

(No Model.)

3 Sheets—Sheet 1.

W. S. BURROUGHS.  
RECORDING DEVICE FOR CALCULATORS, &c.

No. 505,078.

Patented Sept. 12, 1893.

Fig. 1.

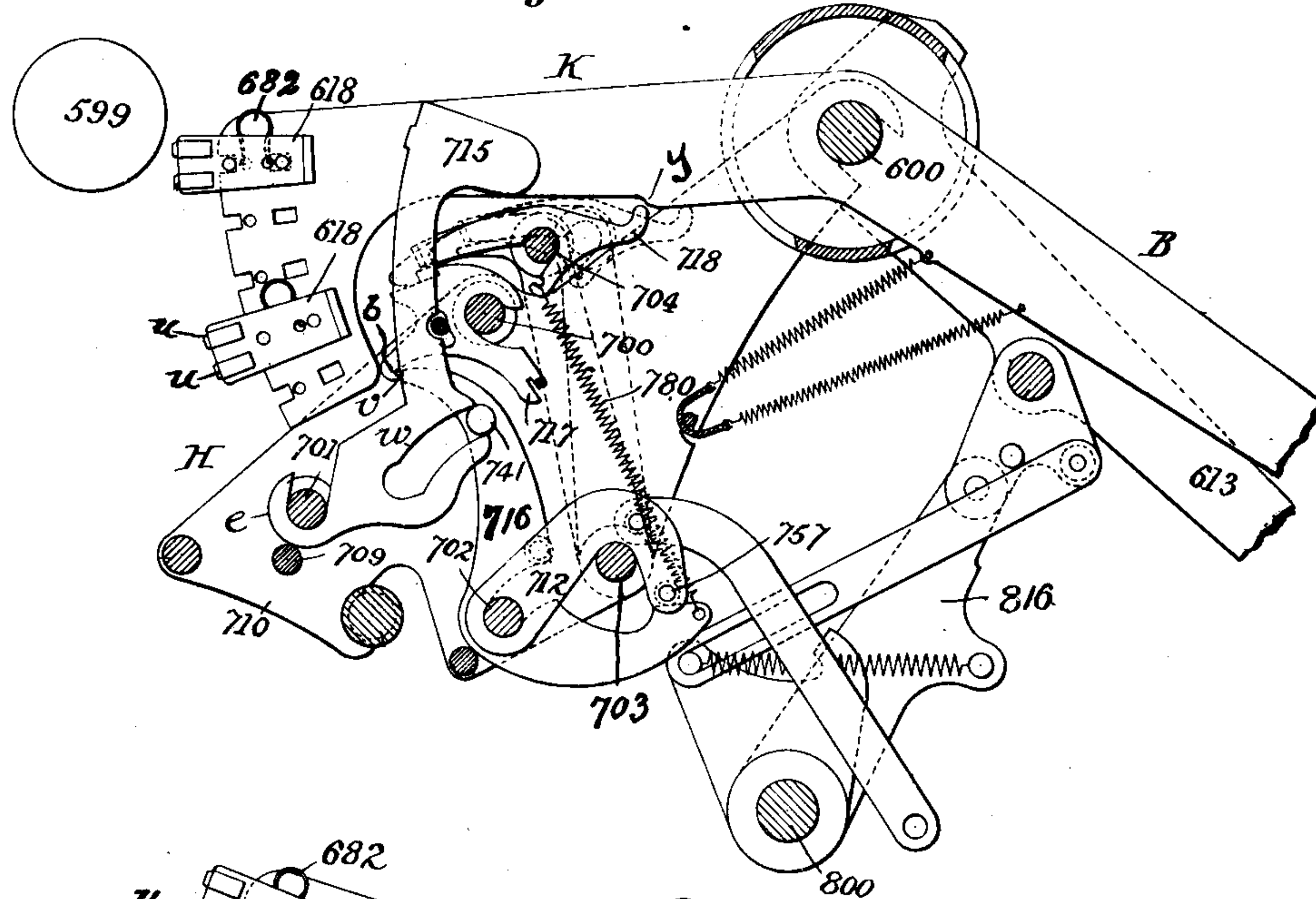
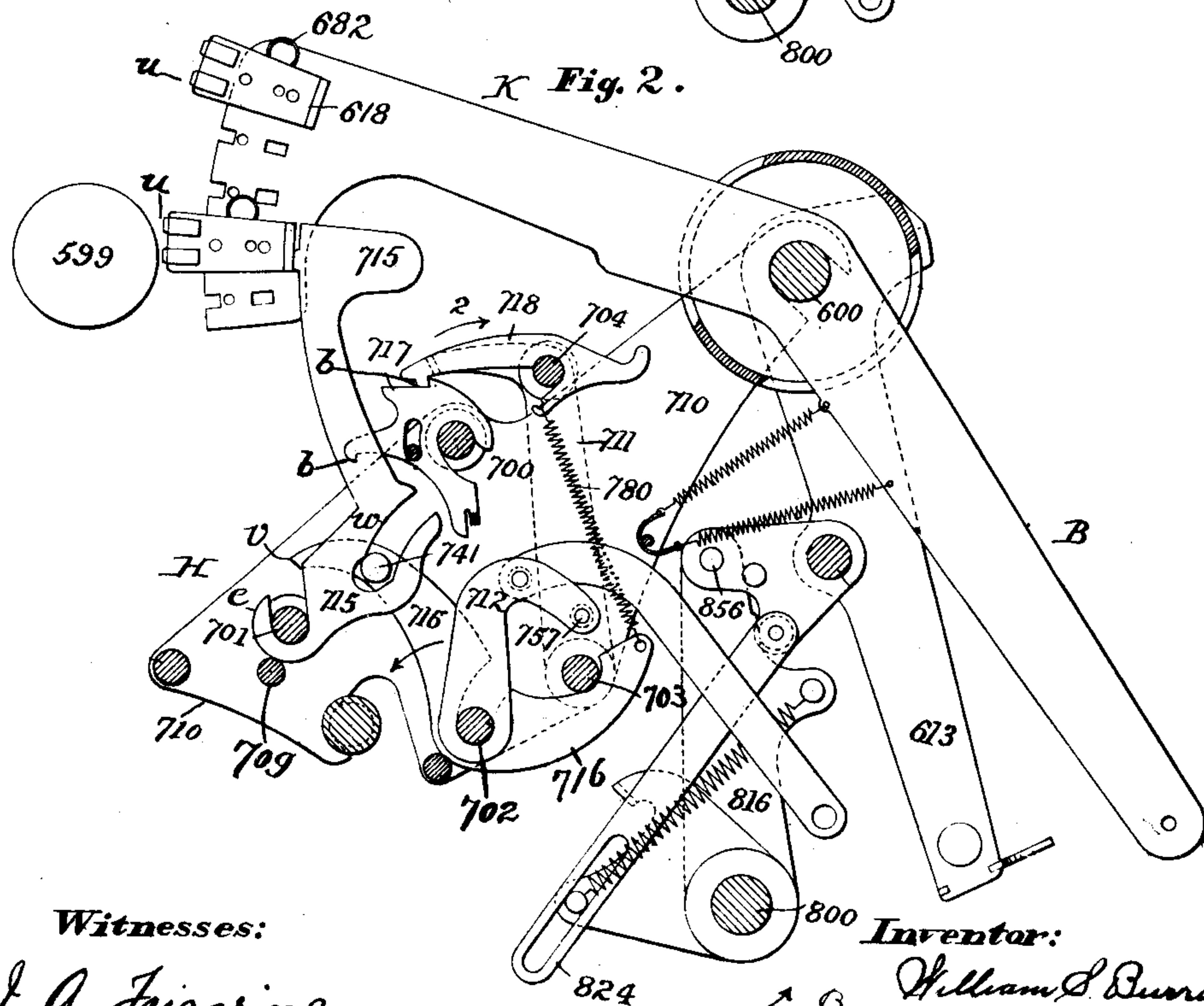


