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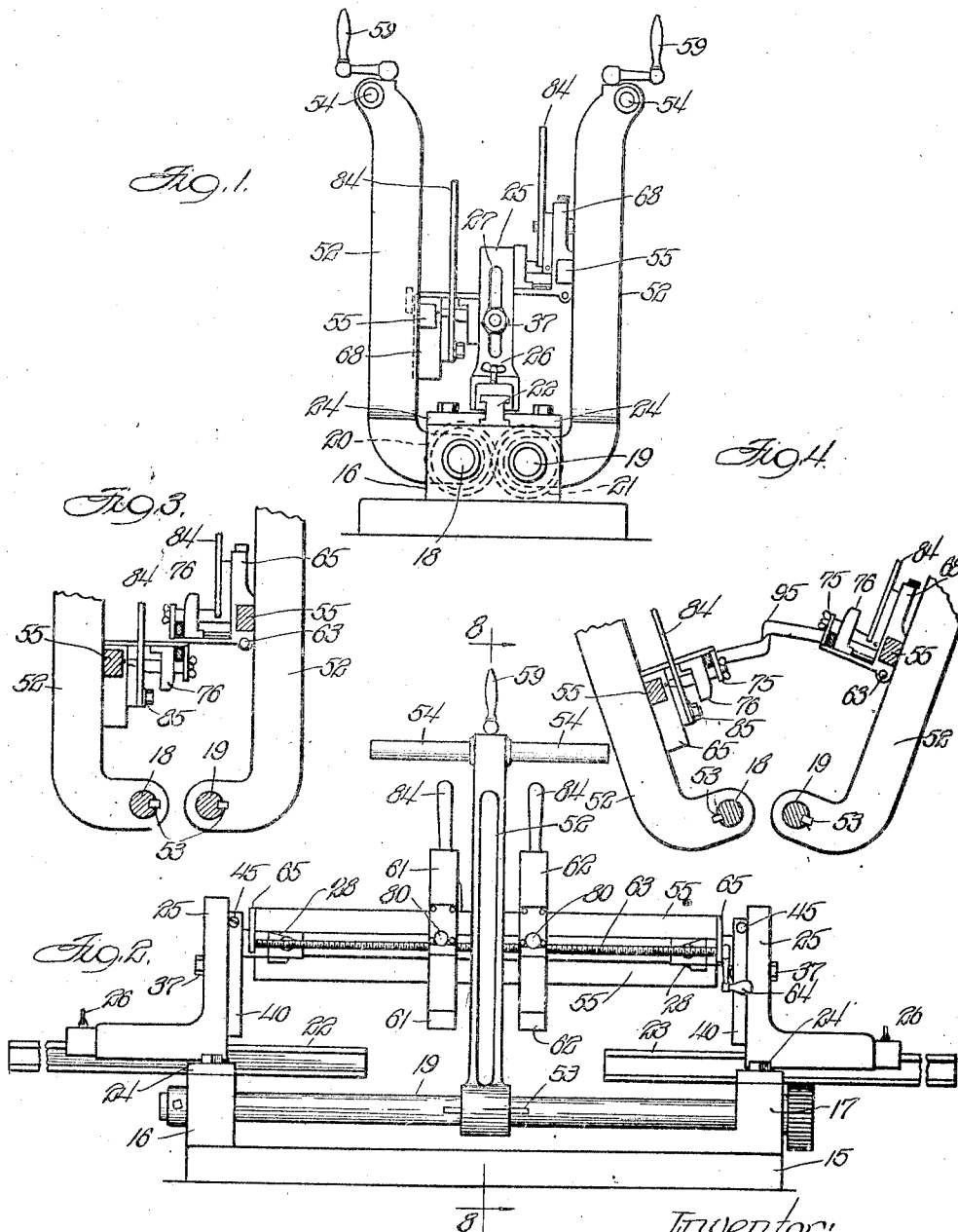
A. H. KOPPRASCH

