

(No Model.)

2 Sheets—Sheet 1.

C. J. REED.

MECHANISM FOR FORMING BATTERY PLATES.

No. 532,701.

Patented Jan. 15, 1895.

Fig. 1,

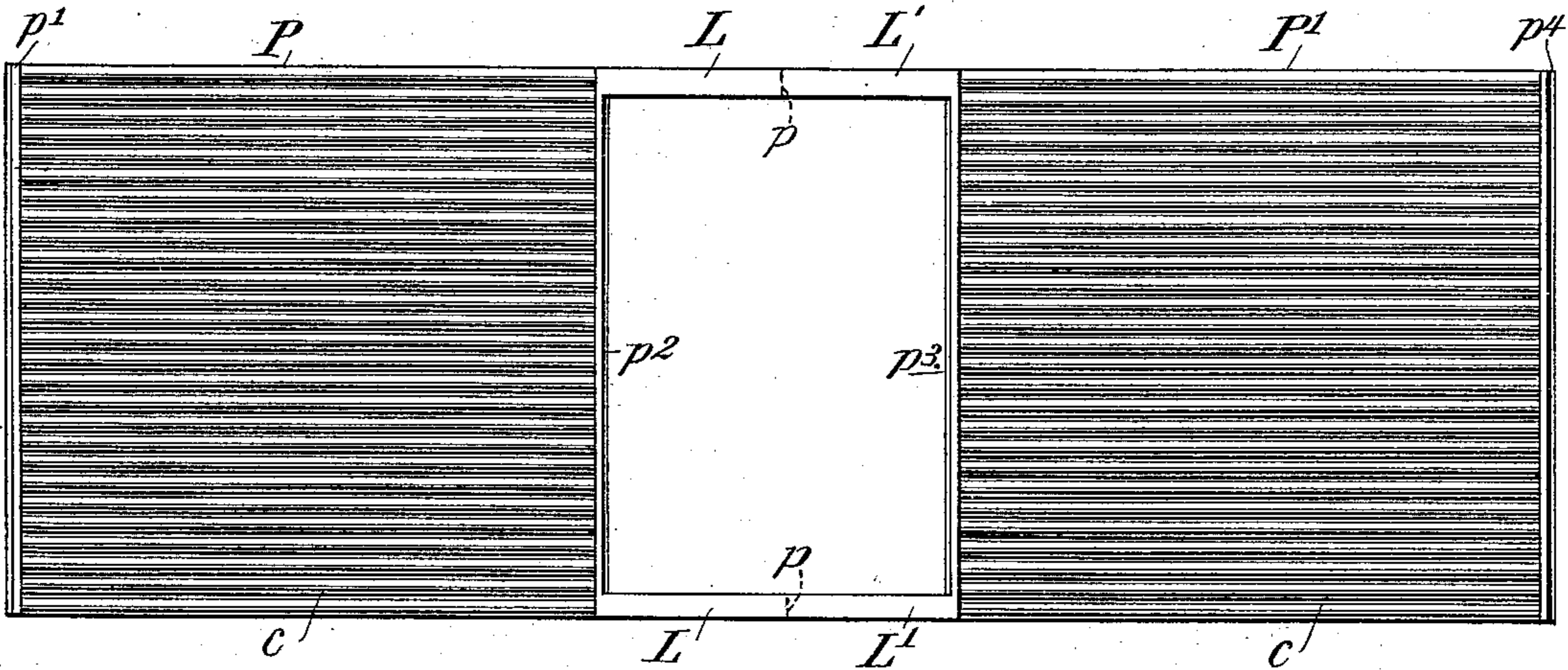


Fig. 2,

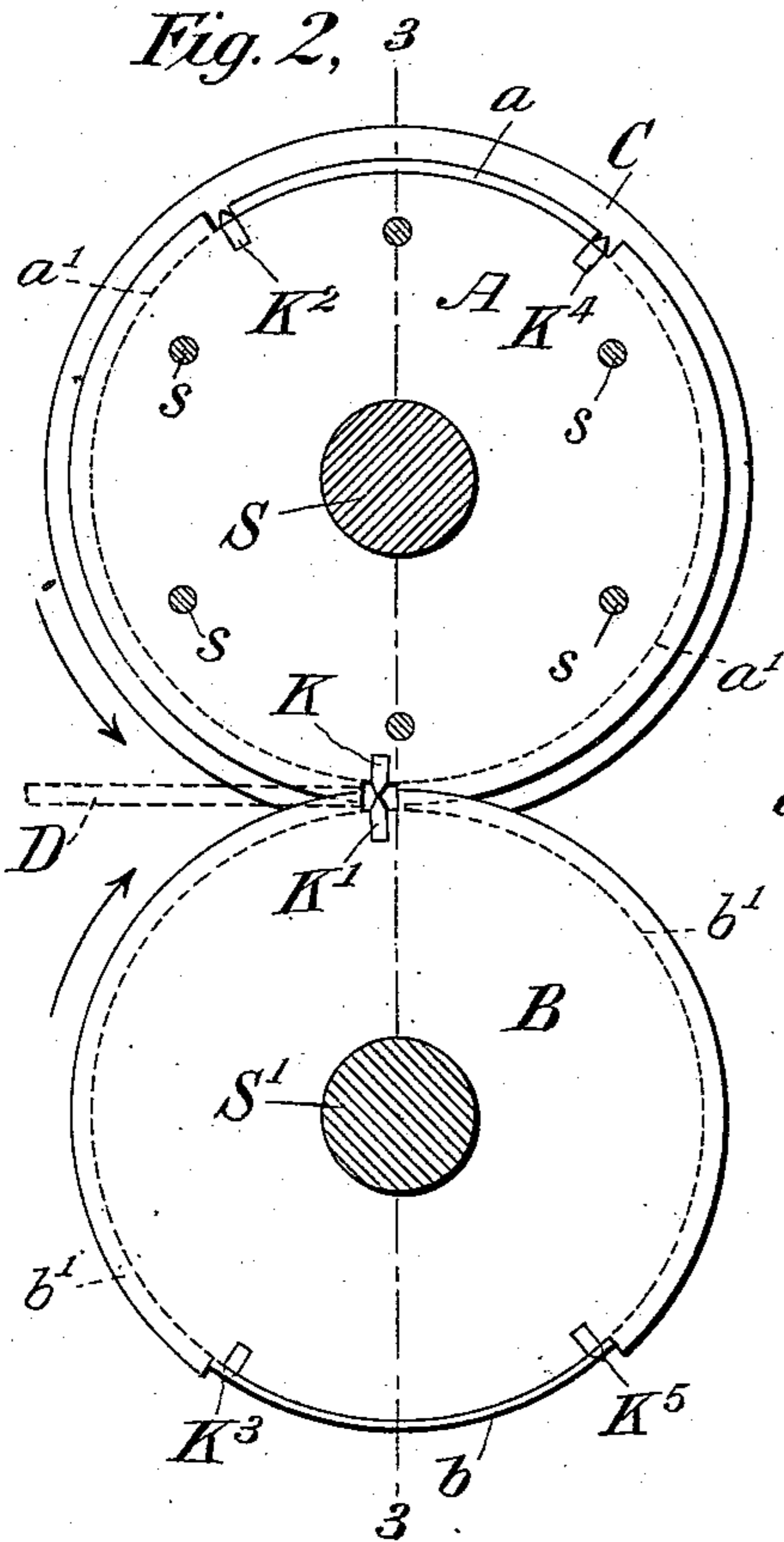
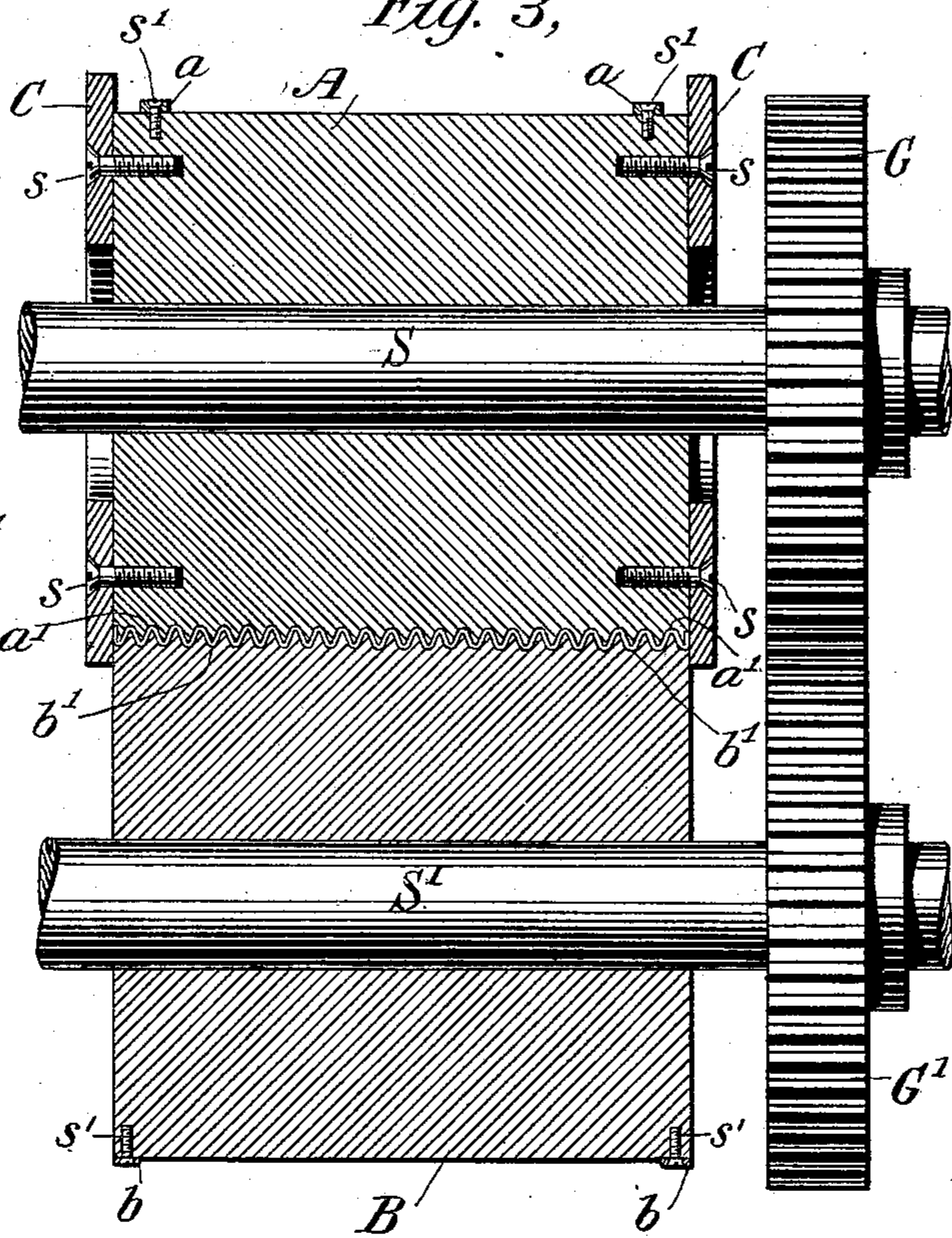