Fig. 2.



Witnesses:

I. A. Fairgrieve  
and H. Dobson

Inventor:

By William S. Burroughs  
Lester Freeman  
attys

(No Model.)

3 Sheets—Sheet 2

W. S. BURROUGHS.

RECORDING DEVICE FOR CALCULATORS, &c.

No. 505,078.

Patented Sept. 12, 1893.

*Fig. 3.*

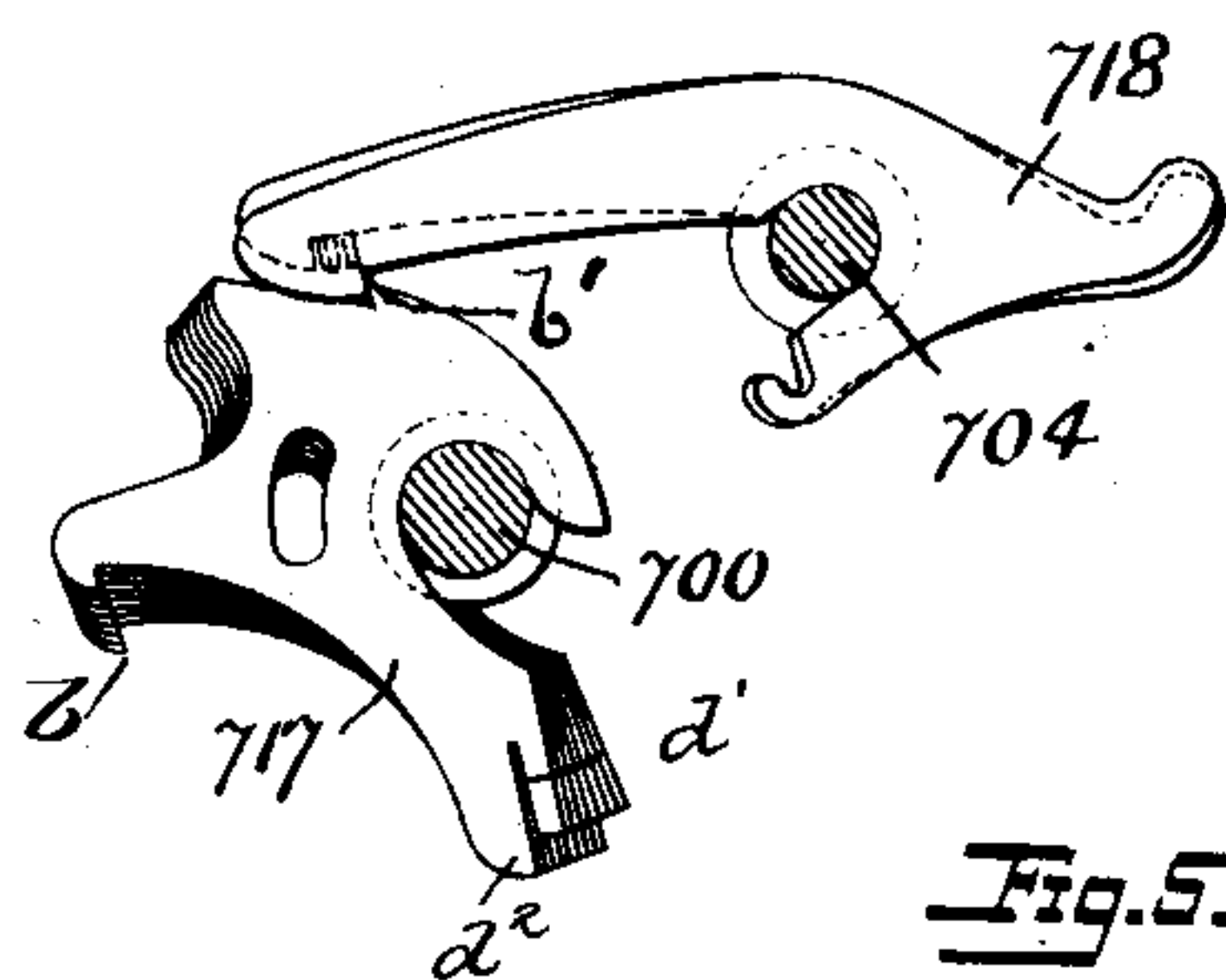
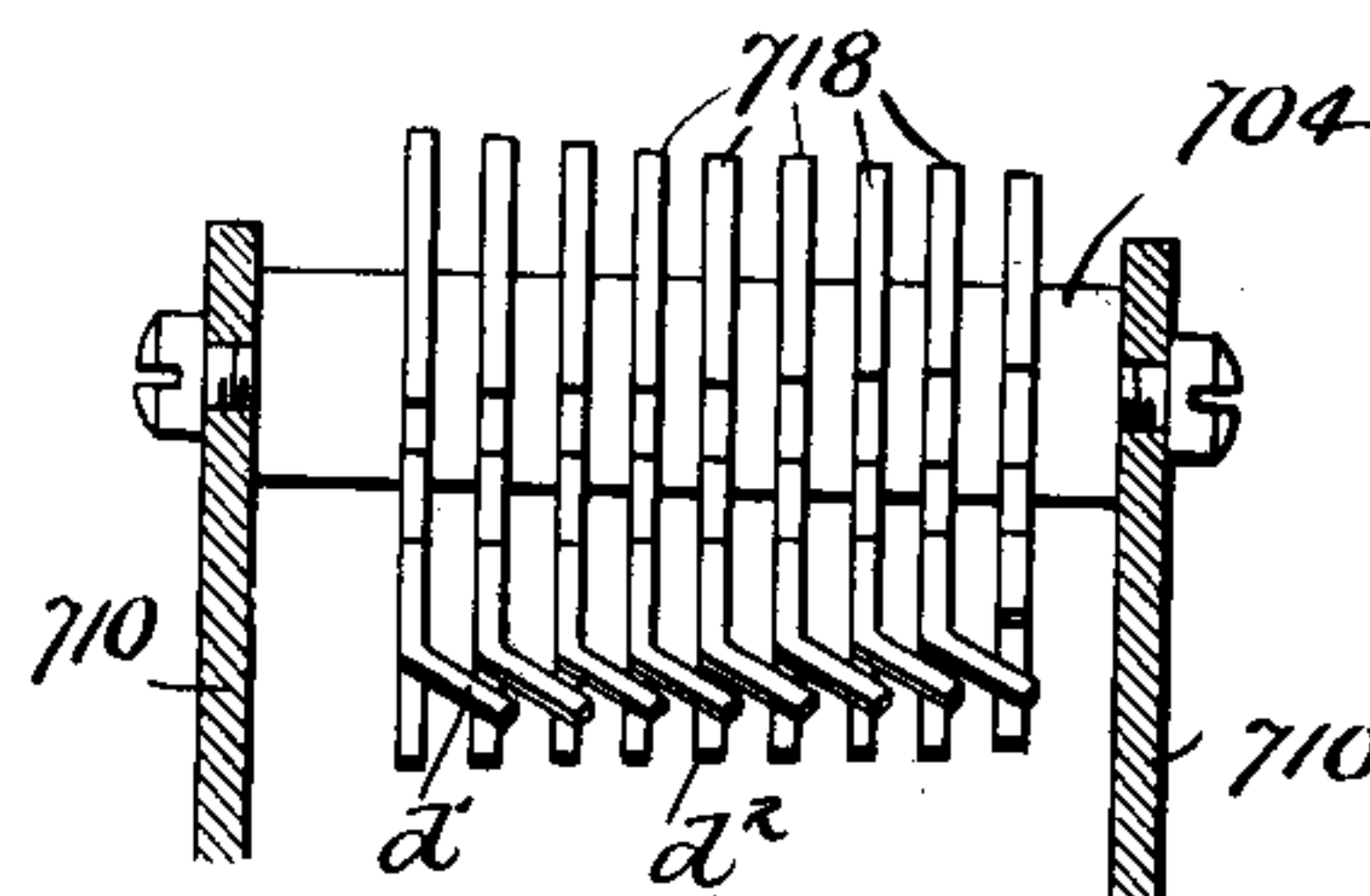