1,573,972

COIL FORMING MACHINE

Filed May 6, 1924

3 Sheets-Sheet 1



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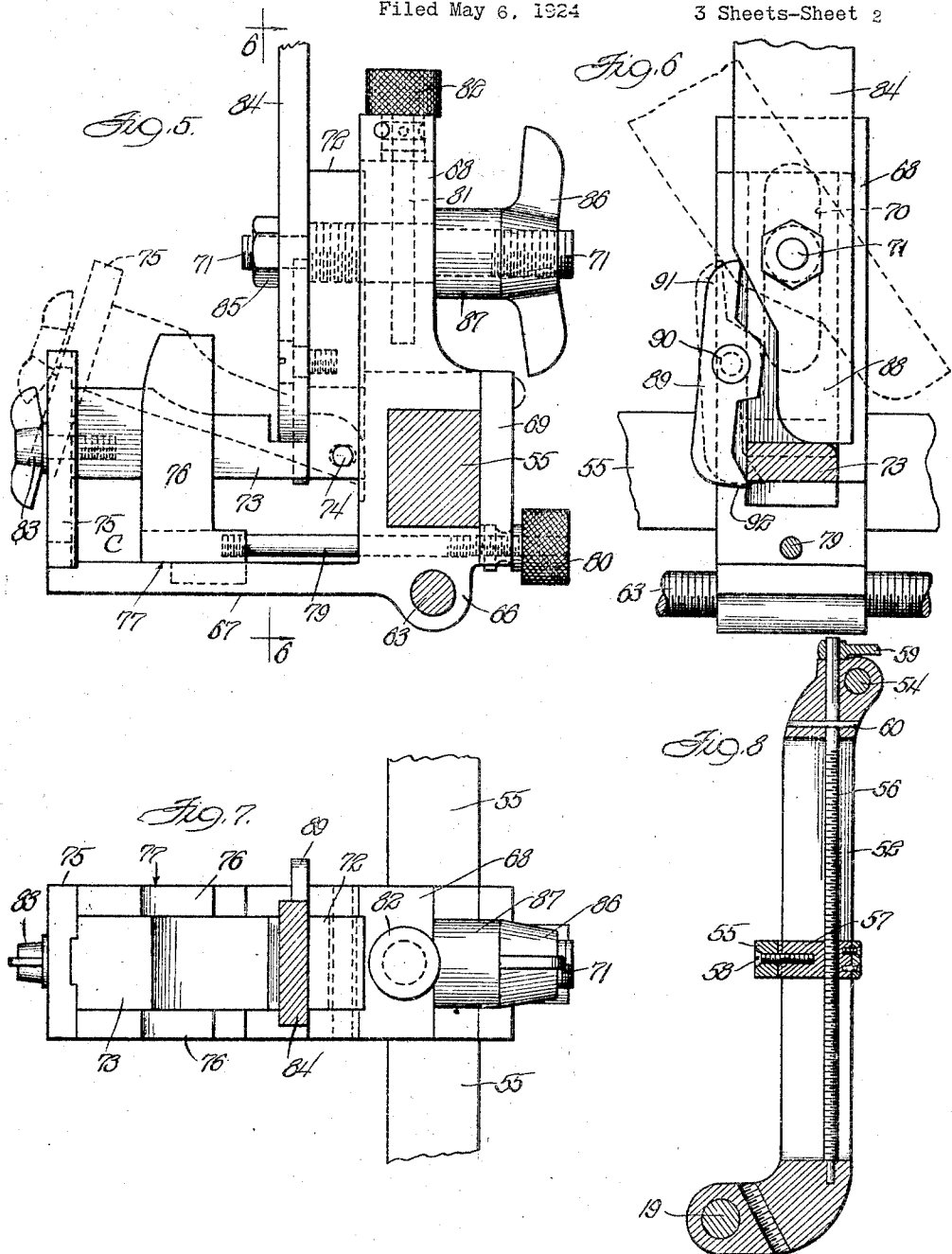
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COIL FORMING MACHINE

