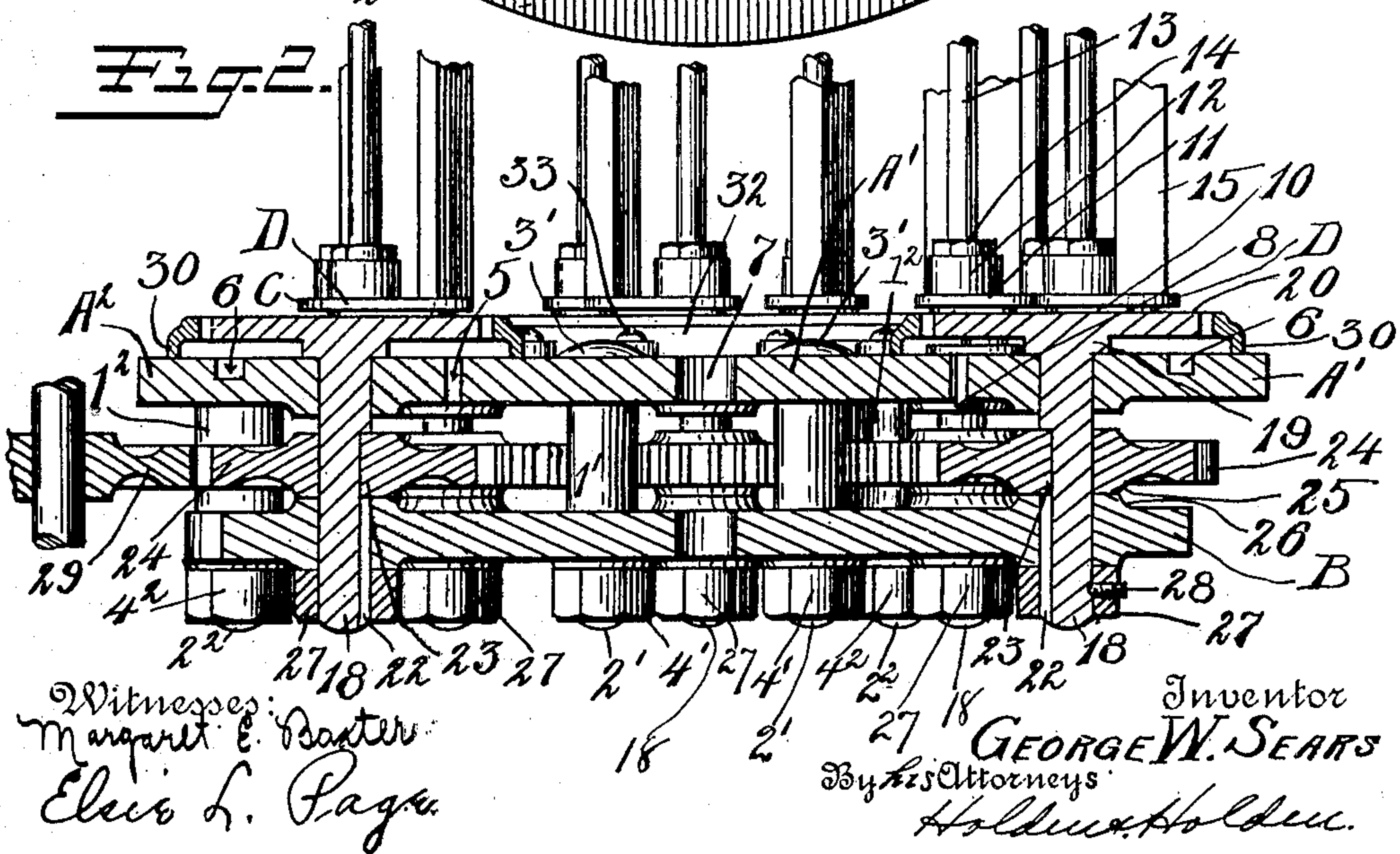
