

Sept. 29, 1953

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2,653,378

APPARATUS FOR HOLDING BOOKS

Filed Feb. 3, 1947

3 Sheets-Sheet 1

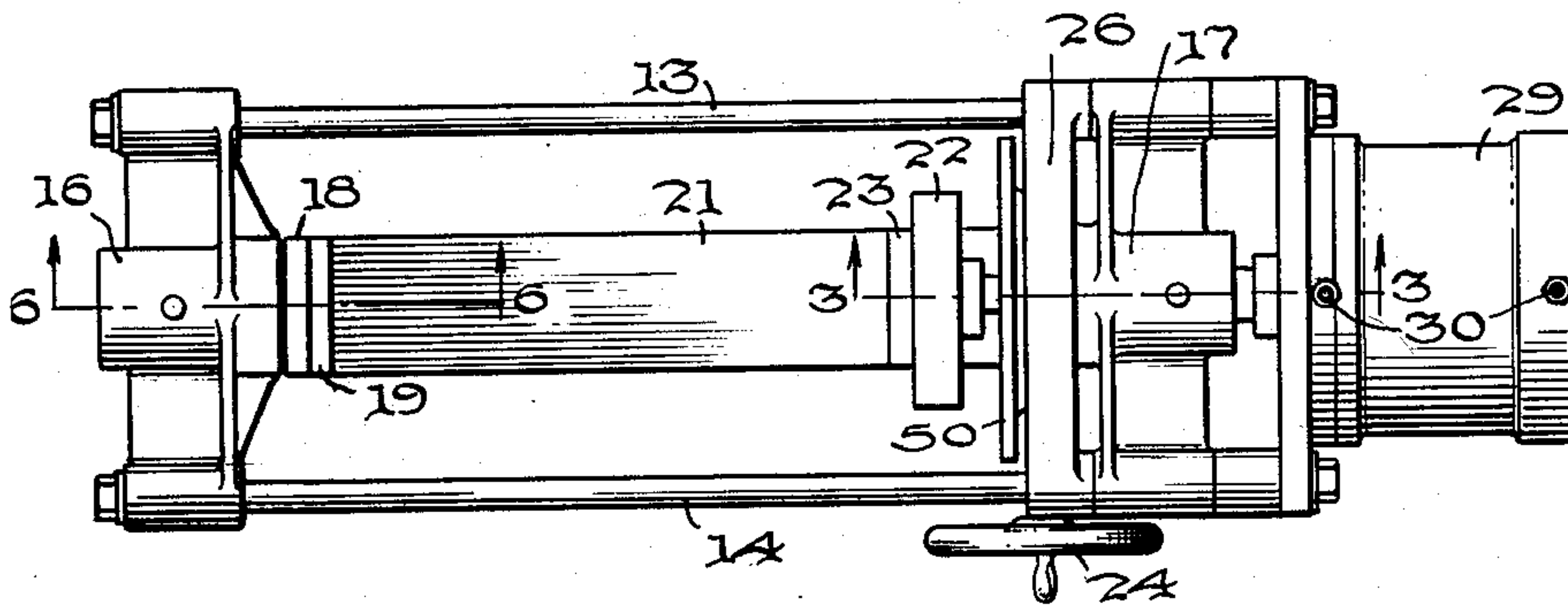


Fig. 1.