Fig. 3,



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

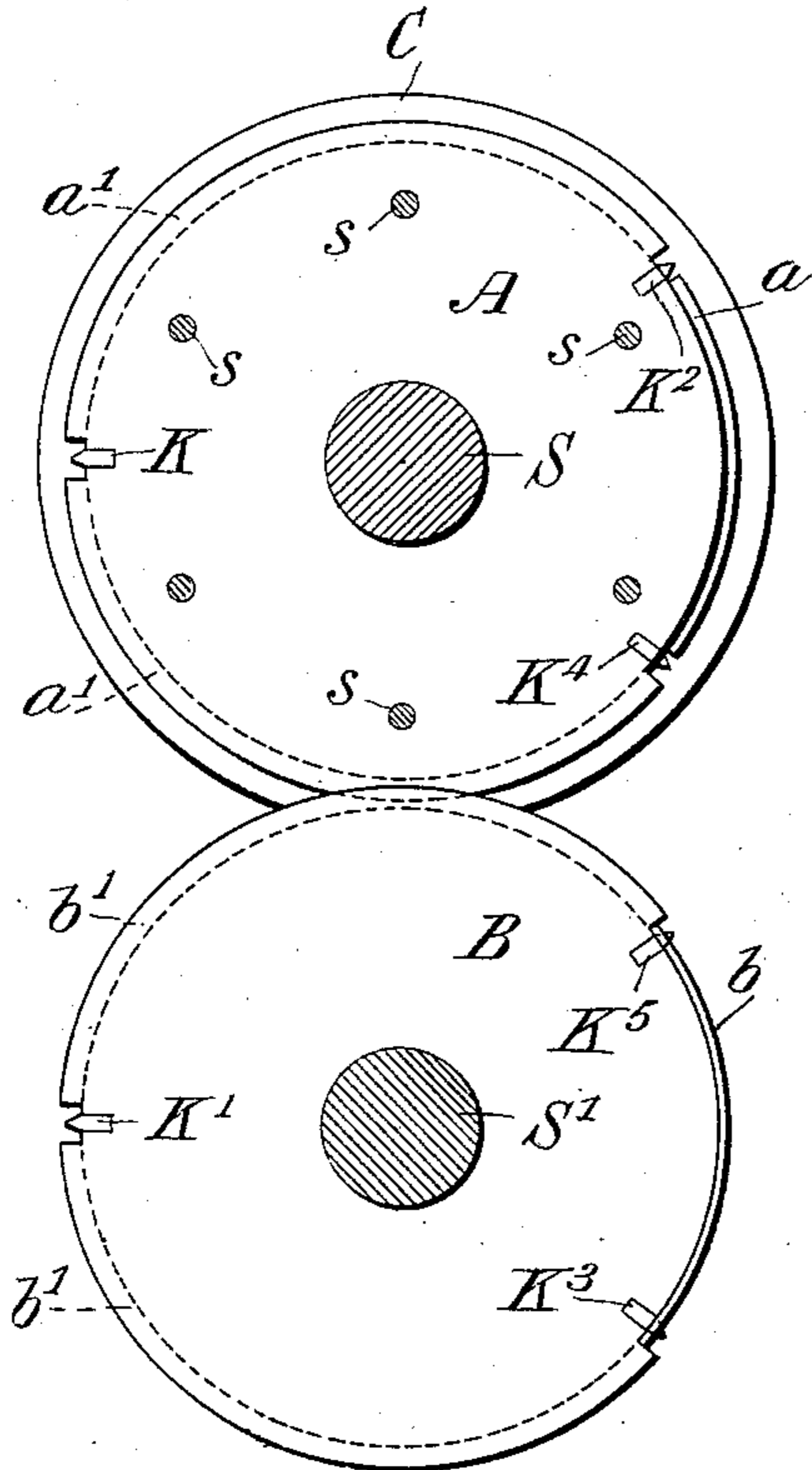
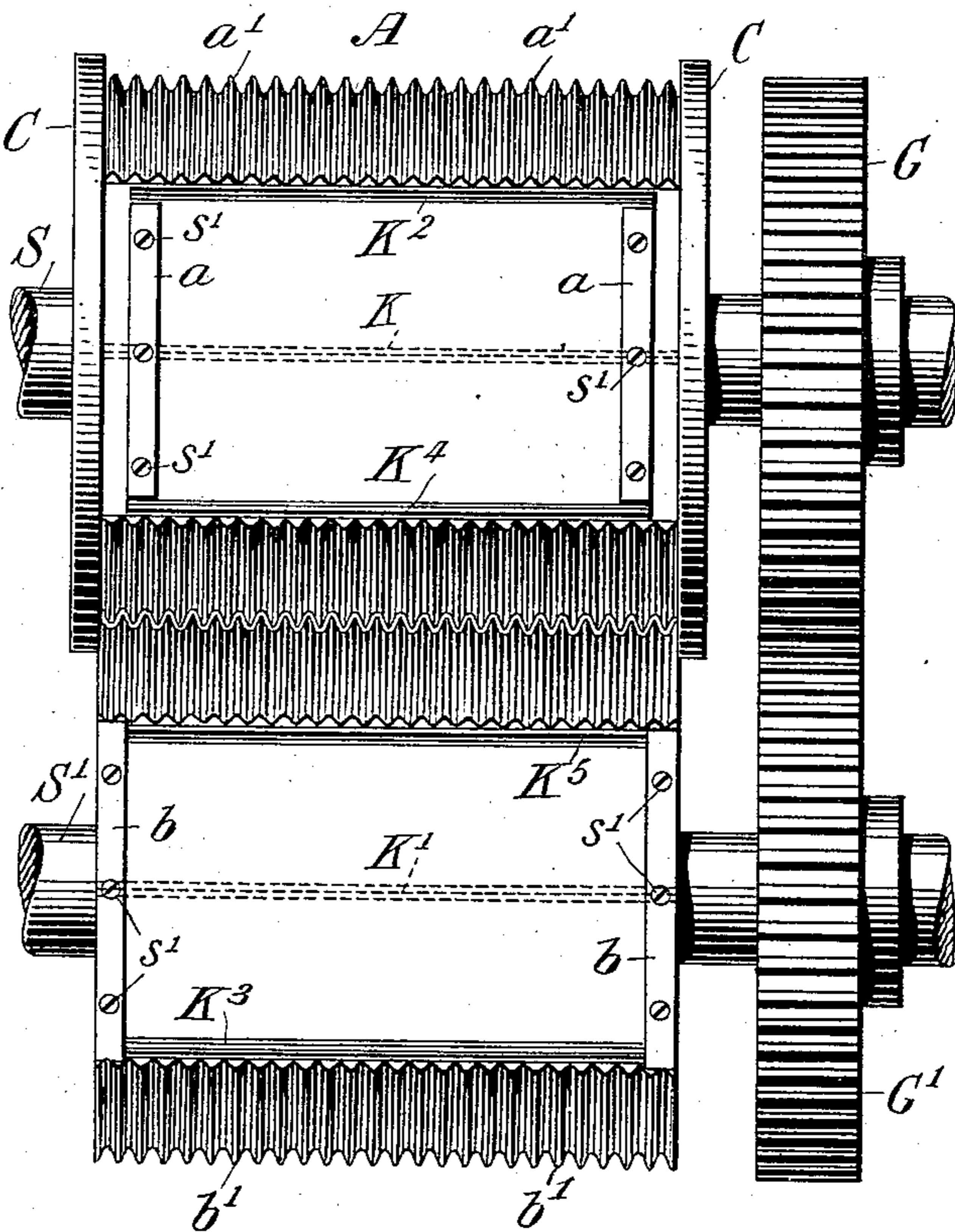