Fig. 4.



**Fig. 5.**

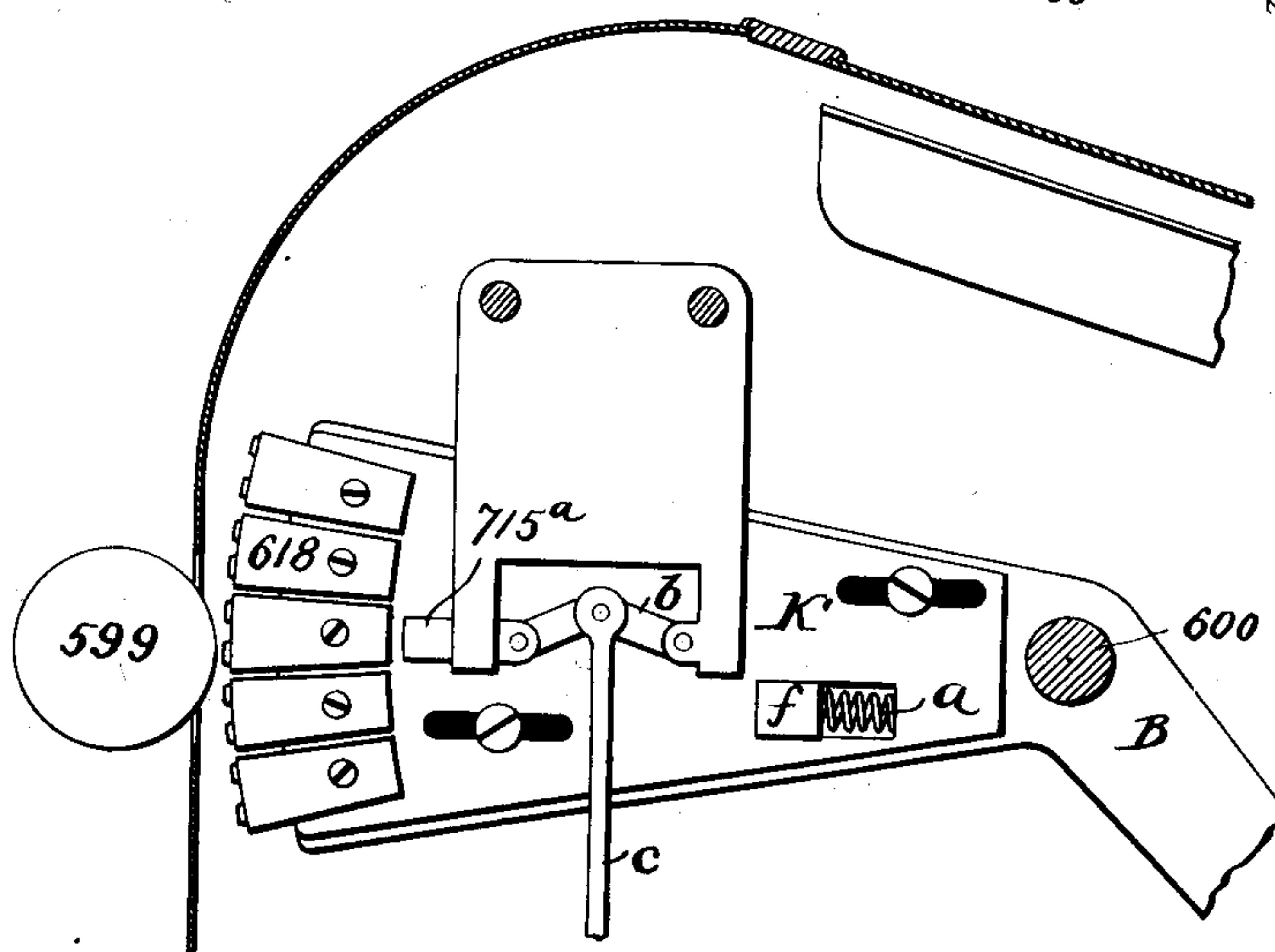
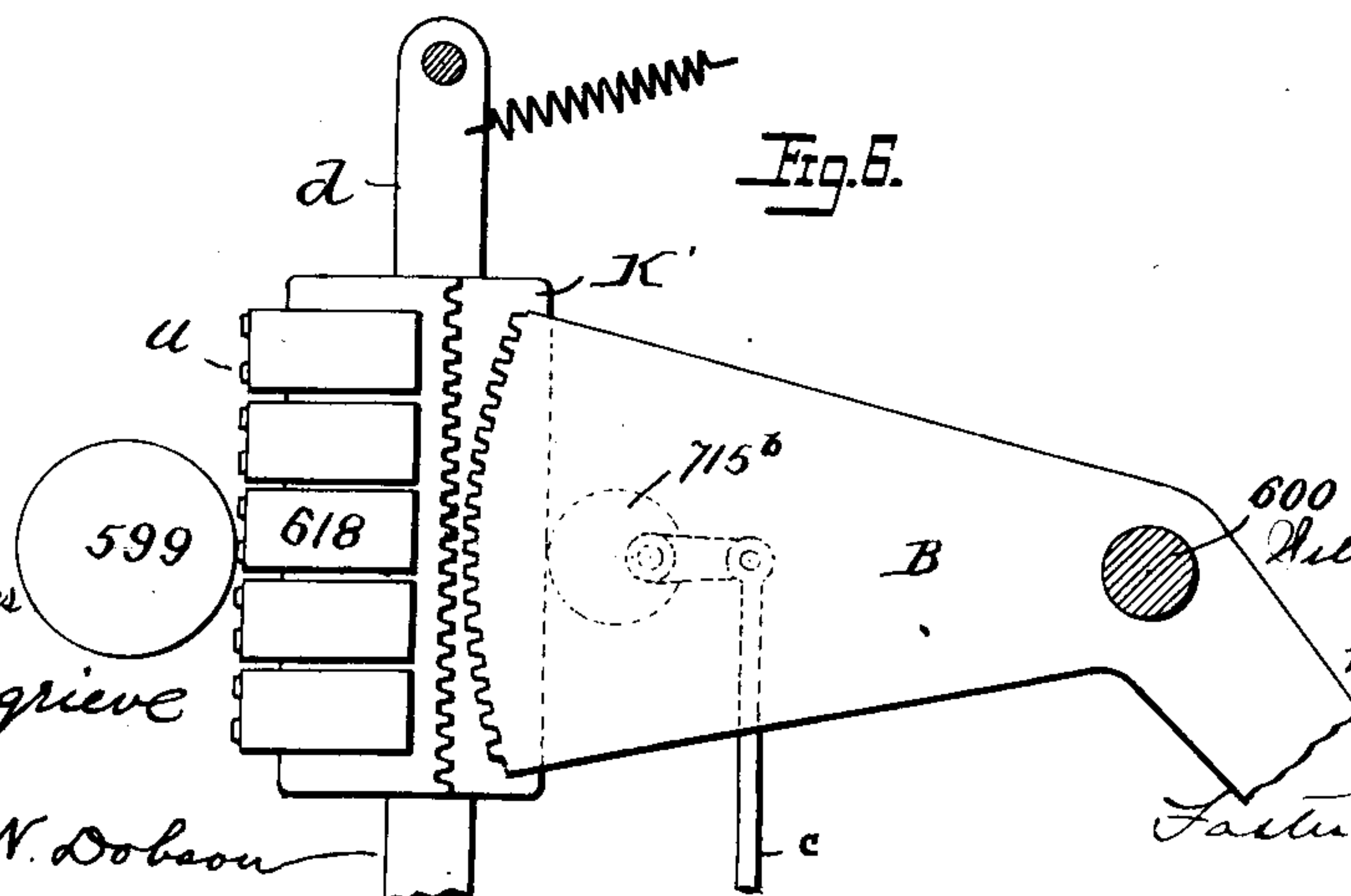


Fig. 6.



Witnesses  
L. A. Fargrieve

Allen V. Dobson

600  
William S Burroughs  
Inventor

Foster & Freeman  
Attorneys

(No Model.)

3 Sheets—Sheet 3.

W. S. BURROUGHS.

RECORDING DEVICE FOR CALCULATORS, &c.

No. 505,078.

Patented Sept. 12, 1893.