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3 Sheets-Sheet 2



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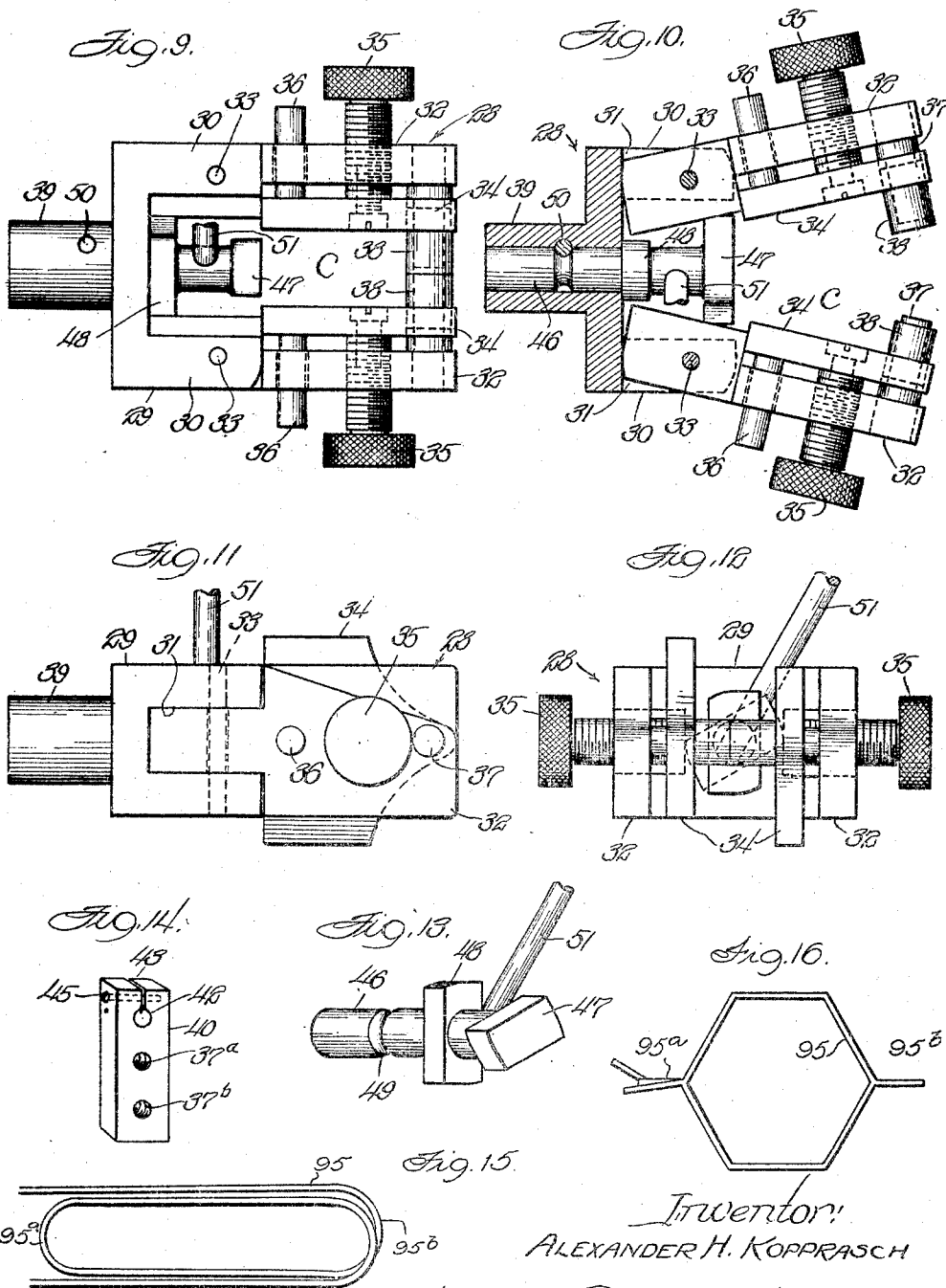
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COIL FORMING MACHINE

Filed May 6, 1924

3 Sheets-Sheet 3



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Patented Feb. 23, 1926.

1,573,972

UNITED STATES PATENT OFFICE.

ALEXANDER H. KOPPRASCH, OF CHICAGO, ILLINOIS, ASSIGNOR TO ELECTRIC SERVICE SUPPLIES CO., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

COIL-FORMING MACHINE.

Application filed May 6, 1924. Serial No. 711,405.

To all whom it may concern:

Be it known that I, ALEXANDER H. KOPPRASCH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Coil-Forming Machines, of which the following is a specification.

The invention relates to improvements in coil forming machines for dynamo electric machines.

The machine is to be used for forming coils of armatures, stators and the like, for dynamo electric machines after the coils have been wound, so that they will readily conform to the space assigned to them on the finished product, with the edges of both sides of the coil in the proper radial plane.

The objects of the invention are to provide a machine which may be manipulated rapidly and thereby reduce the labor cost; which is incomplex so that it may be readily understood and operated; which is accurate in the accomplishment of the intended functions; which is not expensive in cost of production; and which has a large range of adjustment to accommodate coils of various sizes.

Other objects, benefits and advantages will be readily understood from a consideration of the following specification taken in conjunction with the drawings, wherein:—

Fig. 1 is an end elevation of the machine.