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR FORMING BATTERY-PLATES.

SPECIFICATION forming part of Letters Patent No. 532,701, dated January 15, 1895.

Application filed September 12, 1894. Serial No. 522,780. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. REED, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have made a new and useful Invention in Mechanism for Forming Battery-Plates, of which the following is a specification.

My invention has for its objects, first, the construction of rolled grooved electrodes or battery plates with stiffening ribs and connecting lugs or ears in completed form; second, the construction of electrodes or battery plates which shall be entirely symmetrical in form and possess an equal amount of active surface when prepared or formed; third, the preparation of electrodes or plates possessing all of the functions necessarily attributable to the products of the mechanism hereinafter described.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 represents a plan view of a pair of electrodes or plates as they appear after the lead or equivalent material from which they are formed has been passed through the machine and the forming cylinders or rolls have made one complete revolution. Fig. 2 represents an end view of the mechanism, illustrating in dotted lines a sheet of lead as it is being rolled. Fig. 3 is a vertical sectional view taken through the body of the machine on line 3—3, Fig. 2, the shafting and cog-gearing for driving the cylinders or rolls being shown in elevation. Fig. 4 is an end view and Fig. 5 an elevational view of the machine, said figures showing in detail those portions of the rolls which cut or trim the ends of the electrodes and the connecting or contacting lugs or ears.