Fig 7

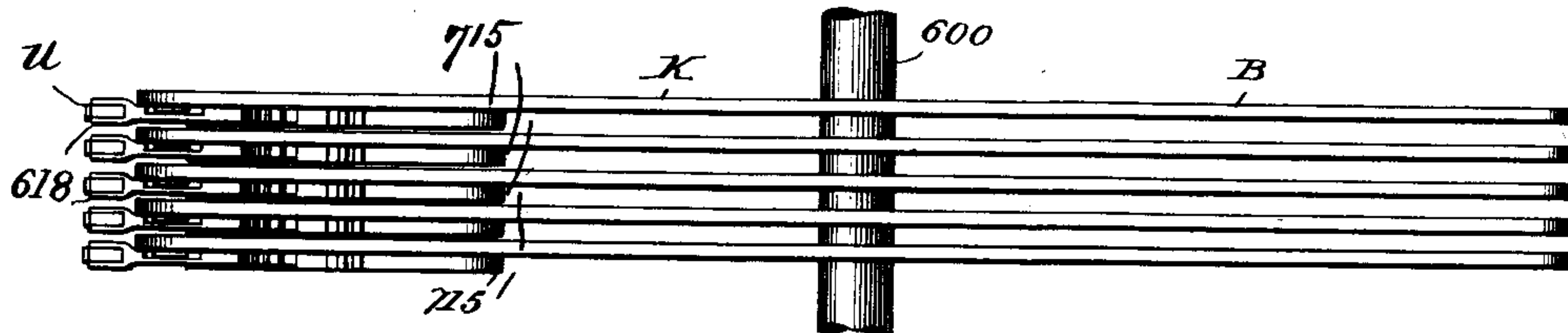
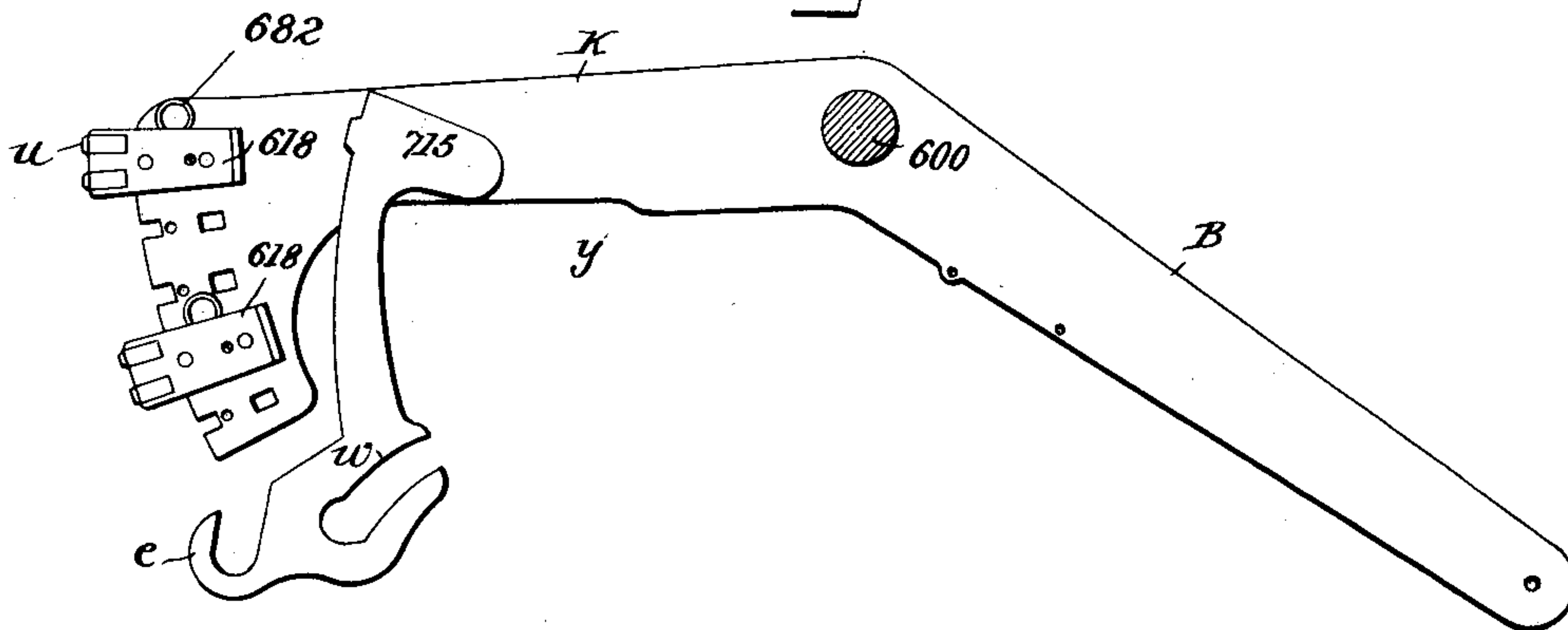


Fig. 8.