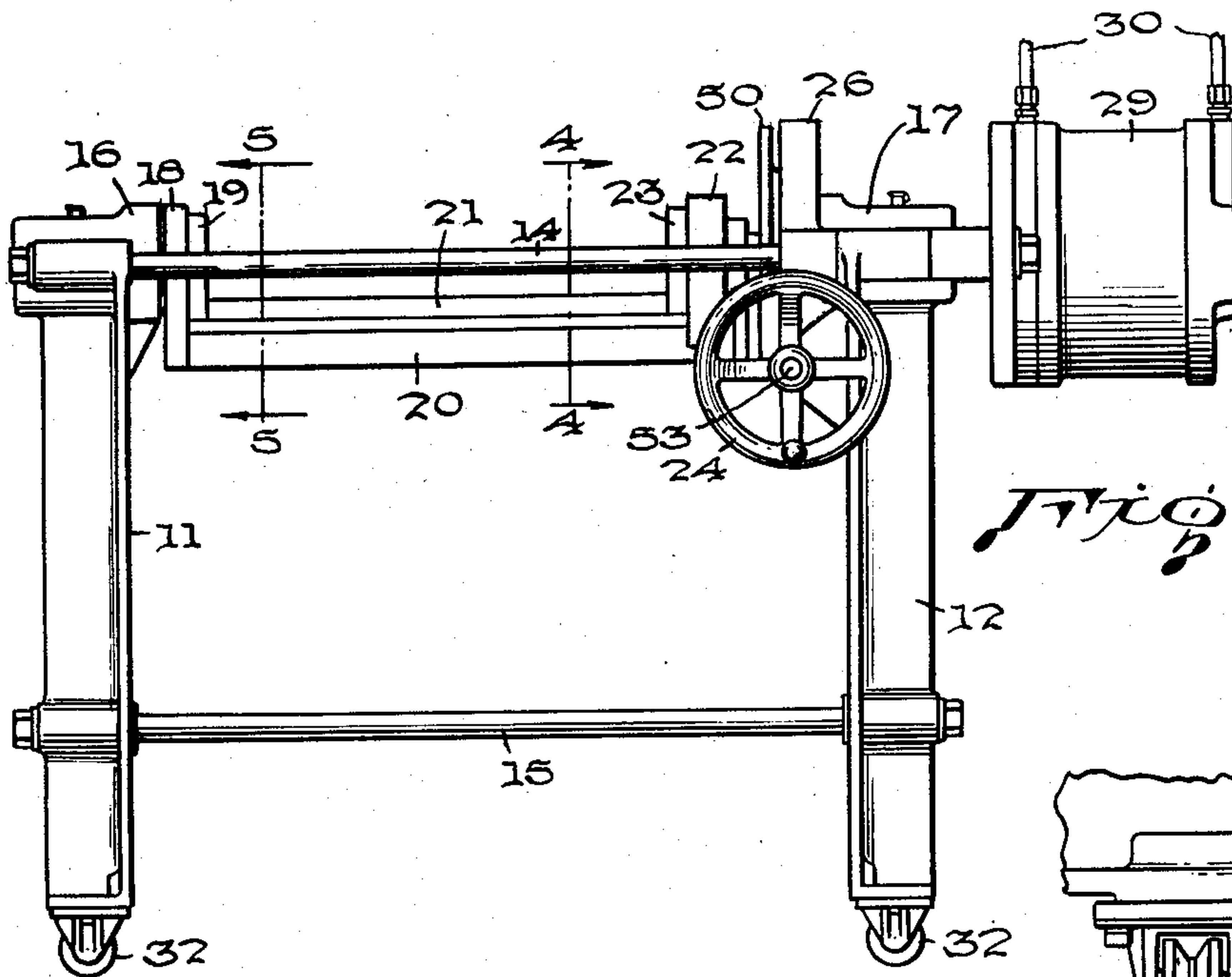


Fig. 2.

Fig. 6.

