No. 691,869. Patented Jan. 28, 1902

A. F. PETCH.

APPARATUS FOR FORMING COMMUTATORS.

(Application filed Aug. 8, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

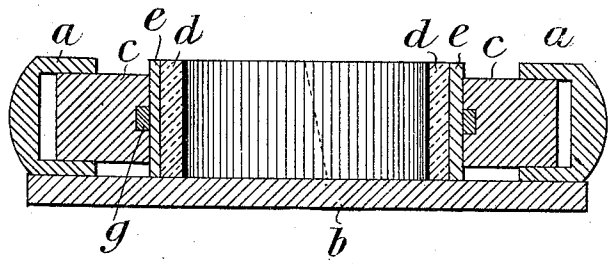
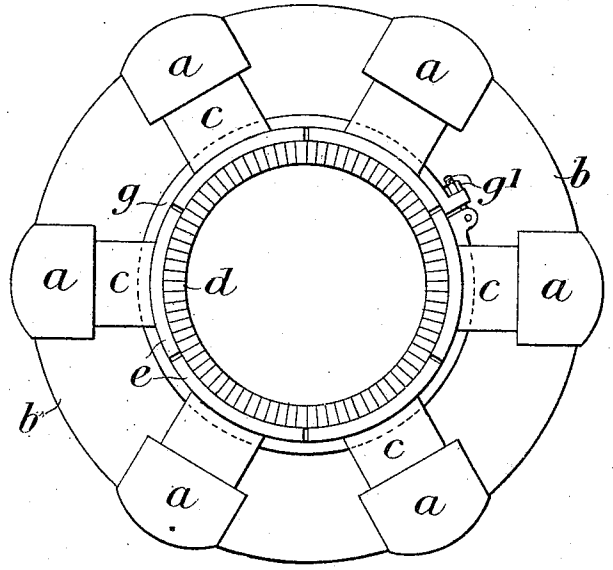


Fig. 2.



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Fig. 4.

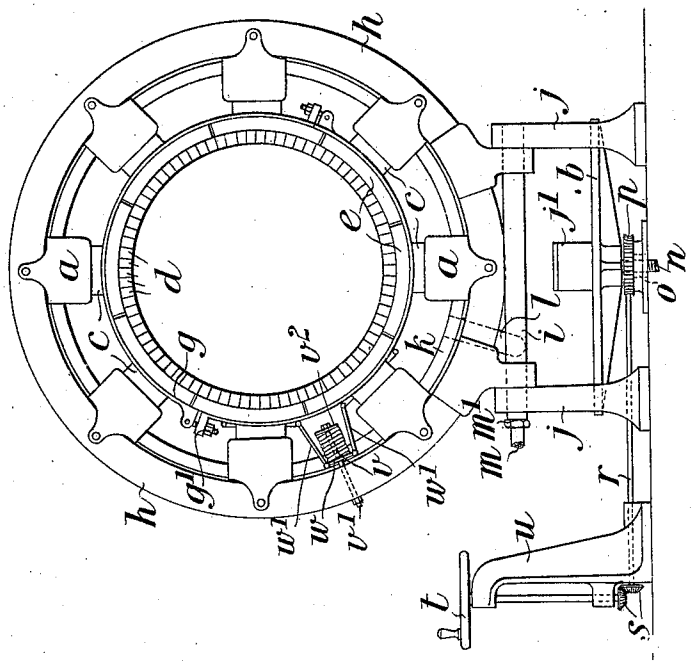
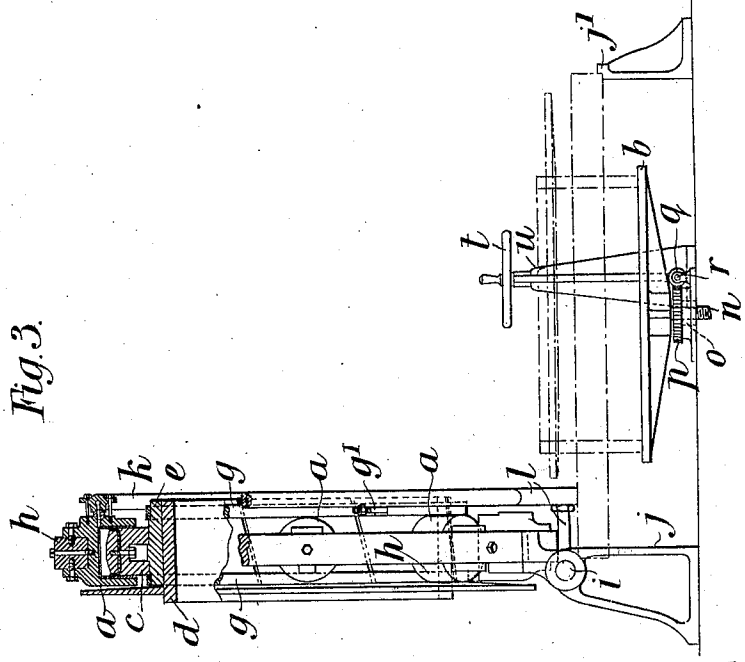


