

**Nov. 26, 1935.**

**G. KEYSER**

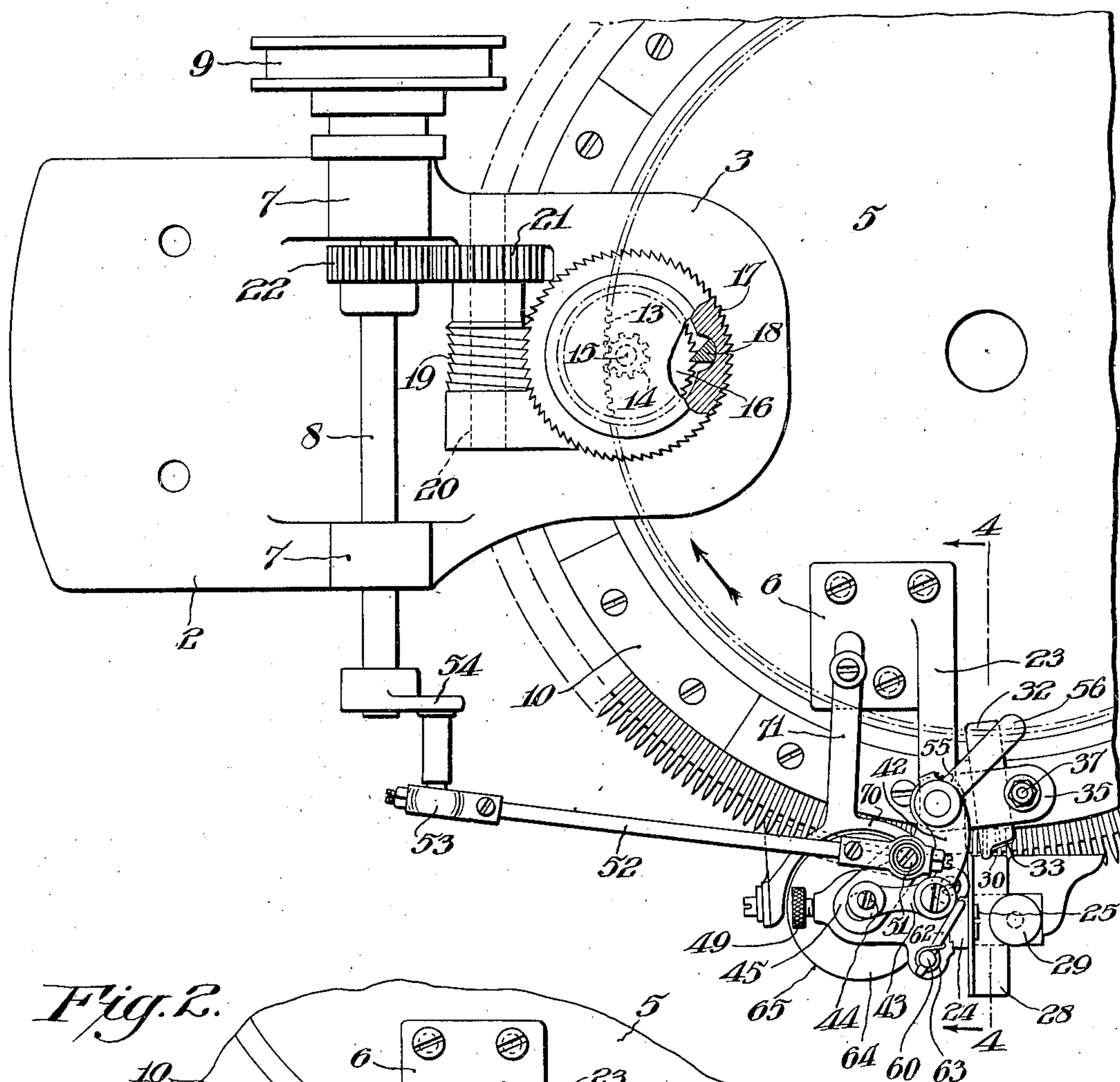
**2,022,377**

MACHINE FOR UNITING KNIT FABRICS

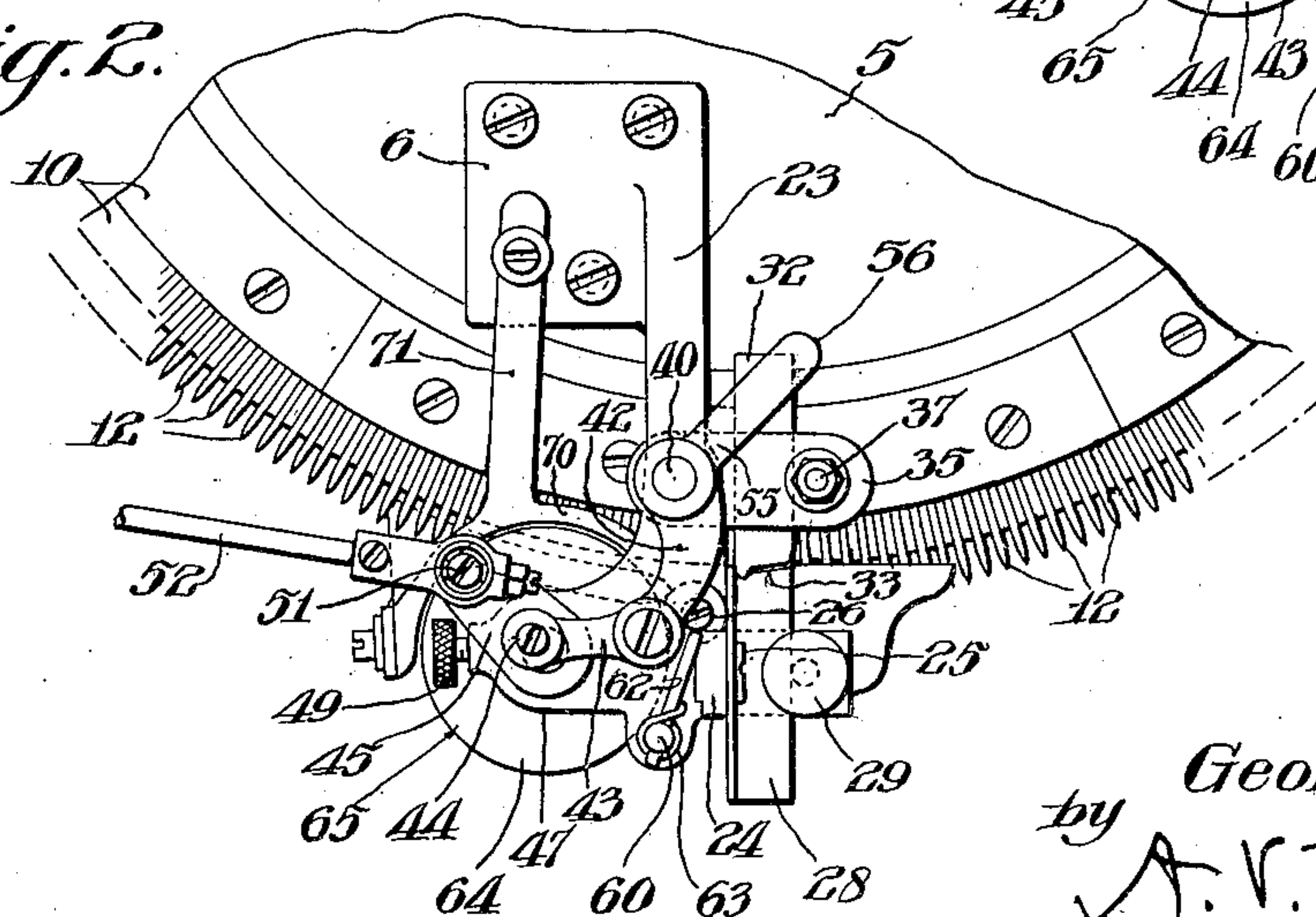
Filed Aug. 1, 1934

3 Sheets-Sheet 1

*Fig. 1.*



*Fig. 2.*



*Inventor*  