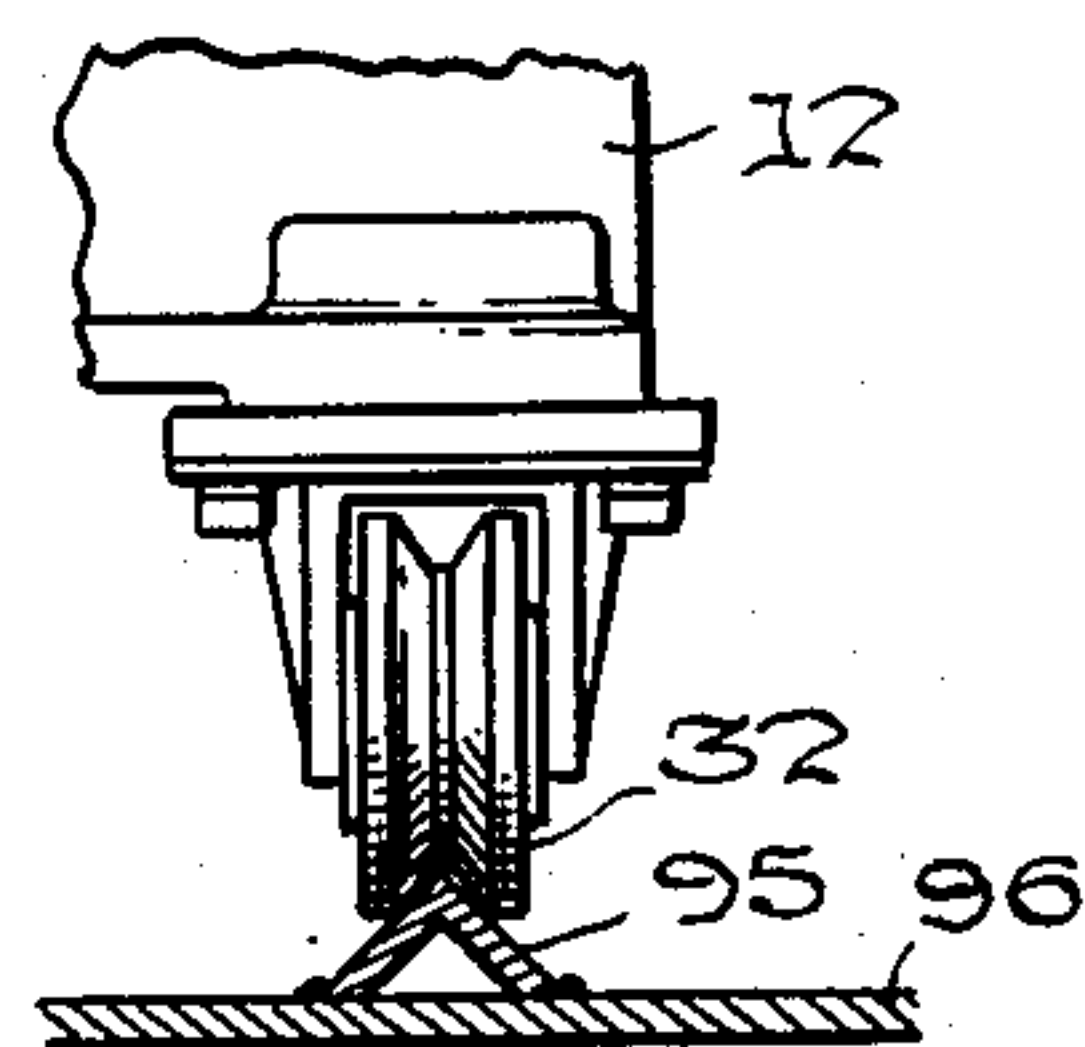
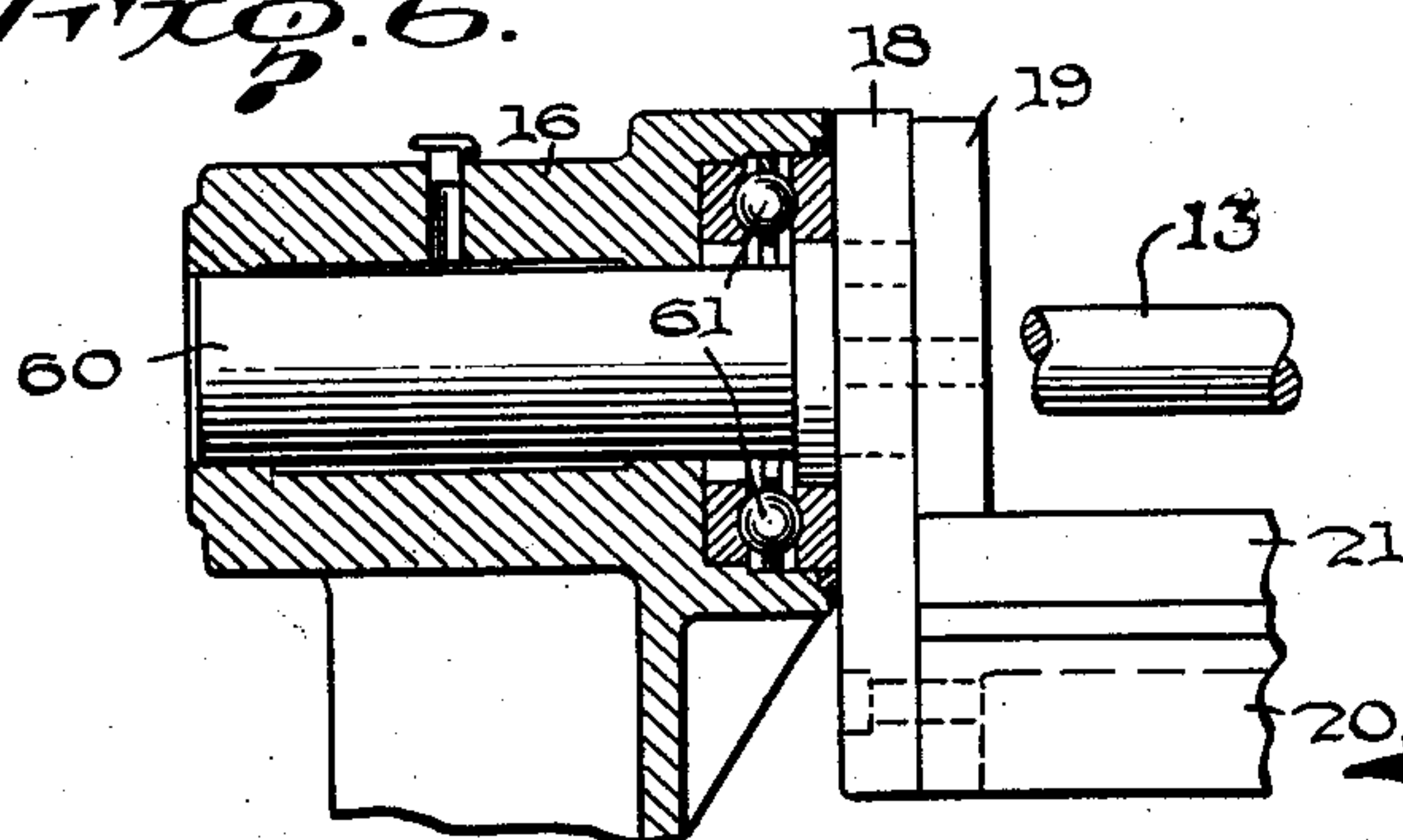


