuck to the frame. Obviously any other method of securing the material to the frame (suitable to the material of which the frame is made) can be practised.

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In the modification of FIGURE 7 the yokes 13, 14 of the two end members 16 are directly mounted on left and right-hand screw threads 12<sup>a</sup>, 12<sup>b</sup> on the screw 12, and the two side members 15 are connected to the yokes by radius arms 36.

The invention greatly expedites the operation of stretching the material and ensures perfectly uniform tensioning, with great rapidity and without demanding any particular skill or experience.

I claim:

1. A tensioning apparatus comprising a base, a shaft carried in the base, left and right-hand screw-threaded portions on the shaft, two brackets mounted on the shaft, one on the left-hand screw-threaded portion and the other on the right-hand screw-threaded portion, means for rotating the shaft, said shaft by virtue of the screw-threaded portions when rotated causing the brackets to move in opposite directions, pivotally movable linkages connected to the brackets, gripping members connected to the linkages, the gripping members being in the form of four straight channels at 90° angles to each other, each gripping member being movable outwards under the action of the linkages, whereby a sheet of flexible material gripped by them is tensioned, a frame supported by the base at a level below a sheet of flexible material gripped in said gripping members, and means connected to the frame for lifting it up into contact with tensioned flexible material.

2. A tensioning apparatus as claimed in claim 1 wherein said means connected to the frame comprises two further shafts mounted in the base, left and right-hand screw-threaded portions on each said further shaft, a collar on each left and each right-hand screw-threaded portion, linkages connected to the collars, means for rotating the said further shafts, the rotation of the shafts causing the collars to operate the linkages, a bed connected to the linkages, the frame which is raised into contact with the tensioned flexible material being carried by the bed.

3. A tensioning apparatus for a sheet of flexible material comprising four gripping members arranged at right angles to each other, said members being organized to grip four margins of a sheet of material to be tensioned, means for moving all four members outwards simultaneously to tension the material, a frame mounted below the gripping members, and means connected to the frame for raising it into contact with the tensioned material, each gripping member including a channel, a resilient seating in each channel, and members loosely located in the channels and shaped to engage and clamp material to be tensioned against said seatings.

4. A tensioning apparatus for a sheet of flexible material comprising four gripping members arranged at right angles to each other, said members being organized to grip four margins of a sheet of material to be tensioned, means for moving all four members outwards simultaneously to tension the material, a frame mounted below the gripping members, and means connected to the frame for raising it into contact with the tensioned material, said means for moving the gripping members outwardly simultaneously comprising an operating shaft having left and right hand threaded portions, a pair of in-

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ternally threaded yokes mounted on said threaded portions of the operating shaft and fixed to an opposed pair of said gripping members, and links pivotally connected to said yokes and to the other opposed pair of gripping members.

5. A tensioning apparatus comprising a frame, gripping members associated with the frame, the gripping members being organized to grip the material to be tensioned, means engaging with the gripping members to move them relatively outwards by amounts sufficient to tension the material, and means for moving the tensioned material and the frame into contact with each other, thereby enabling the material to be secured to the frame while in its tensioned condition, said means engaging the gripping members to move them outwards comprising an operating shaft, left and right-hand screw threads on the operating shaft, means for rotating the operating shaft, and linkages actuated by means of the screw-threads, the linkages being connected with the gripping members, said gripping members being slideably guided in outward and inward movements by portions engaging guides, said linkages each comprising three toggle arms pivoted together at one end and pivotally connected at their free ends to two of said gripping members and a yoke member threaded on said operating shaft.

6. A tensioning apparatus for a sheet of flexible material comprising, in combination, a supporting base, four gripping members arranged at right angles to each other and movably carried by said base for movement toward and away from a common center, a pair of yokes disposed on opposite sides of said common center, means for simultaneously and uniformly moving said yokes toward and away from said common center, and means connecting said gripping members to said yokes for simultaneously and uniformly moving said gripping members toward and away from said common center in response to corresponding movements of said yokes.

7. The apparatus defined in claim 6 including means for moving a mounting frame into contact with the tensioned material.

8. The apparatus defined in claim 6 wherein said means connecting said gripping members to said yokes comprises toggle links.

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CHARLES W. LANHAM, *Primary Examiner*,

MILTON S. MEHR, *Examiner*.

L. A. LARSON, *Assistant Examiner*,