*George Keyser*  
*by* *A. V. Ziegler*  
*Attorney*

Nov. 26, 1935.

G. KEYSER

2,022,377

MACHINE FOR UNITING KNIT FABRICS

Filed Aug. 1, 1934

3 Sheets-Sheet 2

Fig. 3.

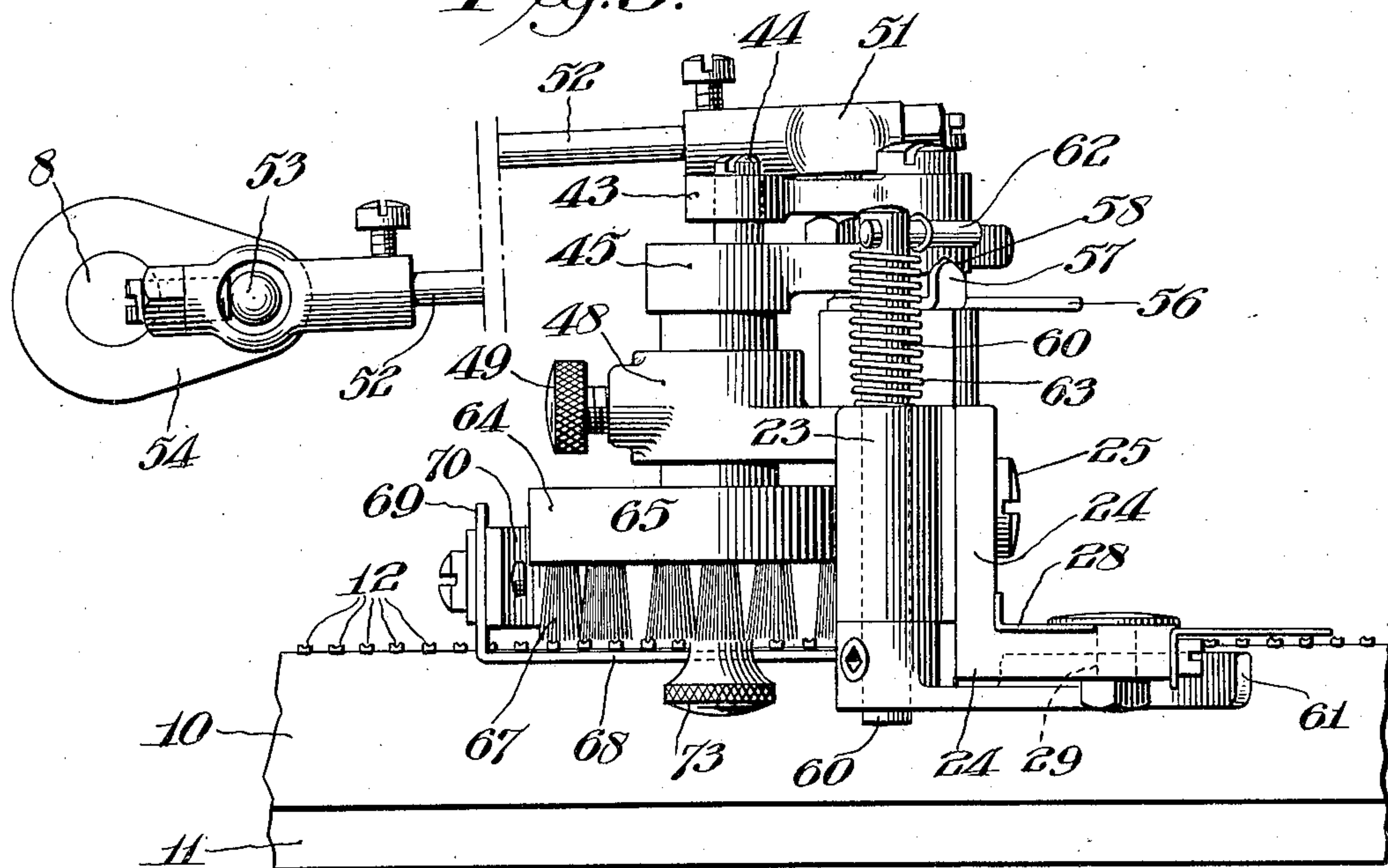
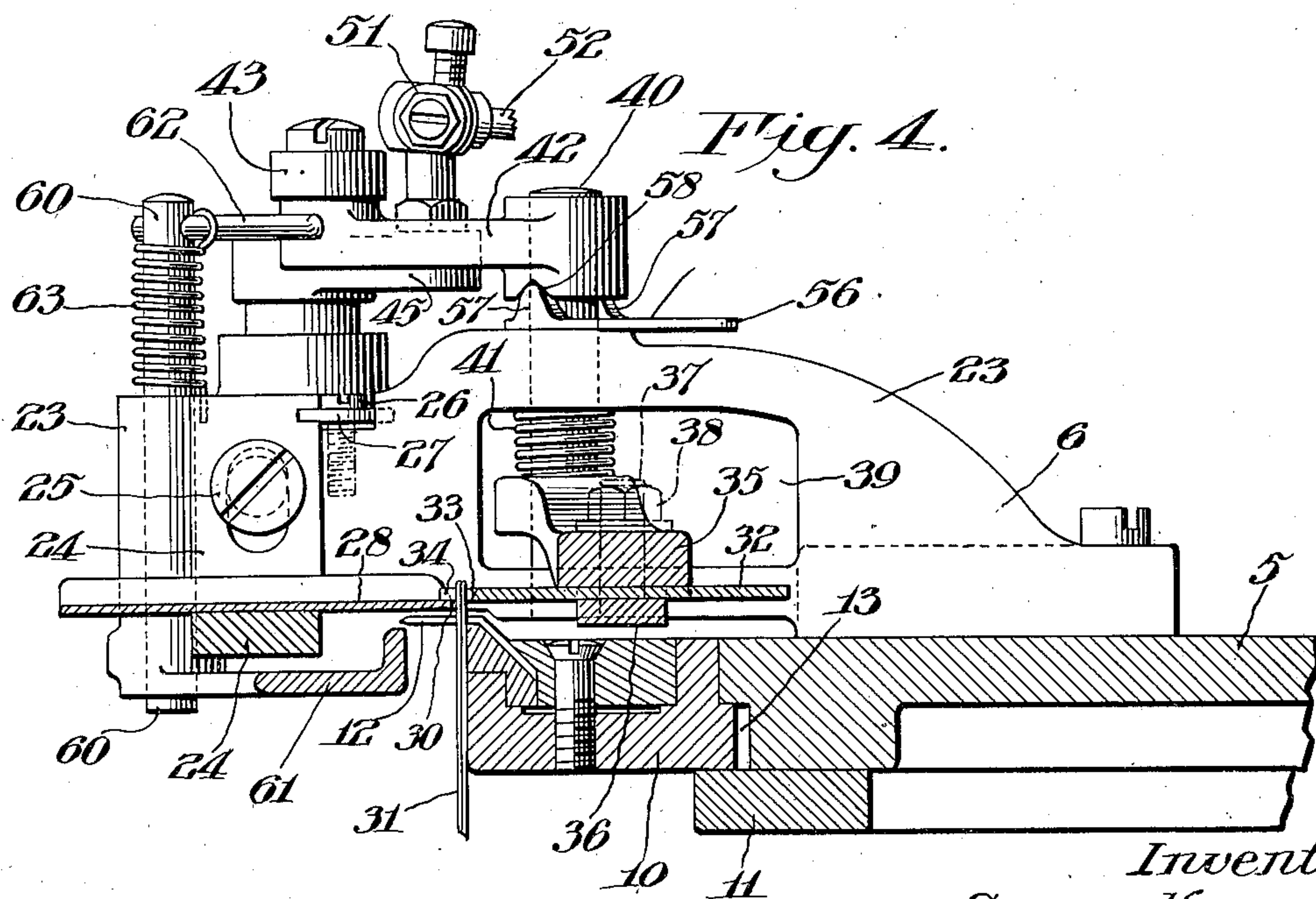