Witnesses  
*J. G. Hinkel*  
*J. J. McCarthy*

Inventor  
*W. S. Burroughs*  
*Foster Freeman*  
Attorneys



# UNITED STATES PATENT OFFICE.

WILLIAM S. BURROUGHS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE  
AMERICAN ARITHMOMETER COMPANY, OF SAME PLACE.

## RECORDING DEVICE FOR CALCULATORS, &c.

SPECIFICATION forming part of Letters Patent No. 505,078, dated September 12, 1893.

Application filed May 14, 1892. Serial No. 432,971. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM S. BURROUGHS, a citizen of the United States, residing at St. Louis, Missouri, have invented certain new and useful Improvements in Printing-Recorders, of which the following is a specification.

This invention relates to certain improvements in printing recorders, having for its object to simplify the construction and insure a positive action of the mechanism to which end the parts are constructed as fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation in part section of sufficient of a printing recorder to illustrate my improvements. Fig. 2 illustrates the same parts in a different position. Fig. 3 is a detached view illustrating the devices for releasing the drivers; Fig. 4, an edge view of the triggers illustrated in Fig. 3. Figs. 5 and 6 are views illustrating modifications. Fig. 7 is a plan showing a number of type carriers. Fig. 8 is a side view of one of the carriers and part of the type thereon.

In the class of machines to which my improvement relates there is a series of type-carriers each connected so as to be operated by a lever B, and means whereby the said carriers are brought to different positions by the operation of certain keys to move the type corresponding to said keys into place opposite a platen.

As the means for adjusting the levers and tape-carriers constitutes no part of my present improvement I have not fully illustrated the same but the construction and operation will be fully understood by Letters Patent issued to me August 31, 1888, No. 388,119, and also by my application for Letters Patent, Serial No. 431,964, filed May 5, 1892.

In the construction illustrated in the accompanying drawings there is a series of levers B, which correspond to the rack levers F, of my aforesaid patent, and which swing about a shaft 600 and which are elevated by means of a frame 613, operated by a toggle 816, connected to the frame and to a shaft 800. Each of the type carriers is in some way connected so as to be operated by one of the levers B, to carry the types to positions

opposite the platen 599 which is shown in the form of a roller.

As shown, in Fig. 5 the type are connected immovably to the carriers K' and each of the latter is capable of a limited sliding motion on a rectangular projection *f* of the adjacent lever B, a spring *a* retracting the carrier K'. Each type block 618 when in position opposite the platen 599, has its type face tangential thereto and the opposite end of the block is in front of the type-driver 715<sup>a</sup>, which in said Fig. 5 is a sliding bar moved by a toggle *b*, to which motion is imparted by a rod *c*, operated from any moving part of the machine. As the toggle is depressed the carrier K' and the opposite type are pushed toward the platen 599, and when the toggle is raised the carrier and the type slide back under the action of the spring *a*.

In the construction shown in Fig. 6 the carrier K' is a block sliding on a guide *d* and having a straight rack gearing with a curved rack constituting one end of the lever B. Opposite the carrier is a cam driver 715<sup>b</sup> turned by means of the rod *c* from any moving part of the machine to push the block and type toward the platen.

While the constructions shown in Figs. 5 and 6 illustrate one feature of my invention I prefer to embody said feature in the construction shown in Figs. 1 to 4 in which the type are moved percussively. In said figures, the carrier K is in the form of an extension of the contiguous lever B, and the type are arranged radially with reference to the pivot shaft 600 thereon that is in such manner that their faces are upon a curved line adjacent to the platen roller 599. I connect each type, movably, to the carrier and push each type block 618 outward against the roller platen, when the impression is to be made. As shown, the type *u* are arranged in pairs, each pair upon a sliding block 618, for purposes of economy, although each type may be upon a separate block, and these blocks move in guides in the carrier K radially to the shaft 600, being retracted by springs 682. A single percussive type driver 715, is arranged in such position that it will operate upon the heel of each block 618, when the latter is in position between the driver