In the construction of storage battery plates it has been customary heretofore to prepare the body portion of the plate and afterward to attach the stiffening ribs and the contacting or conducting lugs or ears which unite the independent plates together. My present invention is designed to overcome this difficulty and expense in construction and to make a plate of this general nature which shall be integral in form.

My invention will be fully understood by referring to the following detailed description of the drawings and to the especial features of novelty particularly pointed out in the claims at the end of this specification.

Referring first to Figs. 2, 3, 4 and 5, A and B represent grooved steel cylinders or rolls which are sustained in adjustable journal bearings by axles S and S' upon a rigid frame not shown, said axles being connected together by gear wheels G and G' which cause them to rotate at the same speed under the action of properly applied power. These cylinders or rolls A and B are provided with grooves *a' a'* and *b' b'* which, however, do not extend entirely around them, said grooves being discontinued over extended fractional portions of the rolls on one side and over limited fractional portions thereof on the other side, the discontinuations being in each instance in the nature of depressions or spaces having the same radial distances from the axes of the rolls as the bottoms of the grooves.

K, K', K², K³, K⁴ and K⁵ are cutters or knives which are situated in dove-tailed or equivalent grooves in the depressions or spaces, see Figs. 2 and 4, the edges of said knives being slightly below the outer portions of the grooves *a' a'*, *b' b'*, the location of said knives being such that when the rolls advance under the action of the gear wheels G and G', the knives K and K' will be in alignment with each other as shown in Fig. 2, while under a further advancement the knives K² and K³ will be in like position, the knives K⁴ and K⁵ assuming under like conditions the same position.

a a are trimming knives or cutters secured in the depression or groove of the roll A and near the opposite ends thereof by screws *s', s', s'*, and *b b* are corresponding trimming knives which are located at the outer ends of the like depressions of the roll B, their location upon that roll being such that the outer edges of the trimming knives *a a* will act like shears upon the inner edges of the corresponding trimming knives *b b*.

C C are trimming rings or disks secured by screws *s, s, s, s*, to the opposite ends of the roll A and are of such external diameters that when in position they extend slightly past the

opposite ends of the roll B and thereby act as trimmers for dressing or trimming off the edges of the metal as it is rolled forward through the machine.

5 In Fig. 1 is shown a pair of completed plates or electrodes P and P' as they appear after the rolls have made one complete revolution, *c c* being the grooved or body portions thereof, *p'*, *p*², *p*³, *p*⁴ the stiffening ribs at the opposite
10 ends and L L, L' L' the lugs or ears which are afterward cut apart by a pair of shears at the medial line *p p*.

I will now describe the mode of operation of the apparatus.

15 The rolls A and B having been properly adjusted to the thickness it is desired to roll the grooved electrodes, sheet lead D of the required thickness and width is passed between them as shown in Fig. 2, the rolls moving
20 under the action of properly applied power and the gear wheels G and G'. See Figs. 2 and 3. As the rolls advance the grooves *a'* *a'* and *b' b'* cause the lead to assume the corrugated form shown at *c c*, Fig. 1, and the
25 first depression or space seen immediately on the left of the knives K and K', Fig. 2, forms the stiffening rib *p*⁴, Fig. 1. As the rolls advance, therefore, the electrode P' with the grooves *c* is completed and the trimming disks
30 C C, Figs. 3 and 4, trim off the surplus lead which extends over either side of the roll B. Finally when the rolls reach such a position that the knives K² and K³ assume the relation which now exists between the knives K
35 and K', Fig. 2, the stiffening rib *p*³ is formed and the aforesaid knives sever the lead between the electrode P' and that portion of the lead sheet which immediately follows. As the rolls advance, the trimming knives *a a*
40 acting like shears against the inner edges of the trimming knives *b b*, Fig. 5, cut out a blank sheet of lead and leave the lugs or ears L' L', L L, Fig. 1, until the third set of knives K⁴ K⁵ reach a position similar to that
45 of K and K', Fig. 2, when the blank sheet of lead is again severed by them and the stiffening rib *p*² of the electrode P formed. A further advancement of the rolls completes the electrode P and finally the knives K and
50 K' assume their original position forming the stiffening rib *p'*. In like manner as the rolls advance, the electrodes are made in pairs and as they are forced out of the machine they may be severed at the medial line
55 *p p* by a pair of shears or any analogous instrument.