Fig. 4.



Inventor  
George Keyser  
by A. V. [Signature]  
Attorney.



Nov. 26, 1935.

G. KEYSER

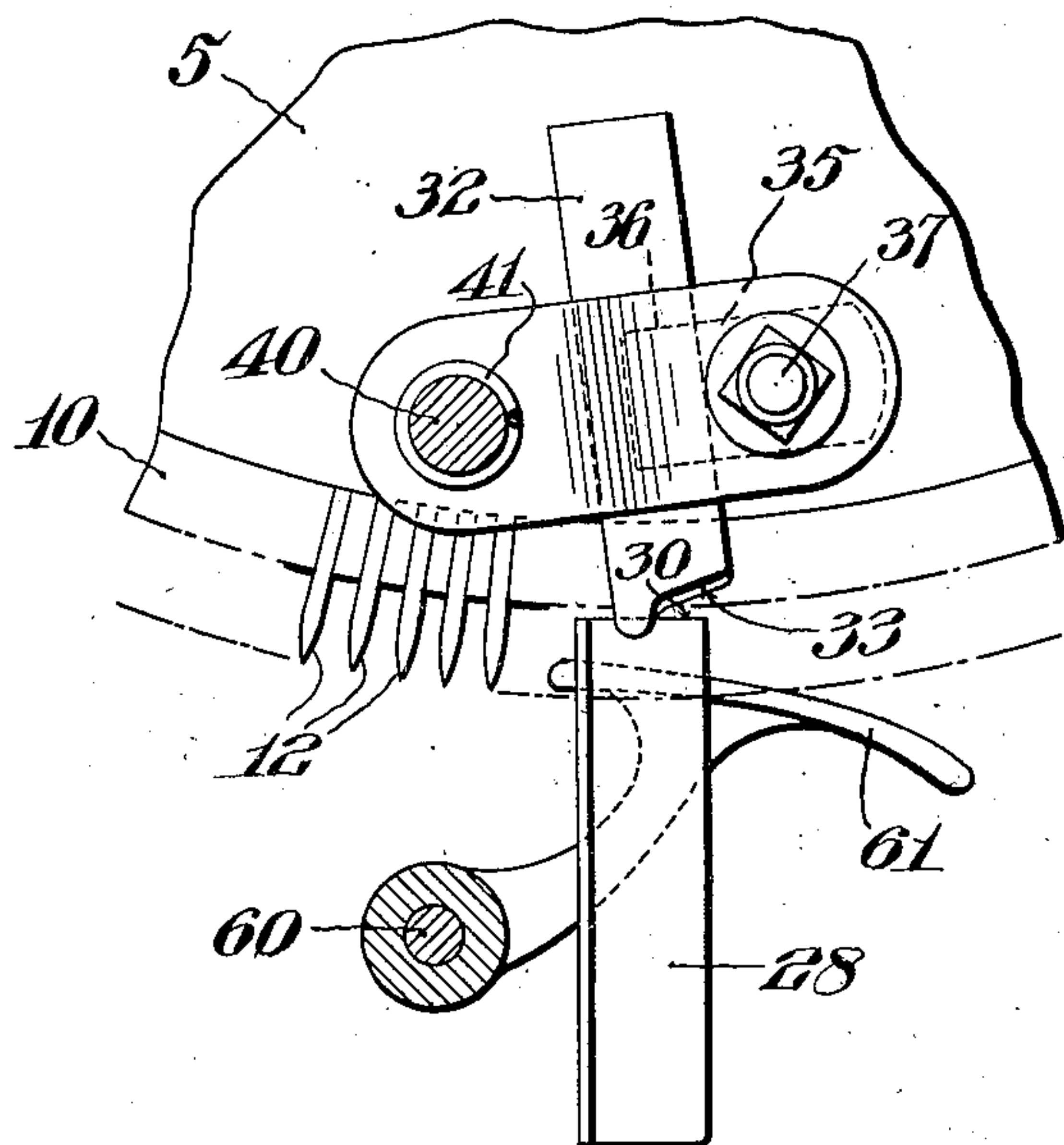
2,022,377

MACHINE FOR UNITING KNIT FABRICS

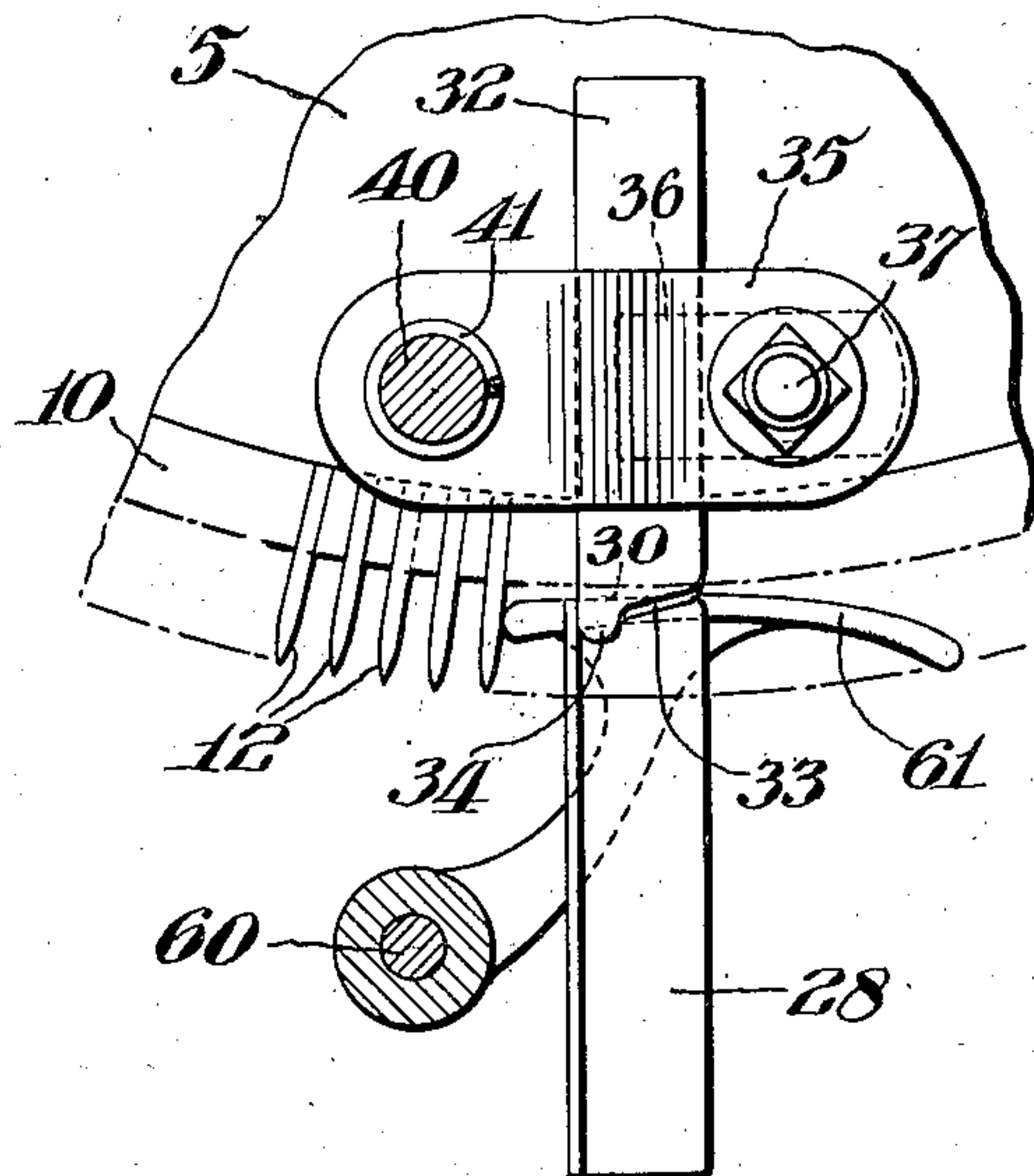
Filed Aug. 1, 1934

3 Sheets-Sheet 3

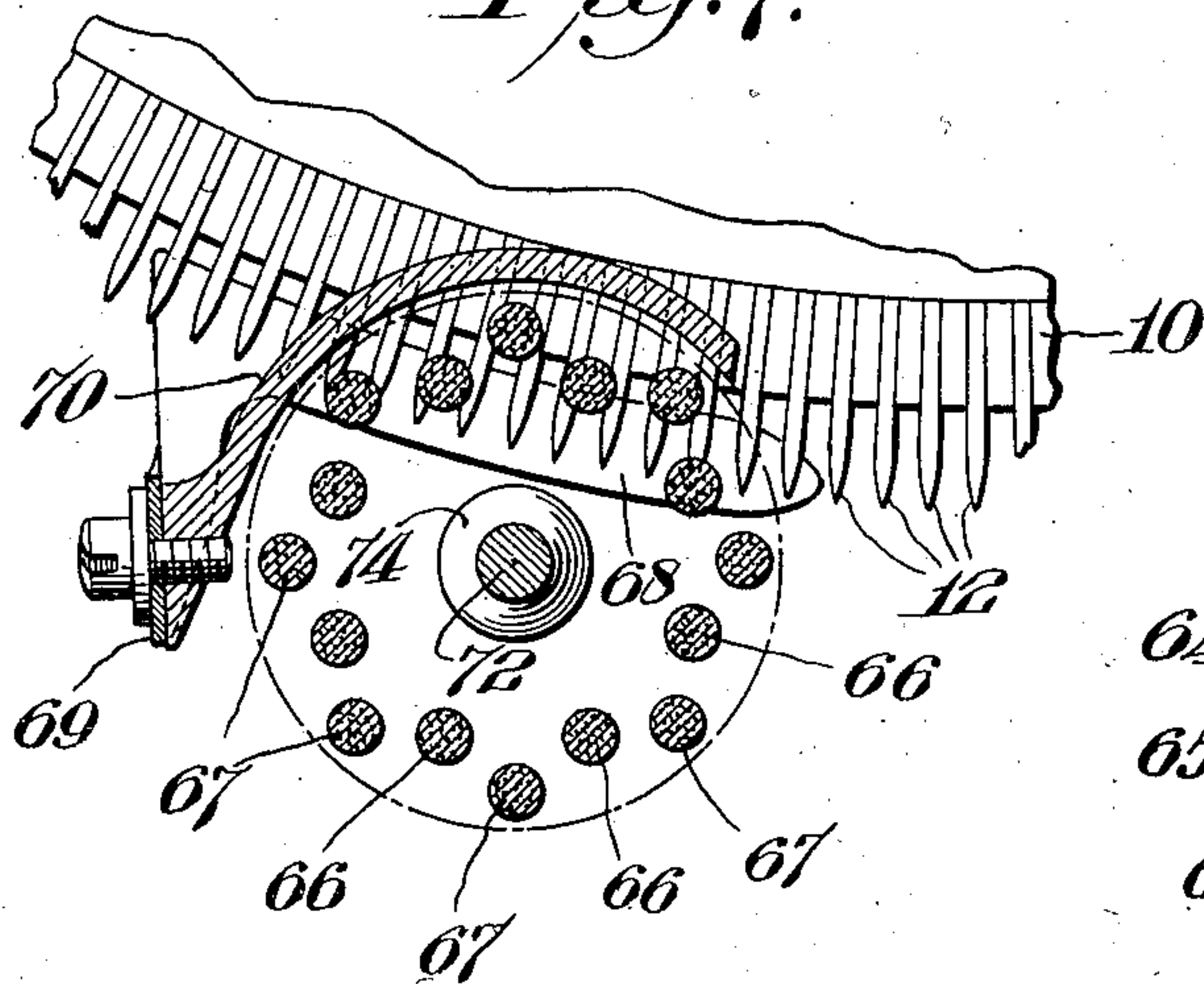
*Fig. 5.*



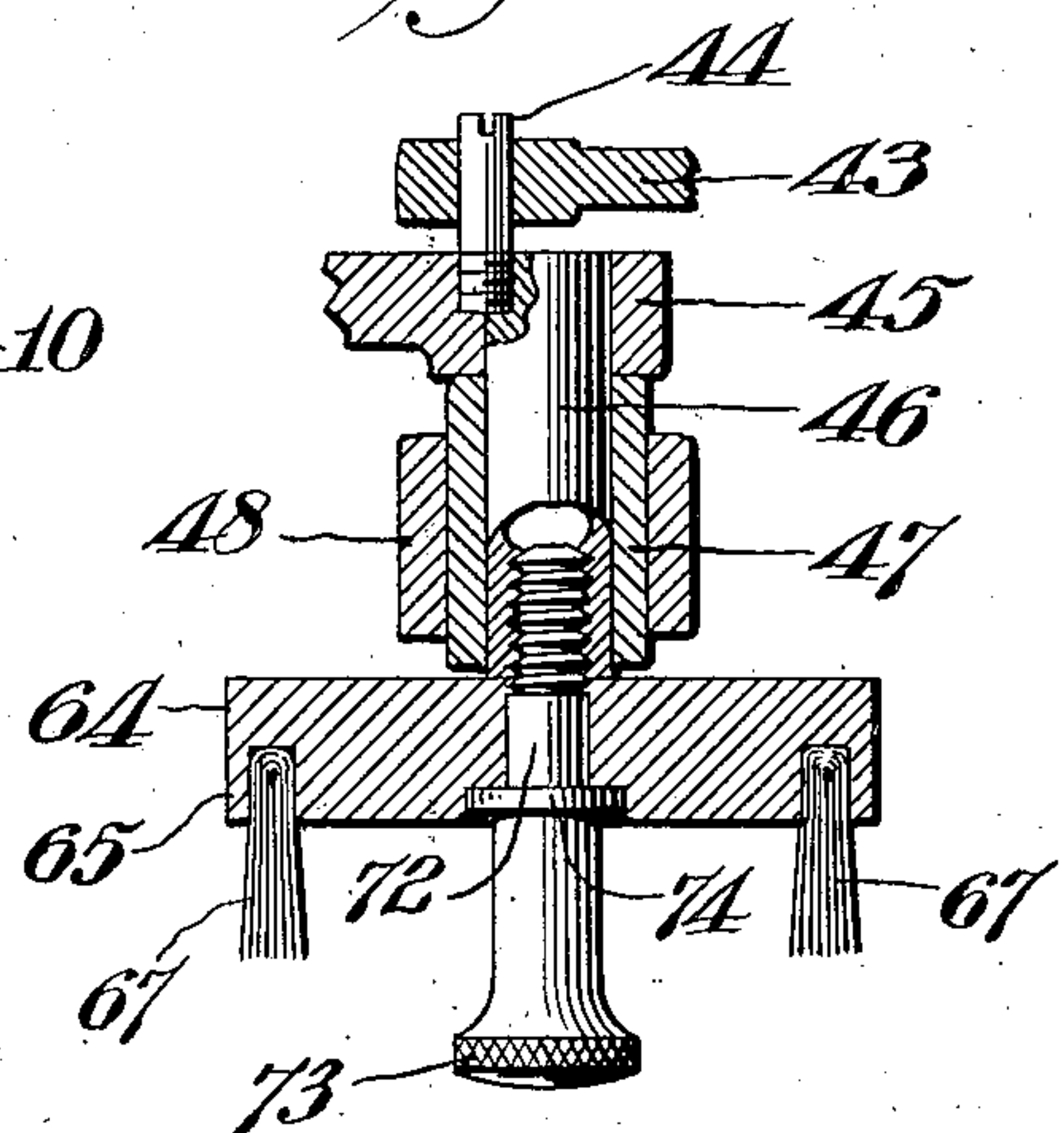
*Fig. 6.*



*Fig. 7.*



*Fig. 8.*



Inventor  
George Keyser  
by A. V. Grouff  
Attorney



## UNITED STATES PATENT OFFICE

2,022,377

## MACHINE FOR UNITING KNIT FABRICS

George Keyser, Philadelphia, Pa.

Application August 1, 1934, Serial No. 737,999

11 Claims. (Cl. 112—26)

This invention relates to machines for uniting knit fabrics wherein the fabrics to be united are carried by a series of impaling pins which project radially from a rotatable ring, and the invention relates particularly to improvements in the mechanism of such machines for cutting or trimming from the fabrics the excess portions thereof which extend above the impaling pins, and for brushing or cleaning from the fabric the loose threads resulting from the cutting or trimming operation.

