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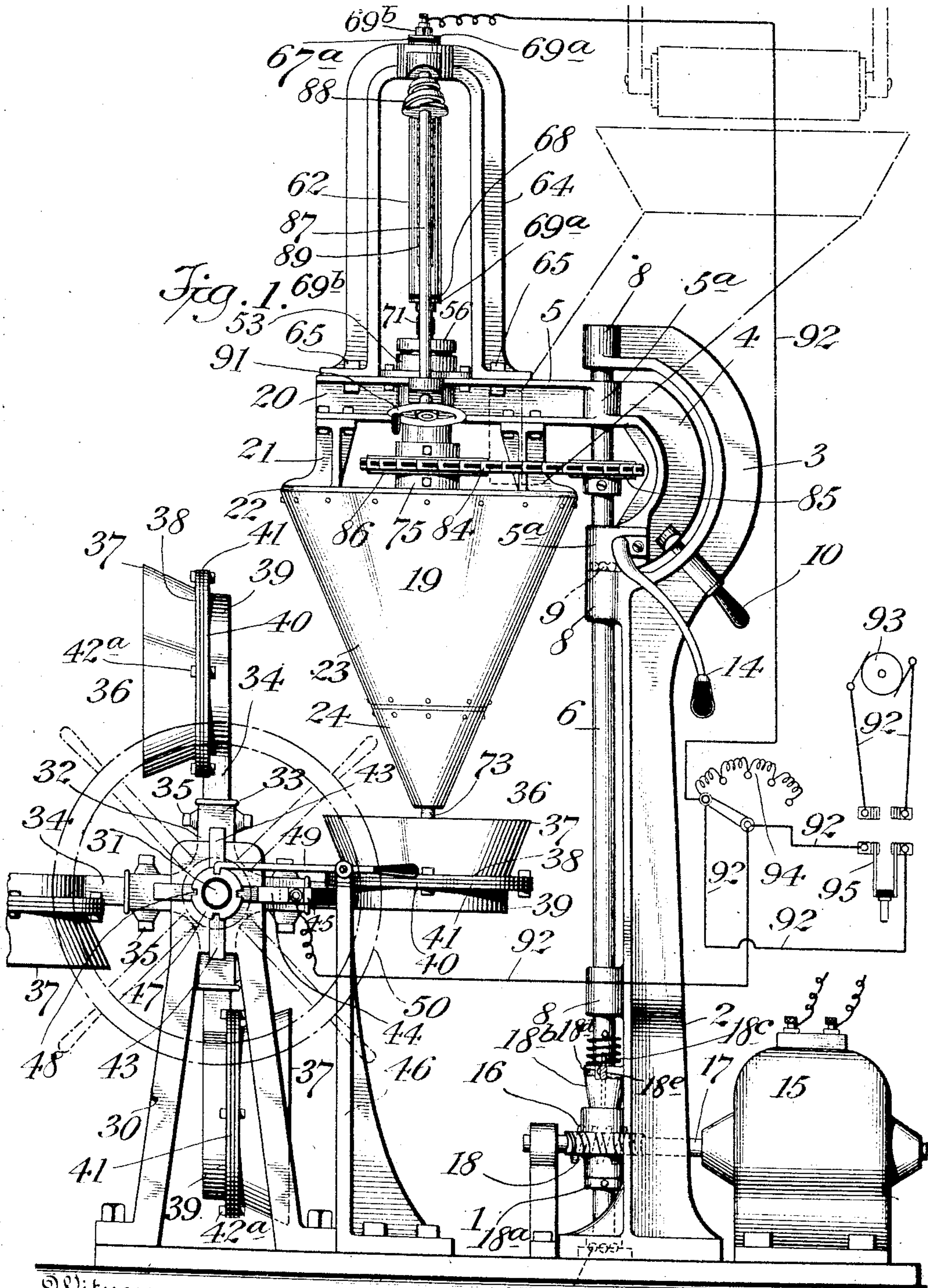
PATENTED SEPT. 3, 1907.

J. C. YOUNG.

ELECTRIC SMELTING APPARATUS.