Fig. 7.

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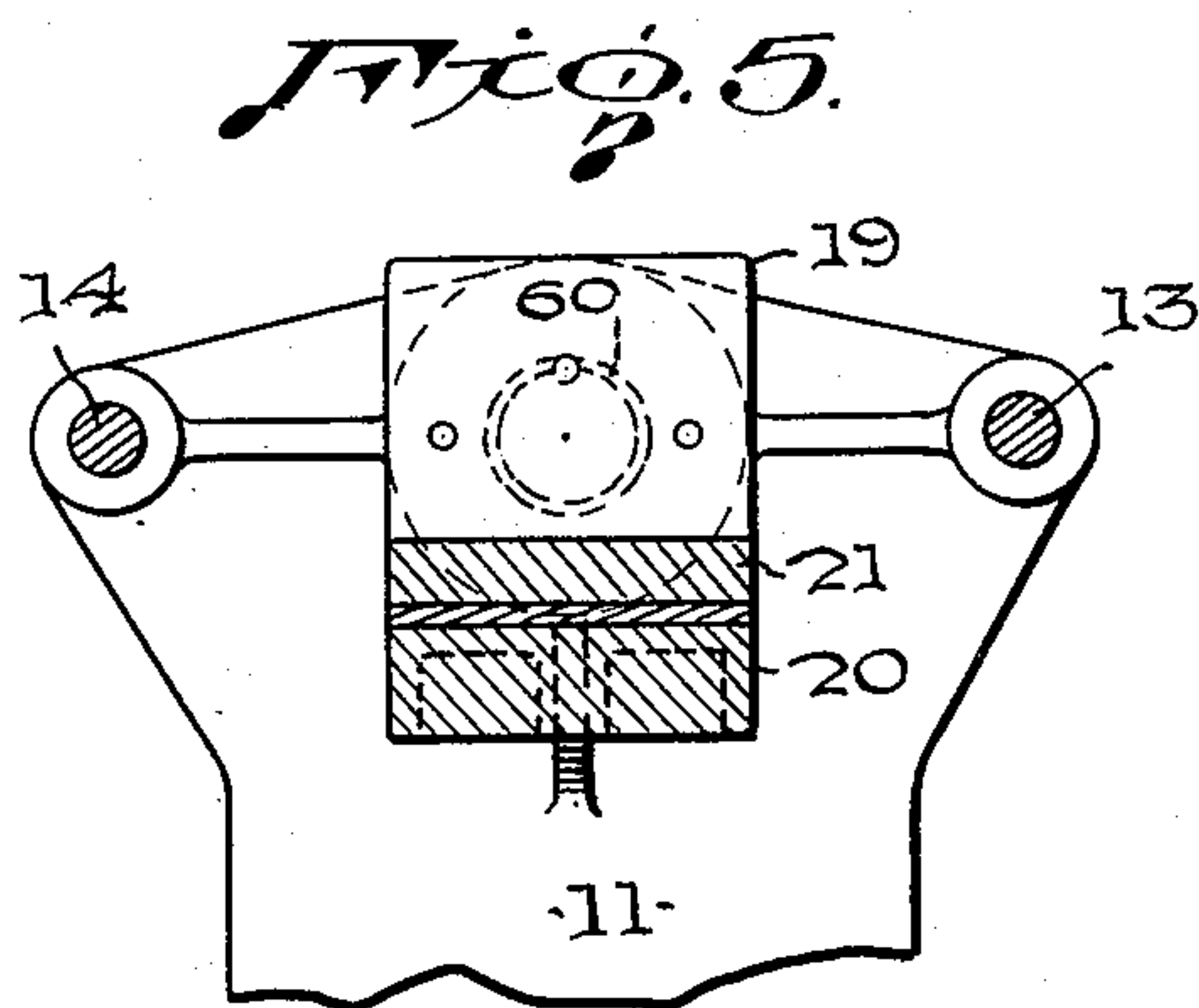
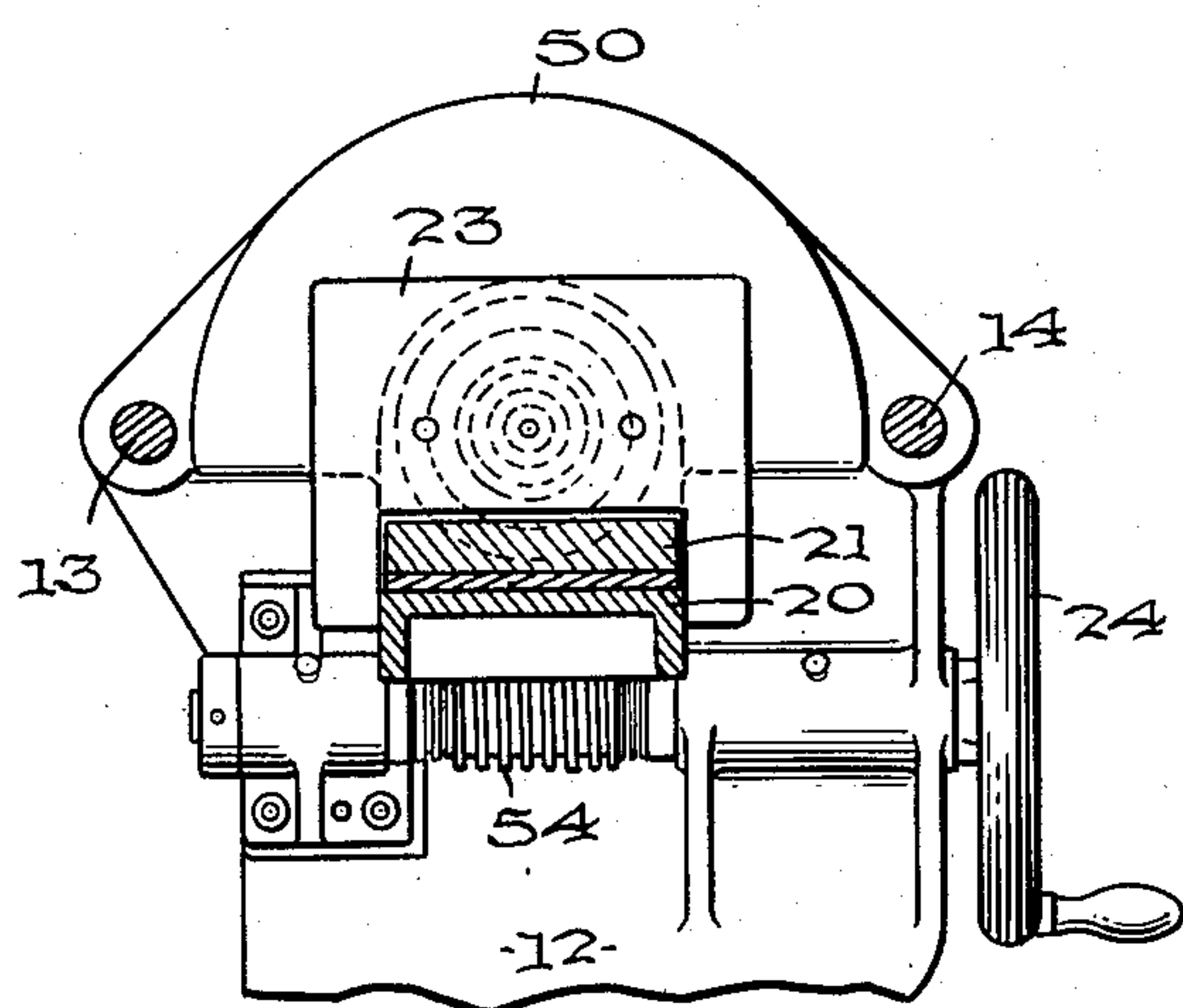