715 and the roller platen 599. This driver is preferably in the form of a hammer, as shown, consisting of a plate, having a terminal hook *e*, that enters an annular groove in a cross shaft 701, and is retained therein by a cross-bar 709, so that the driver swings upon the shaft 701, as a center but can readily be detached therefrom if desired. A spring 780 is preferably used for imparting striking movement to the driver, together with a retractor, for drawing the driver back, and a trigger for releasing it. The simple application of the spring, in this way, however, would sometimes tend to cause the hammer to rebound and produce a second impression. I, therefore, drive the hammer forward by means of an L-shaped lever 716, vibrating upon a fulcrum 702, and having a stud 741, which acts upon the inclined bearing or edge *w*, of a slot in the driver 715, so that when the lever 716, swings in the direction of the arrow, Fig. 2, it drives the driver forward, and when the latter strikes the block 618, the stud 741, will occupy a position at the bottom of the slot of the driver, and hold the latter immovably against any rebound. The lever 716, is operated to effect its said movement by the action of a spring, 780, which answers the double purpose of swinging said lever and also a pawl 718, carried by a cross shaft 704, supported by two arms 711, upon a rocking shaft 703. A sudden blow upon all of the type that are in a horizontal row, at one time, would result in a shock which would be detrimental to the machine. I, therefore, provide means whereby the drivers may contact with the slides in rapid succession. Different means of successively operating the drivers may be used. As shown, it is effected by releasing the spring actuated drivers successively instead of all at once. Each driver is held in a retracted position by a detent or trigger 717, having a shoulder *b* that engages the point *v*, of the lever 716, as shown in Fig. 1, and each trigger 717, is turned back upon the supporting rod 700, by means of the movement of the engaging pawl 718, carried in the direction of the arrow 2, Fig. 2, by the arms 711, and the successive disengagements of the pawls from the triggers is secured by setting the shoulder *b'* of one pawl a little farther back than the shoulder of the preceding pawl, so that when the pawls 718, are carried back the shoulders will leave the engaging shoulders of the triggers in succession releasing one after the other. The pawls 718, cannot engage with the triggers so long as the carriers *K*, are in their normal position, because in such case the tail of each pawl would be brought against an inclined shoulder *y*, of the adjacent carrier *K*, and such pawl would be lifted away from the trigger. When, however, a carrier is lifted and the shaft 704 is carried forward, as results from the action of the parts of the machine the pawl 718 operated by said carrier will engage the adjacent trigger 717 and draw the

latter back. If but a single carrier is moved to print only one figure, indicating a number greater than naught, it is yet necessary that the ciphers of the succeeding sections should be printed so that although the other levers and carriers are not moved, the corresponding type must be struck by the devices and printed. To effect this result, I provide means whereby the adjustment or the release of any one of the devices resulting from the movement of any one of the carriers may be the means for automatically operating the succeeding triggers when the adjacent carriers are not moved. Thus, each trigger 717, is provided with a laterally extended lug *d'*, and which lug is arranged a short distance in advance of a heel or lip *d''* of the next adjacent trigger, so that when any one trigger (see Figs. 3 and 4) is drawn back its lug *d'*, will after a limited movement, strike the heel *d''* of the next trigger on the right, and also swing it backward, and so on, the movement being imparted from one trigger to the next, until all of the triggers at the right of the one directly operated, have successively been lifted to release the contacting levers 716, and through them release the adjacent drivers whereby all of the said type carrying ciphers are struck and the ciphers printed at the right of the figure or figures set in position by the operation of the keys. The various rods, studs or bars supporting the operating parts described are connected to or supported by two parallel plates 710.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination of a platen a series of type carriers movable opposite said platen and a series of separate drivers each arranged to operate upon the type between it and the platen to bring the two together, substantially as set forth.

2. The combination with the series of type carriers, of a platen opposite said carriers and a series of separate drivers arranged to move the type toward the platen, substantially as set forth.

3. The combination of a platen, series of movable type carriers and series of drivers, springs for moving the same toward the type, and detents for holding the drivers in a retracted position, substantially as described.

4. The combination with the series of type carriers and series of drivers and springs for moving the drivers percussively against the type, of detents for holding the drivers retracted, and means for successively releasing the detents, substantially as set forth.

5. The combination of the platen a series of carriers, arranged side by side and a series of type each movably supported upon a carrier, and separate drivers for acting upon the movable type, substantially as set forth.

6. The combination of the platen, carriers, type, and drivers, and levers provided with projections for making contact with bearings



on the drivers and arranged to hold the latter in the forward position to which they are thrown, and springs for actuating the levers, substantially as set forth.

5 7. The combination with the drivers having inclined bearings *w*, and levers having studs or projections 741, and springs for actuating the levers, substantially as set forth.

8. The combination with the drivers and  
10 their actuating devices of detents for holding the drivers out of action a swinging rod carrying pawls for actuating the detents, and carriers, having shoulders arranged to control the action of the pawls, substantially as  
15 set forth.

9. The combination with the type drivers, of actuating and controlling devices therefor, and carriers having shoulders arranged to be struck by said controlling devices to throw  
20 the same out of operative position, substantially as set forth.

10. The combination with the type drivers, of a series of detents or triggers arranged to hold the drivers in a retracted position, a series of controlling pawls and shoulders upon  
25

the triggers and pawls arranged each in advance of the next shoulder to secure the release of the triggers in succession, substantially as set forth.

11. The combination with the series of 30 drivers, of means for actuating the drivers, a series of triggers controlling the actuating means, a series of pawls controlling the triggers and springs connecting the triggers and operating devices for the drivers, substantially as described. 35

12. The combination with the series of drivers, of a series of triggers or detents and connections between the drivers and triggers each trigger having an arm extended to make 40 contact with and operate the succeeding trigger after a limited movement of the actuating trigger, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of 45 two subscribing witnesses.

WILLIAM S. BURROUGHS.

Witnesses:

E. PARMER,

A. H. B. OLIVER.