In machines of this character, the loops of courses of stitches of the fabrics to be united are impaled upon the impaling pins below the top edges of the fabrics and the excess portions of the fabrics extending above the impaled loops are cut or trimmed from the portions of the fabrics beneath the same by a suitable cutting device arranged above the path of travel of the impaling pins. Such cutting devices are intended to cut each piece of fabric through the fabric loops of the next course of stitches above the loops which are impaled upon the pins, and these cutting devices have been defective in operation because they have, at times, cut through the impaled fabric loops when a loosely knit piece of fabric or a piece of fabric having the loops of a slack course of stitches impaled upon the pins was presented to the cutting devices, because the looseness of the impaled loops permitted the cutting device to draw them into the space between the cutting edges of its cutting blades.

This defective operation varied in greater and less degree in accordance with the dullness and sharpness of the cutting blades; that is to say, while the impaled loops of a given looseness might not have been drawn into the space between the cutting edges of sharp or recently sharpened blades, loops of the same looseness have been subsequently drawn into such space and have been cut by the blades after the cutting edges thereof have been dulled to a greater or less extent by use.

An object of the invention is to reduce the extent of or entirely eliminate the aforesaid defective operation of the cutting device by the provision of a novel and effective means to prevent the impaled fabric loops from being drawn into the device and cut thereby.

Another object of the invention is to provide a novel and advantageous means whereby the loose threads carried by the impaling pins and the fabric loops impaled thereon may be brushed therefrom and discharged from the machine following the cutting or trimming operation.

Another object is to provide a novel cutting device having cutting blades whose cutting edges can be located in close proximity to the path of travel of the impaling pins to properly act upon and cut or trim fine fabric close to the path of travel of the loops thereof which are impaled upon the pins.

The invention resides in the elements and the combinations of them hereinafter described and claimed.

In the accompanying drawings, illustrating the invention,

Figure 1 is a top view of sufficient of a machine for uniting knit fabrics to illustrate the invention.

Figure 2 is a top view of some of the mechanism illustrated in Fig. 1, showing the same in another position.

Figure 3 is a front view of the cutting and brushing and fabric holding mechanism.

Figure 4 is a sectional view, showing the fabric holding and cutting mechanism, on line 4—4 of Fig. 1.

Figures 5 and 6 are sectional detail views showing parts of the fabric holding and cutting mechanism in different positions during the operation thereof.

Figure 7 is a horizontal section taken through the bristle tufts of the brush and showing the relation thereof to the impaling pins and the guard beneath them.

Figure 8 is a sectional detail showing the brush and the shaft carrying the same.

Referring to the drawings, the frame of the machine comprises a base plate 2 adapted to be secured upon a suitable table or support, an arm 3 extending from the plate 2, a disc 5 secured to and supported by the arm 3 and a bracket 6 secured upon the disc 5.

The plate 2 is provided with bearings 7 in which a driving shaft 8 is journaled. The shaft 8 carries a pulley 9 by means of which it may be rotated from a suitable source of power.

Surrounding the disc 5 and rotatably fitted thereto is a ring 10 which rests upon an annular plate 11 secured to the bottom of the disc. The ring 10 is provided with a circular series of radially-projecting impaling pins 12 for receiving the loops of the fabrics to be united and carrying them past the cutting or trimming and brushing mechanism to and past the sewing mechanism (not shown) for uniting the fabrics in the usual manner well known in this art.

The ring 10 is provided with internal gear teeth 13 in mesh with a pinion 14 on the lower



end portion of a shaft 15 which is mounted to rotate in the arm 3. The upper end portion of the shaft 15 has a toothed wheel 16 secured thereon on which a worm wheel 17 is rotatably mounted. The worm wheel 17 carries a pawl 18 engaged with one of the teeth of the wheel 16 to cause it to be turned by and with the worm wheel 17.

The worm wheel 17 is in mesh with a worm 19 on a counter shaft 20 arranged in parallel relation to the driving shaft 8 and fitted to turn in bearings on the arm 3. The counter shaft 20 is provided with a gear wheel 21 in mesh with a similar wheel 22 on the driving shaft 8, whereby, when the driving shaft is rotated, the ring 10 carrying the impaling pins 12 will be slowly and continuously rotated at a uniform speed in the direction of the arrow in Fig. 1.

The mechanism just described for rotating the ring 10 is the same as the mechanism for rotating the ring carrying the impaling pins shown and described in my Patent No. 1,967,714, dated July 24, 1934, to which reference may be had for a further description and illustration thereof.

The bracket 6 has an arm 23 which extends outwardly beyond the impaling pins 12 with sufficient clearance above the same. The outer end of the arm 23 carries a vertically adjustable angle bracket 24 whose vertical limb is fitted to a guiding groove in the arm 23 and is secured to the arm by means of a screw 25 which extends through a vertical slot in bracket 24 and is screwed into the arm 23. When the screw 25 is loosened, the bracket 24 may be adjusted either up or down by turning a vertically arranged screw 26 which is screwed into the bracket arm 23 and has an annular flange 27 fitted to turn within a horizontal slot in one side of the vertical limb of the bracket 24. The horizontal limb of the bracket 24 has an elongated cutting blade 28 adjustably secured thereon by means of a short bolt 29 which extends through the horizontal limb of the bracket 24 and clamps the blade 28 between the same and the head on the upper end of the bolt. The blade 28 has a longitudinally extending upwardly projecting stiffening rib at one side thereof, as shown in the drawings, and extends radially with respect to the ring carrying the impaling pins 12, and the inner end portion of the blade extends over the pins in close proximity thereto and has a cutting edge 30 on its inner end adjacent to and outwardly of the path traversed by the upwardly projecting portions of the fabrics, shown at 31 in Fig. 4, to be united as they are carried by the pins 12.

Arranged above the fixed cutting blade 28 and extending inwardly therefrom is a movable cutting blade 32 having a cutting edge 33 at its outer end adjacent to the cutting edge 30 of the blade 28 and having a projection 34 which extends outwardly over the blade 28. The blade 32 is seated in a transverse groove in the bottom of an arm 35 and it is held in place therein by a head 36 between which and the arm 35 the blade 32 is clamped. The head 36 is carried by the lower end of a bolt 37 which extends upwardly through the arm 35 and has a nut 38 screwed on to the upper end thereof to engage the arm and draw the head 36 upwardly to clamp the blade 32. The nut 38 may be loosened to permit the adjustment of the blade 32 with respect to the arm 35 and to the blade 28. The employment of the stiffening rib on the cutting blade 28 enables me to use a very thin blade between the movable blade 32 and the impaling pins 12 and thus bring

the cutting edges of the blades close to the impaling pins for cutting fine fabric above and close to the loops thereof which are impaled upon the pins.