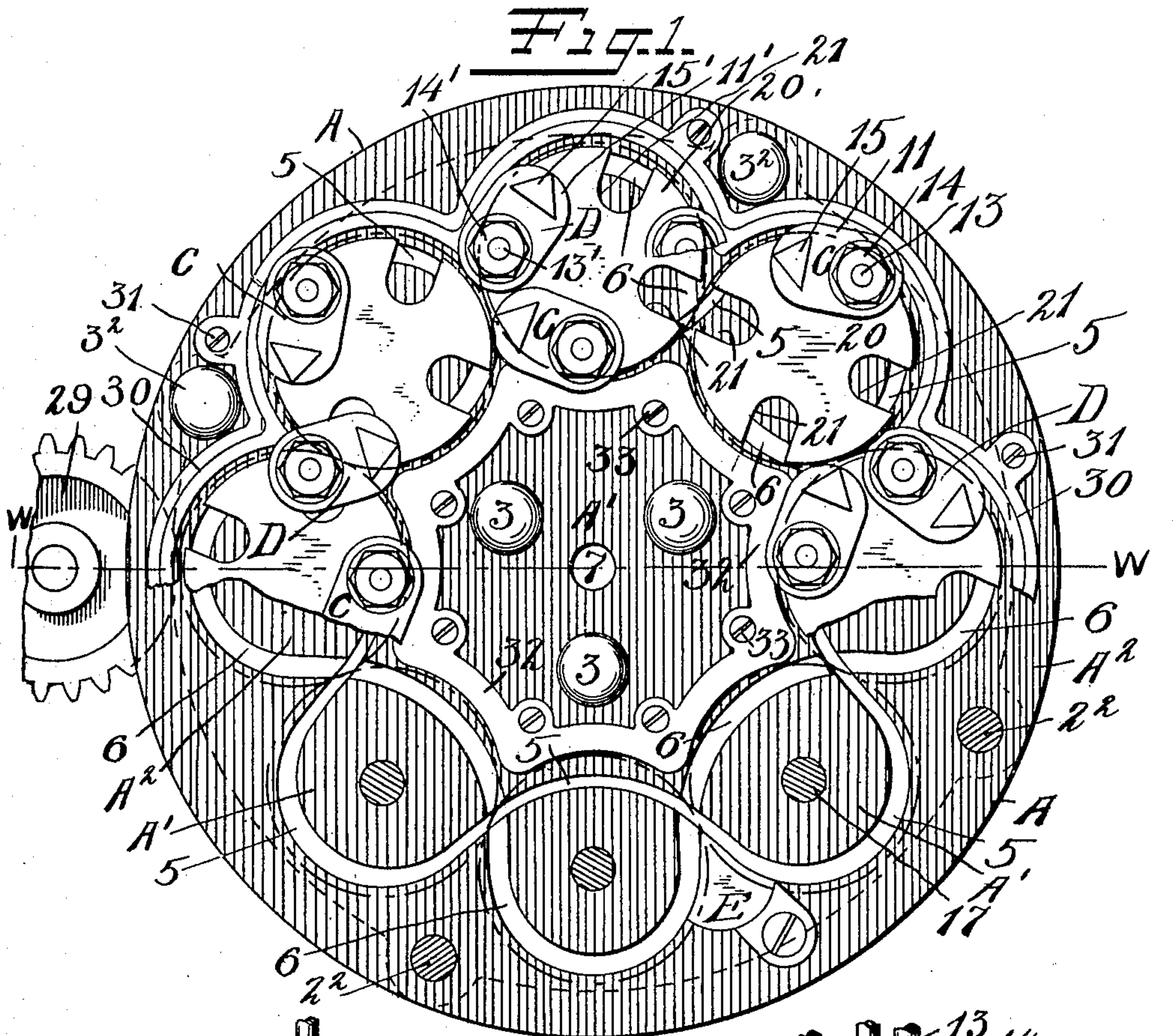