Fig. 3.



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UNITED STATES PATENT OFFICE.

ALBANY FRANCIS PETCH, OF LONDON, ENGLAND.

APPARATUS FOR FORMING COMMUTATORS.

SPECIFICATION forming part of Letters Patent No. 691,869, dated January 28, 1902.

Application filed August 8, 1901. Serial No. 71,406. (No model.)

To all whom it may concern:

Be it known that I, ALBANY FRANCIS PETCH, a subject of the King of Great Britain, residing at 42 Florence road, Finsbury Park, London, England, have invented new and useful Improvements in the Manufacture of Electrical Commutators and Apparatus Therefor, of which the following is a specification.

This invention relates to a mode of pressing together the metal bars and insulating-strips of electrical commutators and to apparatus therefor.

According to the invention the parts—namely, the commutator-bars and the insulating-strips—are pressed together by means of fluid-pressure exerted upon a number of rams working in cylinders so arranged that the rams travel inward radially toward a common center. The said rams are provided on their inner ends with die-blocks curved to suit the periphery of the commutator to be pressed. With this arrangement when pressure is applied the segments or bars and the insulating-strips are forced together by the die-blocks operated on by the rams. The ram-cylinders may be fixed to a bed-plate or against a suitable abutment-ring or the cylinders and ring may be made in one or more pieces. Furthermore, in lieu of rams working in cylinders I may employ cylinders which move on fixed rams.

In the accompanying drawings, Figure 1 is a vertical section of one form of apparatus which may be employed for carrying out the invention, and Fig. 2 is a plan thereof. Fig. 3 is a sectional side elevation of a modified form of apparatus, and Fig. 4 is an end elevation thereof.

Referring first to the arrangement shown in Figs. 1 and 2, *a a* are the fluid-pressure cylinders, which are suitably secured to the bed-plate *b*, the said cylinders being arranged radially around the bed-plate *b* and being provided with pistons or rams *c c*, the axial lines of which meet in a common center—that is to say, the center of the commutator *d* the parts of which are to be pressed together. *e e* are the die-blocks, which are secured upon the inner ends of the rams *c c*, the said die-blocks being of such shape and curvature that when the parts of the commutator are fully pressed together they almost form a complete ring around the same, as clearly shown in Fig. 2. *g* is a clamping-band which can be tightened around the pressed commutator before the rams are relieved of pressure, so as to temporarily hold the parts of the commutator together after its removal from the press and while it is being machined. In the drawings the clamping-ring *g* is shown passed around the die-blocks *e e*, the rams *c c* being recessed to receive it; but it will be obvious that one or more such bands can be passed directly around the commutator itself. Any suitable means may be employed for tightening the band around the commutator, and in the drawings this is shown effected by means of a bolt and nut *g'*, Fig. 2.

In the arrangement illustrated in Figs. 3 and 4 the fluid-pressure cylinders *a a* are not directly secured upon the bed-plate *b*, but are secured upon a ring *h*, which is mounted upon a hinge-shaft *i*, held in bearings in the supports *j j*. The pressure-fluid is supplied to the cylinders *a a* through the supply-pipe *k*, which communicates by the branch *l* with the hinge-shaft *i*, as clearly shown in the figures, the said shaft being at this part made hollow and being connected to the supply-pipe *m* by means of the stuffing-box *m'*.