Fig. 2 is a side elevation.

Fig. 3 is a fragment of the machine of Fig. 1 showing it closed with a coil therein.

Fig. 4 is a similar view showing the machine open or spread.

Fig. 5 is an enlarged detail end elevation of a part of the machine shown in Figs. 1 and 2 for engaging the side members of the coil preparatory to spreading it.

Fig. 6 is a section taken on line 6—6 of Fig. 5.

Fig. 7 is a plan view of the device of Figs. 5 and 6 showing the operating handle in cross section.

Fig. 8 is a longitudinal section through one of the main oscillating levers taken on line 8—8 of Fig. 2.

Fig. 9 is a side elevation of the coil holding means for engaging and holding the ends of the coil while the side members thereof are being expanded or spread, showing the device closed.

Fig. 10 is a similar view of the same device showing it open.

Fig. 11 is a plan view of the device shown in Figs. 9 and 10.

Fig. 12 is an end view thereof.

Fig. 13 is a perspective view of an operating cam device.

Fig. 14 is an isometric perspective of a detail.

Fig. 15 is a plan view of a coil before it is formed.

Fig. 16 is a similar view of the coil after it has been formed.

In all of the views the same reference characters are employed to indicate corresponding parts.

The machine is mounted on a base frame 15, having bearing blocks 16 and 17, one at each end in which two parallel rotatable shafts 18 and 19 find support.

Fixed to the respective shafts 18 and 19 are two intermeshing pinions 20 and 21, one to each shaft, so that the shafts will turn together in opposite direction when either shaft is rotated.

Supported on the pillow blocks 16 and 17 are elongated I-beams 22 and 23, respectively, by clamping blocks 24.

A pair of brackets 25—25 are slidably movable on the beams, one on each. Each bracket is slotted, as at 27, to receive the coil holding device 28. A slidable block 26 is adjustably fixed to the beams by a thumb screw as a gage to prevent greater separation of the brackets 25.

The device 28 engages and holds the ends of the coil to prevent rotation thereof while its side members are being expanded and reformed. There is one such device mounted on each of the brackets 25.

This coil holder comprises a frame 29 having two arms 30—30. Each arm is slotted at 31 to receive laterally movable, like arms 32 pivoted to the slotted fixed arms 30, at 33.

The movable arms 32 are substantial duplicates, therefore the description of one will apply to all.

Mounted on the arm 32 is a slidable plate 34, movable bodily by a screw 35 and guided studs 36, 36. A sleeve 38 surrounds the stud 37 to make a broken joint with the other stud and sleeve by the end of the stud projecting into the sleeve that projects beyond the inner end of the associate stud.

The frame 29 is vertically adjustable on the bracket 25. A hollow stud 39 projects rearwardly of the frame into the plate 40, Fig. 14, to which it is fixed and is adjustably movable therewith. The plate is clamped firmly in adjusted position on the bracket 25. The stud 39 extends into the hole 42 of the plate. The bracket is split at 43 and the hole is contracted around the stud 39 by screw 45. The plate 40 is held in place by a screw bolt 37 entering either threaded hole 37^a or 37^b.

A rotatable shaft 46 extends thru the hollow boss 39 into the space C between the movable arms 32. This shaft bears on its inner end two cams 47 and 48 for positively opening the arms or jaws 32, as shown in Fig. 10, and for closing them as shown in Fig. 9. The shaft is grooved at 49 to receive a pin 50 which permits the shaft to be rotated, but prevents its removal. A handle 51 is the means, when oscillated, to open and close the jaws 32—32. Between the jaws or arms 32 in the space C the ends of the coil are to be held and the jaws are to be opened to remove the coil after it has been operated upon, by the device, to reform it.

Two like, outwardly curved arms 52 are secured to the shafts 18 and 19, one to each, by a positive means, such as a key 53. A handle 54 extends laterally from near the top of each of the arms and is the means for moving the arms from and to positions shown in Figs. 1 and 4. Since the shafts 18 and 19 are geared together by the pinions 20—21, when one lever or arm 52 is moved by application of pressure to either of the handles 54, the other arm or lever is, manifestly, moved in the same direction, outwardly, or inwardly and to the same extent.