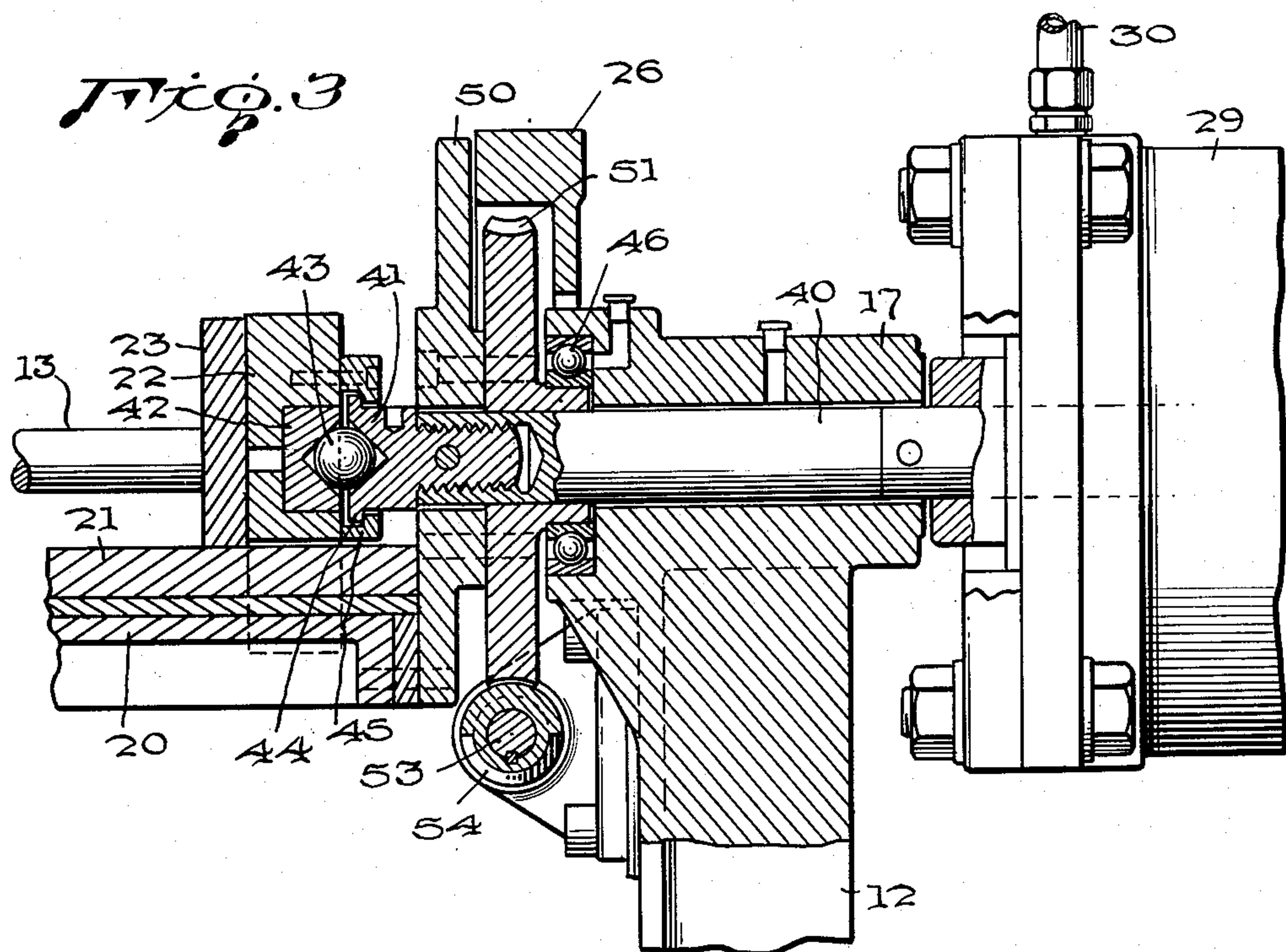
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APPARATUS FOR HOLDING BOOKS