To enable the bed-plate or table *b* to take commutators of different lengths, provision is made whereby it can be raised and lowered. In the drawings this is shown effected through the medium of a screw *n* upon the under side of the table, which works in a nut *o*, capable of turning, but held from movement in the axial direction, the said nut being provided with a worm-wheel *p*, gearing with a worm *q* upon a shaft *r*, which is actuated by the bevel-gearing *s* through the medium of the hand-wheel *t*, mounted in the bracket or support *u*. Where the machine is to be adapted to take commutators of different diameters, different-sized die-blocks are provided with the apparatus, and distance-pieces can be inserted between the ram ends and the die-blocks.

v is one of a number of springs which are advantageously mounted upon rods *v'*, secured to the ring *h*, each spring bearing at its inner end against a disk or plate v^2 upon the said rod and at its outer end bearing against a plate *w*, connected by links *w' w'*

to the rams. With this arrangement when the rams are forced outward under the fluid-pressure, so as to compress the commutator, the said springs are put in compression, and when the rams are relieved of pressure the springs withdraw them into the cylinders. These springs also serve to assist in causing the rams to travel simultaneously and in unison. Fluid-pressure, weights, or any other suitable means may be employed in lieu of the springs for returning the rams within the cylinders.

The machines above illustrated are employed as follows—that is to say, a suitable number of bars *d* and insulating-strips are placed on the table approximately in a circle and inside the die-blocks *e*. The pressure-fluid is then admitted through the distributing-pipes into the cylinders *a*, whereby the rams *c c* are forced radially toward the center and press the die-blocks *e* against the parts of the commutator, which are thus forced firmly together in such a manner that the outer periphery of the commutator becomes approximately cylindrical. The clamping-bands *g* are then secured around the die-blocks or around the commutator itself, as above described, and are tightened, so that when the commutator is relieved of pressure it can be lifted from the machine, together with the clamping-bands, and subjected to the usual finishing processes.

In the machine illustrated in Fig. 3 and 4 both ends of the commutator can be examined before its removal, this being effected by lifting the ring and cylinders from the position indicated in the broken lines in Fig. 3 into the position shown in full lines in Figs. 3 and 4. When the cylinder-ring *h* is in the operative or horizontal position, it is supported by the bracket *j'*, as clearly shown.

In making the die-blocks I prefer that the adjacent edges thereof shall be inclined to the sections of the commutators, so that the said edges will not coincide with the edges of any of the commutator-sections when pressure is applied to the die-blocks. This construction is illustrated in Fig. 3 of the drawings and is a desirable one, as the sections of the commutator might become wedged between the edges of the die-blocks if this construction were not employed.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. An apparatus for forming electrical commutators, comprising among its members three or more radially-disposed pressure-cylinders, rams located therein and adapted to travel toward a common center, curved die-blocks upon the inner ends of said rams adapted to form substantially a complete ring around the commutator, the adjacent edges of said die-blocks being disposed angularly to the sections of the commutator, substantially as described.

2. An apparatus for forming electrical commutators, comprising among its members three or more radially-disposed pressure-cylinders, rams located therein and adapted to travel toward a common center, die-blocks upon the inner ends of said rams adapted to form substantially a complete ring around the commutator and an adjustable clamping-ring adapted to be clamped around the commutator while it is held by said rams and die-plates, substantially as described.

3. An apparatus for forming electrical commutators, comprising among its members, three or more radially-disposed pressure-cylinders, rams located therein and adapted to travel toward a common center, die-blocks upon the inner ends of said rams adapted to form substantially a complete ring around the commutator, said rams being recessed in rear of said die-blocks and a temporary clamping-ring located in said recesses and provided with adjusting devices for clamping it upon said die-blocks while they are held by said rams, substantially as described.

4. In apparatus for forming electrical commutators, the combination with a hinged frame, a plurality of radially-disposed fluid-pressure cylinders supported by said frame, rams or pistons in said cylinders and die-blocks for said rams, adapted to substantially surround the commutator whereby said frame may be swung upon its hinge to enable both ends of the commutator to be examined, substantially as described.

5. In an apparatus for forming electrical commutators, the combination with bearing-supports provided with a hollow trunnion, of a circular frame or ring hinged to said supports and provided with a plurality of fluid-pressure cylinders, operatively connected with said hollow trunnions, rams or pistons in said cylinders, die-blocks connected with said rams, a supporting-table for receiving the parts of the commutators and means for raising and lowering said table, substantially as described.

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C. G. REDFERN.