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APPLICATION FILED JUNE 26, 1908.

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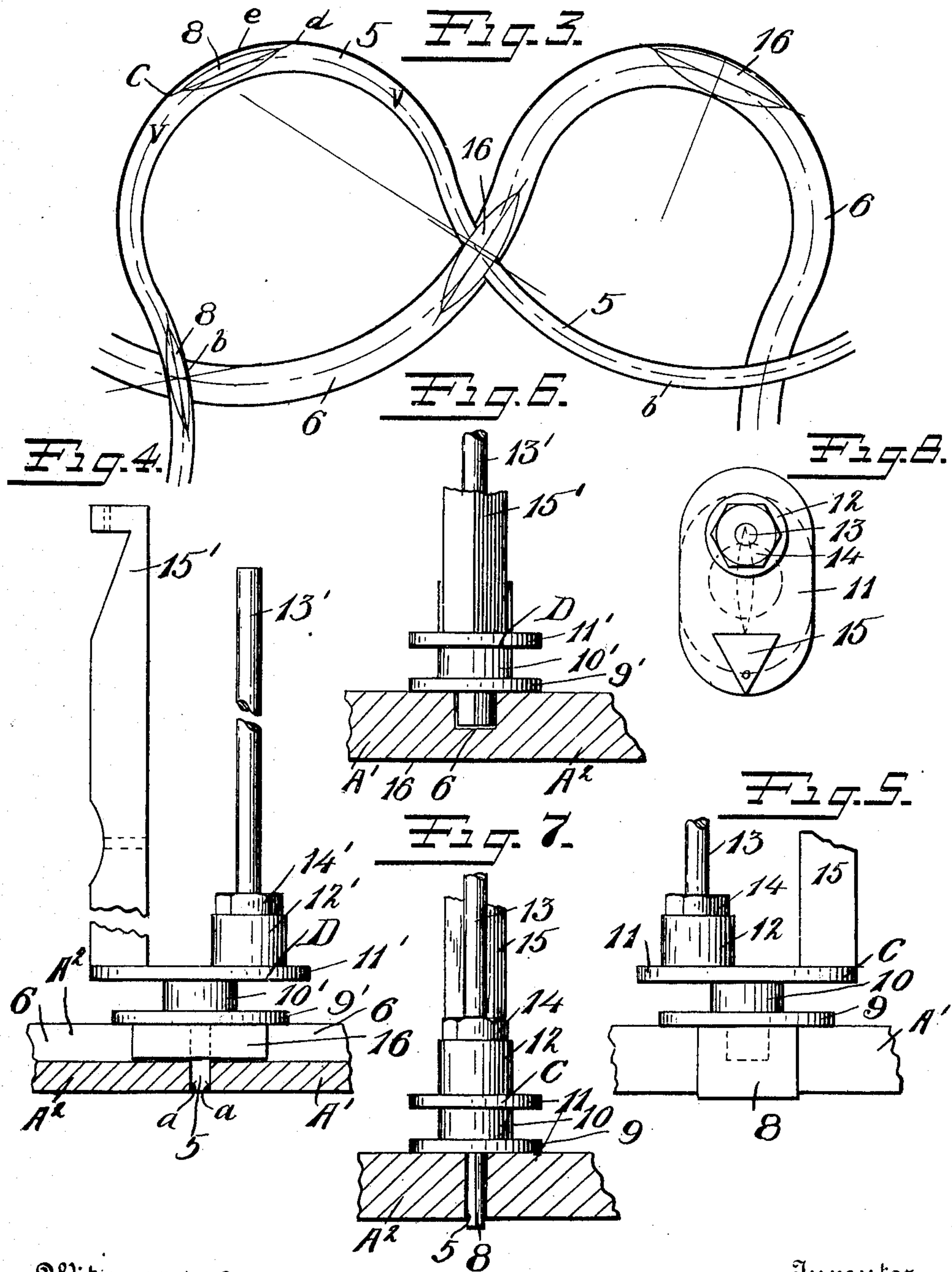
2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

GEORGE W. SEARS, OF ANSONIA, CONNECTICUT.

BRAIDING-MACHINE.

No. 920,189.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE W. SEARS, a citizen of the United States, residing at Ansonia, in the county of New Haven and State of Connecticut, have invented a certain new and useful Improvement in Braiding-Machines, of which the following is a specification.

My invention relates to braiding machines wherein the braiding is effected by delivering threads from a group of bobbins arranged to ride on independent carriers propelled and guided in raceways.

The principal object of my invention is to provide raceways of such a character that the traveling of the bobbin carriers is facilitated, their speed increased, the jamming and clogging of the parts prevented and the life of the machine prolonged.

Another object is to mount the driving and propelling mechanism on opposite sides of the braider plate, thus enabling the latter to be removed without disturbing the stationary parts of the machine; and a further object is to provide a novel construction of bobbin carriers, propelling mechanism and braider plate, and to design a machine in its entirety having an economical and durable construction and a smoothly running and efficient operation.