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3 Sheets-Sheet 2



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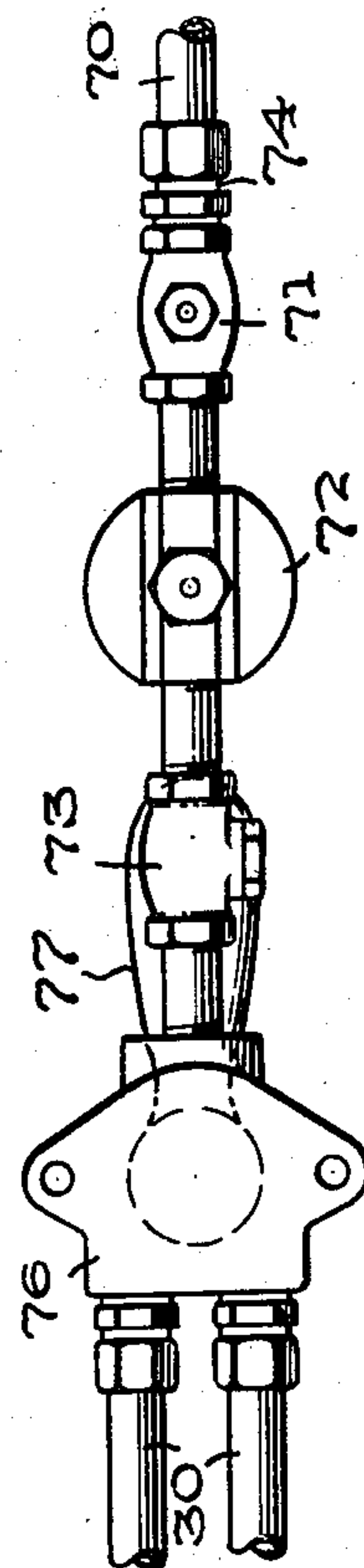
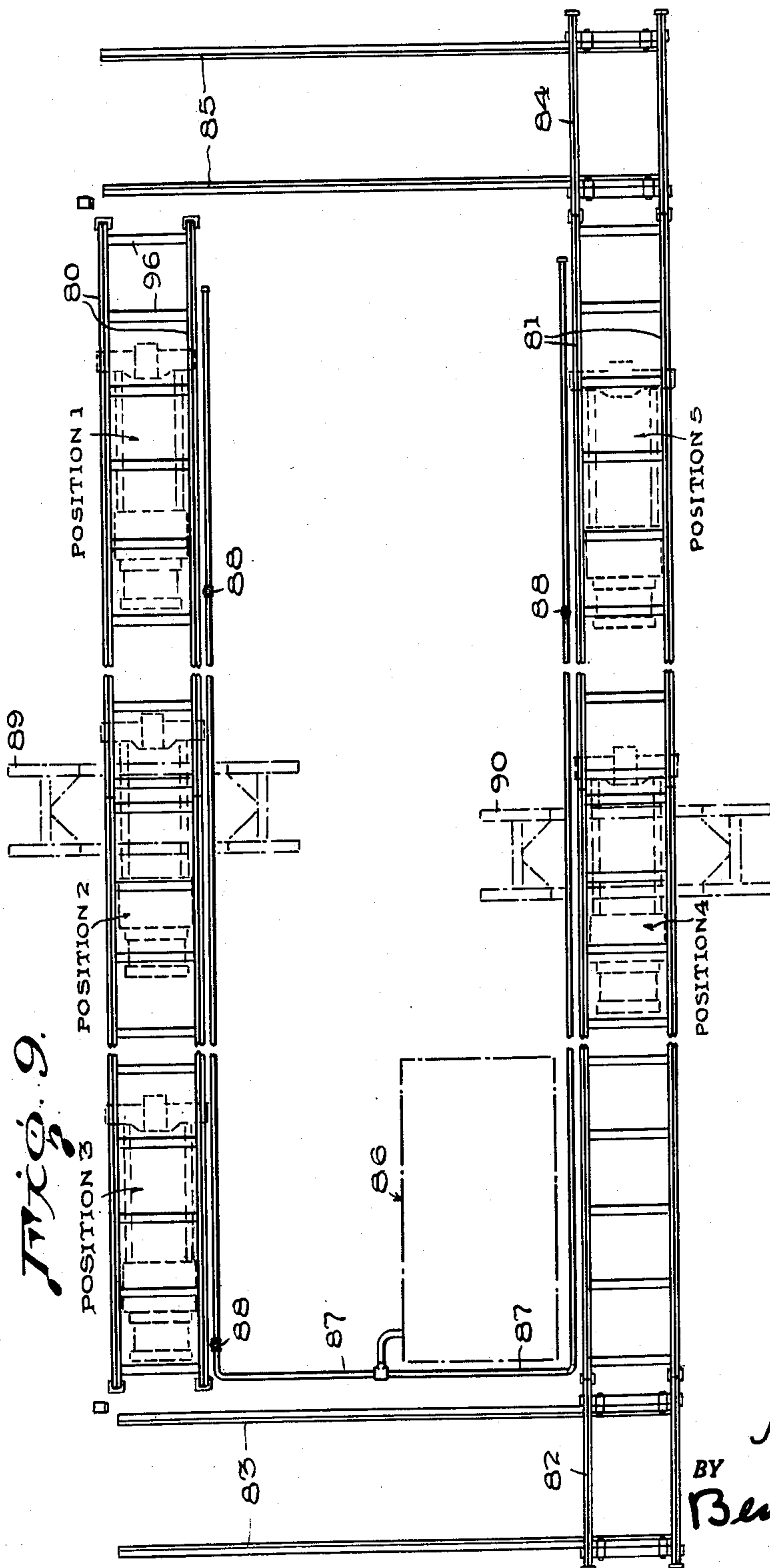
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APPARATUS FOR HOLDING BOOKS

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3 Sheets-Sheet 3



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APPARATUS FOR HOLDING BOOKS

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2 Claims. (Cl. 29—288)

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This invention relates to a machine for treating the edges of books; and more particularly to a machine for holding books under the desired pressure with the edges exposed for treatment, and for conveying the books to successive work stations. The word "books" as used throughout the specification and claims is intended to include papers, cards and the like.

In the manufacture of fine books, it is desirable to treat the edges of the books before they are bound. The treatment may consist of clamping a number of books in a fixture, scraping and/or sanding the edges to produce a smooth finish, applying a dye to the edges, applying gold leaf or spraying gold on the edges, and burnishing the gold on the edges. In the past, the edges of books have been treated more or less by hand. It is therefore an object of this invention to provide a machine capable of facilitating some or all of the aforementioned operations on a mass production basis.

To properly and uniformly treat the edges of books, it has been found necessary to clamp all the books of a lot under uniform pressure. This pressure varies with the type of paper used in the books and a tabulated chart may be referred to for the most desirable pressure to apply for each specific type of book. It is therefore another object of this invention to provide a book-edge-treating machine which is operative to clamp books under a uniform preselected pressure.

It is a further object to provide a book-edge-treating machine which has a quick-acting clamping and unclamping mechanism.

It is a further object of this invention to provide a machine in which clamped books may readily be rotated in position to expose all three edges of the books so that they may be conveniently treated.