The blade carrying arm 35 extends from within an opening 39 in the bracket arm 23 and it projects fixedly from a shaft 40 which is fitted to turn and slide vertically in bearings formed in the upper and lower walls of the opening 39. Encircling the shaft 40 between its upper bearing and the arm 35 is a spring 41 which exerts a downward pressure upon the arm 35 and the shaft 40 to which it is secured and presses the projection 34 of the blade 32 upon the blade 28. When the shaft 40 is rocked back and forth, as will be presently explained, the cutting edge 33 of the blade 32 sweeps over the cutting edge 30 of the fixed blade 28 in a manner to effect shearing actions and to cause the blades 28 and 32 to be worked like the blades of a pair of scissors to cut or shear the edge portions of fabrics carried by the impaling pins 12 into the space between the cutting edges 30 and 33 when the blades are in the open position. The engagement of the projection 34 of the blade 32 with the top of the blade 28, and the pressure of the spring 41 maintains the cutting edges 30 and 33 in proper shearing relation.

The shaft 40 extends above the bracket arm 23 and has an outwardly extending arm 42 secured to the upper end thereof. The outer end of the arm 42 is pivotally connected to and supports one end of a link 43 whose other end is pivoted on a pin 44 which rises from an arm 45. This arm 45 is secured to the upper end of a vertical shaft 46 which is fitted to turn in a bearing sleeve 47 which is vertically adjustable in a projection 48 on the bracket arm 23. A set screw 49 is provided to secure the sleeve 47 in different positions of adjustment. The arm 45 is connected by a ball-and-socket joint 51 to one end of a rod 52 whose other end is connected by a ball-and-socket joint 53 to a crank arm 54 which projects fixedly from the driving shaft 8.

The pivot pin 44 is eccentrically arranged with relation to the shaft 46 carrying the arm 45, and the arms 42 and 45 are so related to each other and to the crank arm 54 that, during the rotation of the driving shaft 8, the crank arm 54 will effect the oscillation or rocking of the shafts 40 and 46 and the parts carried thereby from the position shown in Fig. 1 to the position shown in Fig. 2 and back again. This oscillation of the shaft 40 causes it to close and open the blades 28 and 32 of the cutting device and thereby effect the cutting or trimming of the fabrics carried by the pins 12.

Arranged to turn on the shaft 40 between the bracket arm 23 and the arm 42 is a plate 55 having an outwardly extending arm 56 and two oppositely disposed upwardly extending cam projections 57 adapted to be moved into and out of registry with depressions 58 in the bottom of the boss on the arm 42 on the upper end of the shaft 40. When the projections 57 are in registry with the depressions 58 the spring 41 presses the cutting blade 32 down upon the cutting blade 28 in cutting relation thereto. When, however, the plate is turned to move the projections 57 out of registry with the depressions 58, the projections 57 will act against the arm 42 to raise the cutting blade 32 out of operative relation to the blade 28. Thus it will be understood the cutting device may be thrown into and out of operation when desired for any purpose.



The bracket arm 23 provides a bearing for a rockable shaft 60 which is arranged parallel to the shafts 40 and 46. The lower end portion of the shaft 60 has a fabric holding or clamping arm 61 secured thereto whose free end portion is constructed and arranged to move toward and from the ring 10 beneath the impaling pins 12 and beneath the fabric cutting blades 28 and 32 when the shaft 60 is rocked. The upper end portion of the shaft 60 has an arm or pin 62 projecting fixedly therefrom and arranged to be engaged by the free end portion of the arm 42 which projects from the shaft 40. The arm or pin 62 is pressed toward the arm 42 by a spring 63 which encircles the shaft 60 between the arm 62 thereon and the bracket arm 23 and has one end engaged with the arm 62 and the other end engaged with the bracket arm 23.

When the parts are moved to the position shown in Fig. 1 to open the blades of the cutting device, the arm 42 engages the arm 62 and moves it to the position shown in Fig. 1 against the action of the spring 63, and thereby moves the fabric holding or clamping arm 61 to the open or inoperative position shown in Fig. 5; and when the parts are moved to the position shown in Fig. 2 to close the blades of the cutting device, the return movement of the arm 42 permits the spring 63 to move the fabric holding arm 61 to the closed or operative position shown in Fig. 6.

The part of the fabric holding arm 61 which moves beneath the fabric cutting blades is constructed to engage and clamp or hold between it and the ring 10 the portions of the fabrics passing between them when the arm 61 is moved to the closed or operative position shown in Fig. 6; and when the arm 61 is moved to the open or inoperative position shown in Fig. 5, the fabrics between the arm 61 and the ring 10 will be released.

It will now be understood that each time the cutting blades 28 and 32 are opened and closed to effect a fabric cutting operation, the fabric holding arm 61 will be moved to the open and closed positions to release and hold or clamp the fabrics.

The operations of the fabric holding and cutting devices are so timed relatively to one another that the arm 61 will engage and clamp and hold the fabrics just before the cutting edge of the blade 32 crosses the cutting edge of the blade 28 to cut the fabrics, and after the arm 61 comes into engagement with the fabrics, the arm 42 moves out of contact with the arm 62 and leaves the full power of the spring 63 acting to hold or clamp the fabrics while the cutting blade 32 completes its cutting movement over the blade 28, each time a cutting operation is effected. The clamping operations of the arm 61 are of such short duration and they occur in such rapid succession that they do not produce any appreciable drag upon the fabrics which are advanced by the slowly and continuously rotating ring 10 carrying the pins 12. This clamping or holding of the fabrics at the time the cutting thereof takes place prevents upward movement of the fabrics while they are being cut and thereby prevents the cutting blades from drawing the fabrics upwardly sufficiently to bring the impaled loops thereof into the space between the cutting edges of the cutting blades.

The severed portions of the fabrics above the cutting edges of the blades 28 and 32 are fed outwardly over the top of the blade 28 and discharged from the machine by the outer end of

the blade 32 during the outward movements thereof.

After the severed portions of the fabric just referred to have been removed there remain some loose ends of threads at the cut upper edge of the fabric and also U-shaped portions of the cut loops within the loops which are impaled upon the pins 12 and within the usual needle grooves in the tops of the pins.

To remove these loose ends and U-shaped portions of threads I provide the lower end of the shaft 46 with a brush 64 comprising a head 65 having an inner and outer circular series of bristle tufts 66 and 67, respectively, carried thereby and projecting downwardly therefrom. The brush 64 is located above the impaling pins 12 and it and the shaft 46 carrying the same are mounted to turn on an axis which extends perpendicular to the plane of the pins 12. The bristles of the tufts 66 and 67 extend substantially parallel to the turning axis of the brush. This turning axis is located outwardly of the path of travel of the trimmed edges of the fabrics carried by the pins 12 and in such relation thereto that the free ends of the bristles at the side of the brush which is located above the pins 12 will cross the path of travel of the trimmed edges of the fabrics and brush the same during the rocking or oscillation of the shaft 46 by the mechanism previously explained.