With these and other objects in view my invention consists in the details of construction and manner of operation more fully set forth in the following description and accompanying drawing in which like reference characters refer to corresponding parts.

In the drawings: Figure 1 is a plan view of my improved braiding machine some of the parts being broken away and removed; Fig. 2, a vertical section taken on line *w-w* in Fig. 1; Fig. 3, a diagrammatic plan view of a fragmentary portion of the raceways showing the manner of determining the relative dimensions of the guide shoes; Figs. 4 and 5, vertical longitudinal sections of the groove and slot taken at the intersections of the raceways; Figs. 6 and 7, transverse sections of the groove and slot taken at one of the inwardly curved portions of each raceway, and Fig. 8, a top plan view of one of the bobbin carriers.

My device generally comprises the braider plate A and the base plate B spaced apart by groups of posts 1' and 1² centrally apertured for the passage of the draw bolts 2', 2² termi-

nating at their upper ends in the heads 3', 3² and locked in place by the nuts 4', 4² respectively. The braider plate A contains an endless slot 5 and an endless groove 6 which intersect each other at regular intervals describing a series of closed and connected loops around the central aperture 7'. The slots 5 and the grooves 6 form raceways for the groups of traveling bobbin carriers C and D, the carriers C being arranged to travel in one direction in the slot 5 and the carriers D in the opposite direction in the groove 6 in a manner which will hereinafter be more fully described.

Referring to Figs. 4 to 7 inclusive each bobbin carrier C comprises an elongated shuttle shaped guide shoe 8 arranged to travel in and having its dimensions determined by the width, depth and curvature of the slot 5 as will also hereinafter be more fully described. The shoe 8 is carried by the flat runner plate 9 arranged to bridge the slot and slide along the top of the braider plate and is connected by the neck 10 with the base plate 11. Mounted on the base plate 11 is the spindle base 12 into which is screwed the spindle 13 fastened by the lock nut 14 and adjacent to which is mounted the threadguiding post 15. Each bobbin carrier D comprises an elongated shuttle shaped guide shoe 16 arranged to travel in and having its dimensions determined by the width, depth and curvature of the groove 6. The shoe 16 is carried by the runner plate 9' which is connected by the neck 10' with the base plate 11' on which is mounted the spindle base 12' into which is screwed the spindle 13' fastened by the lock nut 14' and adjacent to which is mounted the threadguiding post 15', all of the parts of the carrier D, with the exception of the shoe 16, having a construction and arrangement identical with the corresponding parts of the carrier C.

Referring to Figs. 1 and 2 the braider plate A is apertured at 17 centrally of each loop described by the intersecting raceways 5 and 6 to form vertical bearings for the repective shafts 18 which are also journaled in similar bearings in the base plate B. Each shaft 18 is enlarged near its upper extremity to form a horizontal bearing seat 19 and terminates in a disk 20 having its periphery vertically recessed at regular intervals to form radially disposed slots or pockets 21 the walls of which are arranged to embrace the necks 10

and 10' of the carriers C and D respectively. Journaled on each shaft 18 by means of the slot 22 and key 23 is a gear wheel 24 having a hub 25 on its under side bearing against a seat 26 offset on the base plate B. The shafts 18 are made in one piece with their seats 19 and disks 20 and may be lifted out of their bearings by detaching the collar 27 which is locked in place by the screw 28. The adjacent gears 24 mesh to form a circular train to which motion may be transmitted by means of the meshing gear 29 which is connected up with a pulley and suitable throwout mechanism in a manner well known in this type of machine. The outer peripheries of the revolving disks 20 are embraced by the guard rims 30 which may be made in sections and removably secured to the braider plate by means of screws 31. The inner peripheries of the revolving disks 20 are embraced by the guard rim 32 which may also be made in sections and detachably secured to the braider plate by means of screws 33. The base and braider plates are centrally apertured at 7 and 7' respectively. The braider plate A is made up of two knockdown sections A' and A². The inner section A' is fastened to the posts 1' by the draw bolts 2' and its outer periphery constitutes the inner wall of the slot 5. The outer section A² is fastened to the posts 1² by the draw bolts 2² and its inner periphery constitutes the outer wall of the slot 5. Thus the inner section A' carries the inwardly curved portions of the groove 6 and the outer section A² carries the outwardly curved portions of the groove 6. A part E of the outer section A² may be removed to permit the insertion of the bobbin carriers in the raceways and pockets after the parts are assembled.