These and other objects of the invention will be apparent to those skilled in the art from the following description taken in conjunction with the appended drawings in which:

Figure 1 is a plan view of a book-clamping stand, several of which may be employed in the system of this invention;

Figure 2 is an elevational view of the same;

Figure 3 is a fragmentary cut away view in the plane of the line 3—3 in Figure 1;

Figure 4 is a fragmentary sectional view in the plane of the line 4—4 in Figure 2;

Figure 5 is a fragmentary sectional view in the plane of the line 5—5 in Figure 2;

Figure 6 is a fragmentary sectional view in the plane of the line 6—6 in Figure 1;

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Figure 7 is a fragmentary edge elevational view of a castor of the stand riding on a rail;

Figure 8 is a plan view of air pressure regulating means for a book clamping stand; and

Figure 9 is a plan view of the track around which the book clamping stands move in going from one operation to the next.

Referring in greater detail to the drawings wherein a preferred embodiment of the invention is shown, the pneumatic clamp shown in Figures 1 and 2 has a frame consisting of back end 11 and front end 12 held rigidly in spaced relationship by tie rods 13, 14 and 15. Back end trunnion 16 and front end trunnion 17 support a rotatable book clamp comprising back end jaw 18 faced with a hard wood block 19, longitudinal shelf 20 faced with hard wood member 21, and front end clamping jaw 22 faced with hard wood block 23. This rotatable book clamp is supported on ball bearings in the end trunnions as will be hereinafter more fully explained with reference to Figures 3 through 6. A hand wheel 24 on worm gear shaft 53 is operative to engage a ring gear in housing 26, the ring gear being in axial relationship with and secured to the front end of the rotatable book clamp. When hand wheel 24 is turned, the book clamp is made to rotate and thus any of the three edges of books in the clamp can be positioned uppermost for convenience of treating.

A pneumatic cylinder 29 is mounted on the front end frame 12 in co-axial relationship with the rotatable book clamp. Pneumatic cylinder 29 has therein a piston (not shown) having a piston rod extending through front end trunnion 17 to book clamp jaw 22. Air under pressure is admitted to the pneumatic cylinder through hose connections 30. When air pressure is applied through one of the hose connections, the piston in the cylinder is forced in one direction; and when air under pressure is applied to the other connection, the piston is forced in the other direction. The front end clamp jaw 22 being connected to the piston rod is thus made to move axially in accordance with the air pressure control device which will be explained in greater detail in connection with Figure 8.

It is very important that books of a lot undergoing treatment be held in a clamp under uniform pressure. By controlling the air pressure to pneumatic cylinder 29, the uniform pressure requirement is easily obtainable. The piston in pneumatic cylinder 29 may have an axial displacement in the order of six inches. In the use of the equipment a plurality of uncovered books are placed side by side on the shelf mem-

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ber 21 between clamp jaw blocks 19 and 23. A predetermined air pressure is then applied to the pneumatic cylinder 29 causing clamp jaw block 23 to compress the books. The treatment of the three exposed edges of the books may be facilitated by turning hand wheel 24 to expose upwardly the edge or edges being treated. When it is desired to release and remove the books from the clamp, air pressure is applied to the other side of the piston in the pneumatic cylinder, causing the clamp jaw block 23 to move rapidly to the unclamped position. It is apparent that both the clamping and unclamping operations are performed very quickly with minimum loss of time and effort.

The bottoms of end structures 11 and 12 are provided with wheels 32 for the purpose of allowing the entire pneumatic clamp structure to be moved to successive work stations, while the clamp maintains the books under constant pressure.

Figure 3 is an enlarged sectional view taken in the plane of the line 3—3 in Figure 1. Piston rod 40 is free to move axially within trunnion 17, one end of the piston rod being connected to the piston within the pneumatic cylinder and the other end having a female thread to receive socket member 41. Clamp jaw 22 has embedded therein a complementary socket member 42 and a steel ball 43 is positioned between socket members 41 and 42 to allow the book clamp structure to be rotated without rotating piston rod 40 and the piston itself. Socket member 41 has an annular flange 44 which is operative to fit under collar 45 fastened to clamp jaw 22. When the books in the clamp are being compressed, piston rod 40 exerts pressure through socket member 41, steel ball 43, socket member 42, clamp jaw 22 and hard wood block 23. When the books are to be released and air pressure is applied to the other side of the piston, piston rod 40 pulls clamp jaw facing block 23 through socket member 41, collar 45, and clamp jaw 22.

Referring briefly to Figures 1 and 2, it is to be noted that clamp jaws 18 and 22 with their hard wood facing blocks 19 and 23, together with the longitudinal shelf 20, faced with hard wood member 21, constitute a rigid structure pivoted at back end trunnion 16 and front end trunnion 17. The structure of the pivot at the front end trunnion 17 will now be described in connection with Figures 3 and 4. Longitudinal shelf 20 is secured to pivot plate 50 which is mounted to rotate co-axially with piston rod 40. A ring gear 51 likewise rotates co-axially with piston rod 40 and is secured to pivot plate 50. Pivot plate 50 and ring gear 51 are not supported by piston rod 40, but rather are rotatably supported by trunnion 17 by means of ball bearings 46.

A housing 26 is provided to cover the exposed portion of ring gear 51 for protective reasons. Shaft 53 has a worm gear 54 thereon which engages the ring gear 51. When hand wheel 24 is turned, the motion is transmitted through shaft 53, worm gear 54, ring gear 51, pivot plate 50, to the rotatable book clamp assembly comprising longitudinal shelf 20 and clamp jaws 18 and 22.

The means by which the back end of the rotatable book clamp is rotatably mounted to the back end trunnion 16 is illustrated in Figures 5 and 6. Longitudinal shelf member 20 is fastened to clamp jaw 18 which in turn is secured to shaft 60 which is rotatable within trunnion 16. Ball bearings 61 are provided between trunnion 16

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and clamp jaw 18 to reduce friction caused by the axial thrust resulting from the pressure applied from the pneumatic cylinder through the books.