I do not limit myself to the particular mechanism herein described for forming a completed rolled plate or electrode which shall
60 be integral in all of its parts as I believe I am broadly entitled to claim mechanism for rolling such completed electrodes, and my claims are generic as to this feature. It is also obvious that intermediate discontinuations of the grooves *a' a'*, *b' b'* might be made in the
65 rolls if desired for the purpose of making one, or more intermediate stiffening ribs similar to

the end stiffening ribs *p' p*² *p*³ *p*⁴. Should such be provided it is of course obvious that there would be no cutting knives like K K', 70 the function of the grooves being to form the intermediate stiffening ribs alone. It is also obvious that instead of forming the grooves longitudinally in the plates P and P', the rolls might be provided with longitudinal 75 ribs and depressions which would form the grooves laterally, the intermediate spaces and cutting knives together with the trimming knives being as hereinbefore described and as shown in the drawings. All such structures I deem as coming wholly within the scope of my claims hereinafter made. 80

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is— 85

1. A machine for forming battery plates from a sheet or strip of metal consisting of means for rolling grooves in the material, and additional means for forming stiffening ribs at the ends of each plate, in combination 90 with means for cutting out a section of the material between each pair of plates as rolled whereby lugs or ears are made integral with the plates.

2. A machine for forming a battery electrode or plate by rolling the same from a sheet or strip of lead, consisting of a pair of grooved rolls provided with corresponding depressions in each roll and one or more pairs of cutting knives on each roll for severing 100 the completed electrode from the material and forming stiffening ribs, in combination with means for cutting out a section of the material between adjoining pairs of plates so as to form conducting lugs or ears, substantially as described. 105

3. A machine for forming a battery electrode or plate by rolling the same from a sheet or strip of lead, consisting of a pair of grooved rolls having each two depressions extending 110 over fractional parts of the roll, in combination with cutters or knives for severing the material and forming stiffening ribs, and trimming knives for forming the conducting lugs or ears, substantially as described. 115

4. A machine for forming a battery electrode or plate by rolling the same from a sheet or strip of lead, consisting of a pair of rolls having each corresponding grooves over a portion of its surface and corresponding de- 120 pressions, in combination with cutting and trimming knives for forming stiffening ribs and the conducting lugs or ears and means for trimming the sides or edges of the material as it is rolled forward. 125

5. A machine for forming a battery electrode or plate by rolling the same from a sheet or strip of lead, consisting of a pair of rolls provided each with corresponding grooves over a portion of its surface, corresponding 130 depressions which occupy the remainder of the surface, and pairs of cutting and trimming knives located in said depressions, substantially as described.

6. A pair of rolls provided with grooves for forming two complete grooved electrodes or plates at each revolution, and additional means for forming two or more stiffening ribs and one or more contacting lugs or ears for each electrode or plate.

7. Mechanism for forming grooved electrodes consisting of a pair of grooved rolls provided with means for forming more than one complete electrode at each revolution of the pair of rolls and additional means for severing the electrodes, the one from the other, substantially as described.

8. Mechanism for forming battery electrodes or plates from lead or equivalent material by rolling, consisting of a pair of rolls provided with means for forming two completed electrodes or plates with conducting or contacting lugs or ears and severing the same from each other at each complete revolution of the rolls, substantially as described.

9. Mechanism for forming battery elec-

trodes or plates by rolling the same in pairs and simultaneously forming lugs or ears for each electrode or plate, in combination with means for trimming the sides or edges of the material as it is fed forward through the machine.

10. Mechanism for rolling battery electrodes, consisting of a pair of rolls having grooves over portions of their surfaces only, depressions over the remainder of the surfaces, severing knives or cutters for severing the plates from each other and forming stiffening ribs at the ends thereof, in combination with additional cutters for forming the contacting ears or lugs, substantially as described.

In testimony whereof I have hereunto subscribed my name this 7th day of September, 1894.

CHARLES J. REED.

Witnesses:

C. J. KINTNER,

M. M. ROBINSON.