As the fabrics carried by the pins 12 pass the brush 64 they pass between the ring 10 and a horizontal guard plate 68 which is located beneath the path of travel of the pins 12 in close proximity thereto. This guard plate 68 has an upturned end portion 69 secured to one side of a guard 70 which embraces the inner side of the brush 64 and is formed on an arm 71 which extends outwardly from and is secured to the bracket 6.

The operation of the bristle tufts 66 and 67 upon the trimmed edges of the fabrics, as above described, causes the two fabrics carried by the pins 12 to be moved or shifted radially in and out thereon together and also relatively to each other within the limits allowed by the ring 10 and guard plate 68 as the bristles of the oscillating brush sweep back and forth over the fabrics. This brushing and shifting of the fabrics upon the pins causes the U-shaped portions of the cut loops to be worked out or dislodged from their positions between the pins 12 and the impaled fabric loops thereon and causes the same with any other waste ends of threads which are present to be brushed from the fabrics, leaving clean rows of loops upon the pins 12 to be advanced thereby and presented to sewing mechanism for uniting the fabrics.

The brush 64 is secured to the lower end of the shaft 46 by means of a screw 72 which projects axially from the lower end of the shaft and is screwed into the same and has a head 73 on the lower end thereof by means of which it may be turned. The screw 72 extends through the center of the brush head 65 and clamps the head between the lower end of the shaft 46 and a collar 74 on the screw. When those portions of the bristle tufts 66 and 67 which sweep over the fabrics on the pins 12 become worn the screw 72 can be loosened to permit the head 65 to be turned relatively to the shaft 46 to substitute fresh bristle tufts of the brush 64 for the worn ones.

I claim:

1. In a machine for uniting knit fabrics, the



combination of supporting means, a rotatable ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting device  
 5 comprising two cooperating cutting blades operable to cut fabric extending above said pins and between the blades, mechanism for operating the cutting device, a holding device operable to prevent upward movement of the fabric extending  
 10 beneath said pins during the operation of the cutting device, and mechanism for operating the holding device.

2. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 15 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting device operable to cut fabric extending above said pins, a holding device operable to prevent upward  
 20 movement of the fabric extending beneath said pins during the operation of the cutting device, a rockable part, means operated by said part for operating the cutting device, means operated by said part for operating the holding device, a ro-  
 25 tatable driving shaft, and means operated by said shaft for rocking said part.

3. In a machine for uniting unit fabrics, the combination of supporting means, a rotatable  
 30 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, two rockable shafts, a cutting device comprising a fixed blade and a movable blade operated by one of said shafts  
 35 for cutting fabric extending above said pins and between the blades, a holding device operated by the other of said shafts to prevent upward movement of the fabric extending beneath said pins during the operation of the cutting device, a  
 40 rotatable driving shaft, and means operated by the driving shaft for rocking the rockable shafts.

4. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 45 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting device operable to cut fabric extending above said pins, mechanism for operating the cutting device, a  
 50 holding device having a part movable into and from an operative position preventing upward movement of the fabric extending beneath said pins, yieldable means for moving said part to said operative position during the operation of the  
 cutting device, and mechanism for moving said part from said operative position.

5. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 55 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting device comprising two cooperating cutting blades operable to cut fabric extending above said pins and  
 60 between the blades, mechanism for operating the cutting device, a clamping arm movable into and from an operative position clamping the fabric extending beneath the pins between the arm and said ring, and mechanism for periodically moving said arm into and from said op-  
 65 erative position.

6. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 70 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting device operable to cut fabric extending above said pins, mechanism for operating the cutting device, a

clamping arm movable into and from an operative position clamping the fabric extending be-  
 neath the pins between the arms and said ring, yieldable means for moving said arm toward  
 5 said operative position during the operation of the cutting device, and mechanism for moving said arm from said operative position.

7. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 10 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting device operable to cut fabric extending above said pins, mechanism for operating the cutting device, a  
 15 rockable shaft, a clamping arm carried by said shaft and constructed to be moved into and from an operative position clamping the fabric extending beneath the pins between the arm and  
 20 said ring when the shaft is rocked, yieldable means for rocking the shaft to move said arm into said operative position during the operation of the cutting device, and mechanism for rocking the shaft to move said arm from said  
 operative position.

8. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 25 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a cutting blade fixedly supported above said pins, a movable cut-  
 30 ting blade arranged to cooperate with the fixed blade to cut fabric extending above said pins, supporting and operating means for the movable blade, a clamping arm movable into and from an operative position clamping the fabric ex-  
 35 tending beneath the pins between the arm and said ring, and yieldable means for moving said arm to said operative position during the movement of said movable blade to effect the cutting operation, and means operated by said operating  
 40 means during the reverse movement of said movable blade to move said arm from said operative position.

9. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 45 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, an elongated cutting blade having a cutting edge at one end thereof and having a longitudinally extending upwardly  
 50 projecting stiffening rib at one side thereof, means for supporting said blade fixedly above the impaling pins, a movable blade above the first named blade having a cutting edge arranged to cooperate with the first named cutting edge to  
 55 cut fabric carried by and extending above the impaling pins, and means for supporting and actuating the movable blade.

10. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable  
 60 ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a brush located above the impaling pins and mounted to turn on an axis which extends perpendicular to the  
 65 plane of said pins and located at one side of the path of travel of fabric carried by the pins and having bristles extending substantially parallel to said axis and having free lower ends arranged to engage loops of fabric carried by the pins,  
 70 mechanism for oscillating said brush on said axis, and a guard supported in close proximity to and beneath said pins and said brush outwardly of the path of travel of fabric carried by the pins.



11. In a machine for uniting knit fabrics, the combination of supporting means, a rotatable ring provided with a circular series of radially projecting impaling pins for carrying the fabrics, means for rotating said ring, a brush located above the impaling pins and mounted to turn on an axis which extends perpendicular to the plane of said pins and located at one side of the path of travel of fabric carried by the pins and having an inner set of bristle tufts and an outer set of bristle tufts farther from said axis than said inner set, the bristles of said tufts extending substantially parallel to said axis and the bristles of said outer set of tufts having free lower ends arranged to engage loops of fabric carried by the pins, mechanism for oscillating said brush on said axis, and a guard plate supported in close proximity to and beneath said pins and both sets of bristle tufts outwardly of the path of travel of fabric carried by the pins.

GEORGE KEYSER.