When the machine is in operation the gear 29 drives the circular train of meshing gears 24 each of which revolves its respective shaft 18 and disk 20. Each disk 20 revolves in an opposite direction from that of the adjacent disks so that when the pockets are following the outwardly curved portions of one raceway they move in the same direction as the pockets in the adjacent disks following the inwardly curved portions of the same raceway. For instance when the pockets are following the outwardly curved portions of the slot 5 the pockets in the adjacent disks follow the inwardly curved portions of the slot 5 in the same direction. The pockets are arranged in one disk relative to those in the adjacent disks so that the adjacent pockets open into each other as they approach and depart from the intersections of the raceways. The clearance between the disks being small enables the pocket in one disk to deliver the neck of the carrier into the pocket of the adjacent disk when passing the intersections, thus the carriers are propelled around their respective circuits by a relay

of pockets, each disk controlling the carriers in the portions of the raceways describing the loop over which it revolves.

In Figs. 1 and 2 I have shown an arbitrary arrangement of the parts wherein I employ eight disks each having four pockets. Eight carriers C travel in the slot 5 and eight carriers D in the groove 6. It is obvious that the carriers may be multiplied by a corresponding multiplication of the pockets in each disk or of the disks themselves. The alternate pockets which are diametrically opposite in the same disks in the disclosed arrangement receive and deliver the carriers in the same raceway. The braiding is effected by delivering the threads from the bobbins (not shown), which ride on the spindles 15 and 15', to a spool located above the braider plate in a manner too well known in the art to require any specific illustration.

When it is desired to use the device as a covering machine the core to be covered is fed upwardly through the apertures 7 and 7' in the base and braider plates respectively, and the machines may be superposed in the well known manner to braid one covering over another. A similar arrangement of raceways comprising slots of equal depth and width but interrupted at their intersections is the usual arrangement in the art. Such a construction of raceways, however, have their disadvantages since the guide shoes of the carriers wear away the corners formed by the intersecting walls thus giving a tendency to the shoes to jam and shunt into wrong raceway and clog the machine. This necessitates a frequent replacing of the parts and more often the entire braider plate. My invention is designed to overcome these defects by making the raceway 5 deeper than the raceway 6 and narrower at the points of intersection. By this arrangement the lower portion *a* of the walls of the slot 5 (see Figs. 4 and 5) are continuous and bridge the space below the grooves 6 at the points of intersection, thereby confining the guide shoes 8 of the carriers C within their slot and preventing the jamming and shunting above referred to. The width of each guide shoe is determined by the width of the narrowest portion of its raceway and its length by the chord of the arc of greatest curvature in the raceway tangent to the medial line of the raceway, that is, referring to the diagrammatic view shown in Fig. 3, the shoe 8 is substantially equal in width to the narrowest portion *b* of the slot 5 and is substantially equal in length to the chord *c-d* tangent to the medial line *v-v* of the slot 5 at the point of greatest curvature *e*.

In order to have the shoe 8 of the requisite length the slot 5 is widened at the points of greatest curvature, that is, the slot is widened at *e* to lengthen the chord *c-d*. The length and breadth of the shoe 16 is

struck from the width, and the arc of greatest curvature, of the groove 6. This raceway may be of uniform width throughout its entire circuit, it being sufficiently wide, however, to enable the shoe 16 to have a longitudinal dimension great enough to bridge well the slot 5 at the points of intersection.

I have described the slot and groove as constituting independent and separate raceways each of a different character, but where they are similar in character and dimension so that the same guide shoe may travel in either one or the other, as in the case of intersecting slots or intersecting grooves, the old and well known arrangement for flat braiding may be employed by eliminating one of the loops of the raceways. This causes the carriers to make a complete circuit of the terminal loops and to return in a different raceway.

While I have designed peculiar propelling means arranged on the opposite side of the braider plate from the driving mechanism and particularly adapted to my improved construction of raceways this same arrangement may be employed with advantage in connection with raceways of a different construction.