Movably supported on each lever 52 is a horizontally situated rail 55 which is moved vertically by a screw shaft 56, passing thru a nut 57, which is secured to the rail by screw 58. The shaft 56 is rotatable by a handle 59 for raising and lowering the rails 55. The shaft 56 is grooved to receive a pin 60 which permits rotary movement of the shaft and prevents axial movement thereof.

Each lever 52 carries on its associate rail 55 a pair of coil engaging members 61 and 62. These members are slidable along the rail by rotating a right and left hand screw 63 which is rotatable by handle 64 and which is supported on its associate rail by brackets 65 thru which the screw passes. When the screw is rotated in one direction the members 61 and 62 are moved on their rail away from each other and when the direction of rotation is reversed, said members are caused to approach each other so that any desired separation of said members may be made for coils of diversified lengths.

The members 61 and 62 are more specifi-

cally shown in Figs. 5, 6 and 7, which will now be described.

There are two coil holding clamps 61 and 62 on each rail 55. On one rail they are vertically reversed, that is the top ends, on one clamp are the bottom ends on the other. Only one of the devices will be described as they are all alike.

An angular frame 66 is composed of a horizontal member 67 and a vertical member 68. The member 68 provides a notch to receive the rail 55 closed by a plate 69. The arm 68 is slotted at 70 to permit the bolt 71 which passes thru the slot to be raised or lowered.

The bolt 71 is threaded into a vertically disposed plate 72 to the lower end of which is pivoted an arm 73 at 74. This arm carries on its outer end a vertically adjustable plate 75 which, in its lowermost position, approaches the horizontal arm 67.

The arm 73 moves between standards 76 of the U-shape member 77. The member 77 extends into a slot 78 in the longitudinal arm 67 and is adjusted by a threaded rod 79 rotated by a thumb nut 80.

A threaded rod 81 passes thru the bolt 71, and is rotated by the thumb nut 82 to raise or lower the pivoted arm 73.

The thumb nuts 80 and 81 are rotated to enlarge the space C, which receives the coil, to accommodate coils of varying sizes.

The plate 75 is slotted and it is held in adjusted position by a screw 83 that passes thru the slot into the end of the pivoted arm 73.

The bolt 71 and parts attached thereto are clamped and firmly held, after being adjusted to a desired position by thumb nut 86. The collar 87 is loose on the bolt 71 and is used so as to space the thumb nut in position convenient for use.

When the arm 73 is in the position shown in Fig. 5 it is locked in that position by the hand lever 84. This lever is pivoted on the bolt 71 and held thereon by the nut 85.

When the handle 84 is in a vertical position its lower end 88 bears immediately upon the arm 73 and firmly holds it down.

When it is desired to unlock the arm 73 to move it into dotted line position, shown in Fig. 5, the lever 84 is moved into dotted line position shown in Fig. 6. This removes the end 88 from the path of arm 73 and actuates a dog 89 to lift the arm 73. The dog 89 is pivoted at 90 and has an upper end 91 which contacts the lever which moves the toe 92, at the lower end of the dog under the lever 73, which raises the arm into dotted line position shown in Fig. 5, whereupon the coil may be removed from the space C.

The area of space may be enlarged by raising 73 and by moving the standard 76 toward the vertical arm 68 by screws 81 and 79, respectively.

Fig. 4 shows the coil 95 in place in the

machine after having been spread. It will be observed that the members of each side of the coil are in radial planes extending from a common point. This is accomplished by the two levers 52 which are oscillatable from two different points laterally displaced from a vertical median plane.

The operation of the device is substantially as follows: A coil, substantially as shown in Fig. 15 is placed in the machine, as shown in Fig. 3 with its ends 95^a and 95^b clamped between the members 34—34 and around the sleeves 38 and stud 37. The device is then closed as shown in Fig. 9, by cam 48 (Fig. 13). The sides of the coil are clamped between members 75 and 76 of Fig. 4. The arms 52 are now separated whereupon the coils are formed as shown in Fig. 16.

Having described my invention what I claim as new and desire to secure by Letters Patent, is:—

A coil holding device comprising two parallel levers; a frame to which said levers are pivoted intermediate their ends; a rotatable shaft supported by said frame between said levers; two cams secured to said shaft, one on each side of said pivotal point, having their operative surfaces in planes at right angles to each other, one cam operable to separate the levers when said shaft is rotated and the other cam operable to bring said levers toward each other upon subsequent rotation of said shaft.

In testimony whereof I hereunto set my hand.

ALEXANDER H. KOPPRASCH.