Figure 8 shows the air pressure control means for the pneumatic cylinder. The control means may be conveniently mounted on front end frame 12 near hand wheel 24. Compressed air is obtained from a source and conveyed through tube 70 to speed control 71 which limits the entrance of air to the pneumatic cylinder and thus limits the speed of action of the piston in the desired amount. Compressed air is then conveyed to lubricator 72 and then to check valve 73. Check valve 73 allows the passage of air in the incoming direction only. Therefore, the source of air pressure can be disconnected, from the pneumatic clamp at coupling 74 and the pressure in the pneumatic cylinder will be maintained. In this way the pneumatic book clamp stand may be moved from one work station to another by disconnecting the source of air pressure and yet books in the clamp will be held under pressure.

Air moves from check valve 73 to four-way hand operated air valve 76. Valve 76 operated by handle 77 can be used to direct compressed air to one end or the other of pneumatic cylinder 29. When air is directed to one end of cylinder 29, the books are clamped; and when air is directed to the other end, books are unclamped.

Figure 9 illustrates an overall system for the treating of book edges wherein a plurality of pneumatic book clamps are conveyed to successive work stations. The conveyor system consists of tracks 80 along which pneumatic clamps can roll. Pneumatic clamps are shown dotted in five positions along track 80. In order to convey the pneumatic clamps from track 80 to parallel track 81, a carriage 82 is provided to roll on tracks 83. A similar carriage 84 is provided to return the pneumatic clamps from tracks 81 to tracks 80 along the rails 85. A complete circuit is thus provided. An air compressor 86 supplies compressed air through pipes 87 to outlets 88 located near each work station.

Books may be loaded onto and clamped in a pneumatic clamp at position 1. The edges of the clamped books may then be scraped and/or sanded to produce a smooth finish. This accomplished, the books may be unclamped and a dye applied to the edges of the books. Because the pressure has been removed from the books, the dye will penetrate the edges of the leaves of the books to the necessary depth. The books are then clamped under pressure and the pneumatic clamp rolled to position 2 where the dyed books are allowed to dry under infra-red dryer 89. After a relatively short period under the dryer, the pneumatic clamp is rolled to position 3 where gold leaf is applied by brush or spray gun to the edges of the books. The pneumatic clamp is then rolled from track 80 to carriage 82 positioned in line with track 80. Carriage 82 carrying the pneumatic clamp is then rolled on rails 83 to a position in line with tracks 81. The pneumatic clamp is then rolled off the carriage 82 onto tracks 81 to position 4 where the gold is dried under infra-red dryer 90. From this position the pneumatic clamp machine is moved to position 5 where the gold is burnished in the established manner. The pneumatic clamp machine may then be moved to any position intermediate of position 5 and position 1 for unclamping and unloading the books. The pneumatic

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clamp machines are conveyed from rails 81 to track 80 on carriage 84 in the same manner as previously described in reference to the other end. It is to be understood that a plurality of pneumatic clamp machines may be used simultaneously on the track system. Operators located at each work station may perform the same operation on the books in each pneumatic clamp machine as it comes along. A pneumatic clamp machine at position 1 will be supplied with air pressure from coupling 88. When it is desired to move pneumatic clamp from position 1, the air hose may be disconnected from coupling 88 and later reconnected at the coupling 88 adjacent to position 3. Because of check valve 73 the pneumatic cylinder will continue to exert pressure through the piston on the books, even though disconnected from the source of air pressure.

Tracks 80 and 81 may be constructed by welding angle irons 95 to base members 96 as shown in cross section in Figure 7. Wheels 32 on the pneumatic clamp machines may then have a peripheral V-shaped groove to ride on angle irons 95. Wheels 32 may be mounted to the frame 12 in a conventional way.

While I have herein described what I believe to be a preferred embodiment of my invention, nevertheless it is to be understood that various changes may be made therein, within the scope of the claims hereto appended.

What I claim is:

1. A machine for holding books while the edges thereof are treated comprising a mobile frame, a book clamp mounted on the frame for rotation about its longitudinal axis, said clamp including a work supporting shelf, a stationary jaw at one end of said shelf and a movable jaw on the shelf movable relative thereto toward and away from the stationary jaw, and means mounted on said frame for moving the movable jaw into and out of work clamping position, said means comprising a pneumatic cylinder, a piston actuated therein, a piston rod connected with the piston and in axial coincidence with the axis of rotation of the book clamp, conical ball seats disposed in facing relation with one in the rear face of the movable jaw of the clamp and the other in the forward end of the piston rod, and a ball engaged in both of said seats and constituting a

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thrust bearing between the piston rod and the movable jaw clamp, and manual means for effecting bodily rotation of the book clamp, the thrust bearing maintaining the clamp pressure while permitting rotation of the clamp.

2. A machine for holding books for treating the edges thereof comprising a frame, a book clamp mounted on the frame and embodying a longitudinal supporting shelf, an upstanding fixed jaw connected with the shelf and having a trunnion support in the rear end of the frame, a disc rotatably mounted at the forward end of the frame and having a fixed connection with the shelf, a movable jaw slidably mounted on the shelf for movement toward and away from the fixed jaw, a worm gear fixed with respect to the disc, a manually actuated worm in mesh with the worm gear, a pneumatically actuated piston rod in axial coincidence with the axis of rotation of the disc and the trunnion mounting of the fixed jaw, and an anti-friction thrust bearing interposed between the forward end of the piston rod and the rear face of the movable jaw, whereby the latter may be advanced toward the fixed jaw with books therebetween to hold the books under a selected pressure and the clamp may be bodily rotated without disturbing such pressure.

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