Having now described my invention what I desire to claim and protect by Letters Patent is:

1. In a braiding machine a pair of raceways each having a bobbin carrier arranged to travel therein, one raceway being bridged by the other raceway and having its sides interrupted for the passage of the bobbin carrier in the other raceway.

2. In a braiding machine a pair of raceways of different width and a bobbin carrier arranged to travel in each raceway, the wider raceway being bridged by the narrower raceway and interrupted for the passage of the bobbin carrier in the narrower raceway.

3. In a braiding machine a braider plate provided with a pair of raceways each having a bobbin carrier arranged to travel therein, the side walls of one of said raceways being bridged by the side walls of the other raceway and interrupted for the passage of the bobbin carrier in the other raceway.

4. In a braiding machine a braider plate provided with endless raceways arranged to cross each other at intervals describing a series of loops, and a series of bobbin carriers arranged to travel in said raceways, the walls of one raceway being bridged by the side walls of the crossing raceway and interrupted for the passage of the bobbin carriers in the crossing raceway.

5. In a braiding machine a braider plate provided with intersecting raceways and a series of bobbin carriers arranged to travel therein, the side walls of one raceway being of greater depth and nearer together at the intersections than the side walls of the other

raceway, and the side walls of the other raceway being interrupted at the intersections for the passage of the bobbin carriers in the first mentioned raceway.

6. The combination with a braider plate provided with intersecting raceways, of bobbin carriers arranged to travel in said raceways, the side walls of one raceway being of greater depth at the intersections than the side walls of the other raceway and the side walls of the other raceway being interrupted at the intersections for the passage of the bobbin carriers in the first mentioned raceway, and means for propelling said bobbin carriers around their respective raceways.

7. The combination with a braider plate provided with intersecting raceways of different width, of bobbin carriers having guide shoes arranged to travel in said raceways, the side walls of the wider raceway being bridged by the side walls of the narrower raceway and interrupted at the intersections for the passage of the guide shoes in the narrower raceway and means for propelling the bobbin carriers around their respective raceways.

8. The combination with a braider plate provided with a pair of endless raceways arranged to intersect at intervals describing a series of closed and connected loops, and a plurality of bobbin carriers each having a guide shoe arranged to travel in each raceway, the side walls of one raceway being of greater depth and nearer together at the intersections than the side walls of the other raceway, and the side walls of the other raceway being interrupted at the intersections for the passage of the guide shoes in the first mentioned raceway, of means journaled to rotate over each loop for propelling the bobbin carriers successively around their respective raceways.

9. The combination with a braider plate provided with a pair of endless raceways arranged to intersect at intervals describing a series of closed and connected loops, and a plurality of bobbin carriers each comprising a base and raceway guiding means connected by a neck, the side walls of one raceway being of greater depth and nearer together at the intersections than the side walls of the other raceway, and the side walls of the other raceway being interrupted at the intersections for the passage of the bobbin carriers in the first mentioned raceway, of disks journaled to rotate in the same plane over said loops, the said disks having their peripheries slotted radially to embrace the necks of the bobbin carriers successively to propel the latter around their respective raceways.

10. A braider plate for a braiding machine provided with intersecting raceways describing a series of closed and connected loops, the said plate comprising an inde-

pendently mounted central section recessed to form the inwardly curved portions of one raceway and having its outer periphery constituting the inner wall of the other raceway.

5 11. A braider plate for a braiding machine provided with an endless slot intersected by an endless groove, the said plate comprising an independently mounted central section having its periphery constituting the inner wall of said slot and recessed to form the parts of the groove circumscribed by said slot.

10 12. A braider plate for a braiding machine provided with an endless slot intersected by an endless groove, the said plate comprising an independently mounted central section having its periphery constituting the inner wall of said slot and recessed to form the parts of the groove circumscribed

by said slot, and an outer section embracing said central section having its inner periphery constituting the outer wall of said slot and recessed to form the connecting parts of said groove.

13. In a braiding machine a braider plate comprising a central section embraced by an outer section and spaced therefrom to form an endless slot, both sections being independently mounted and having their face portions recessed to form an endless groove intersecting said slot.

In witness whereof I have hereunto set my hand this 23d day of June, 1908.

GEORGE W. SEARS.

Witnesses:

WILLIAM E. WHITWORTH,
WALTER A. HOLDEN.