APPLICATION FILED JAN. 16, 1907.

4 SHEETS—SHEET 1.



Witnesses:
A. Appleman
A. B. Blackwood

Inventor
James C. Young
By his Attorney
Charles A. Stephens

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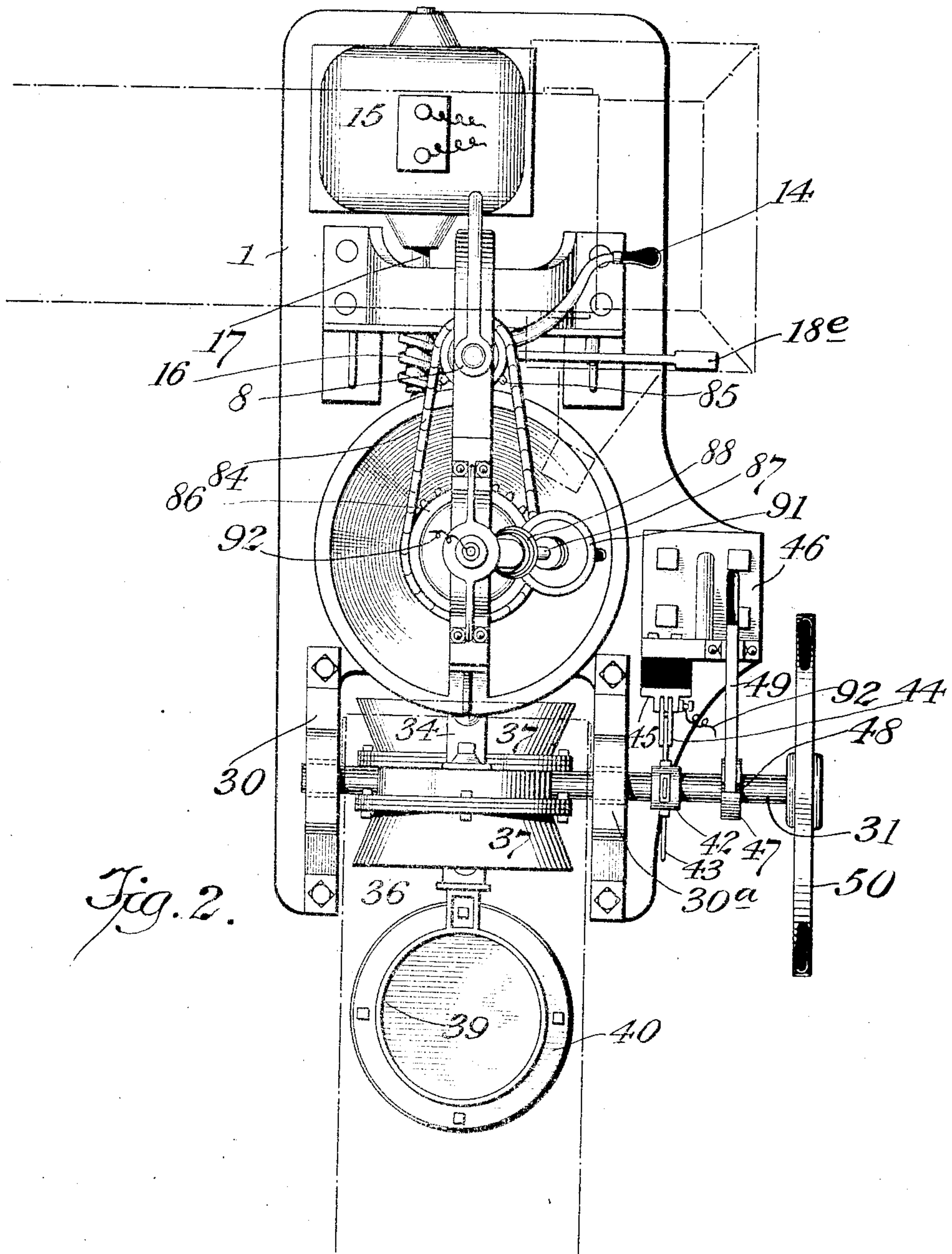
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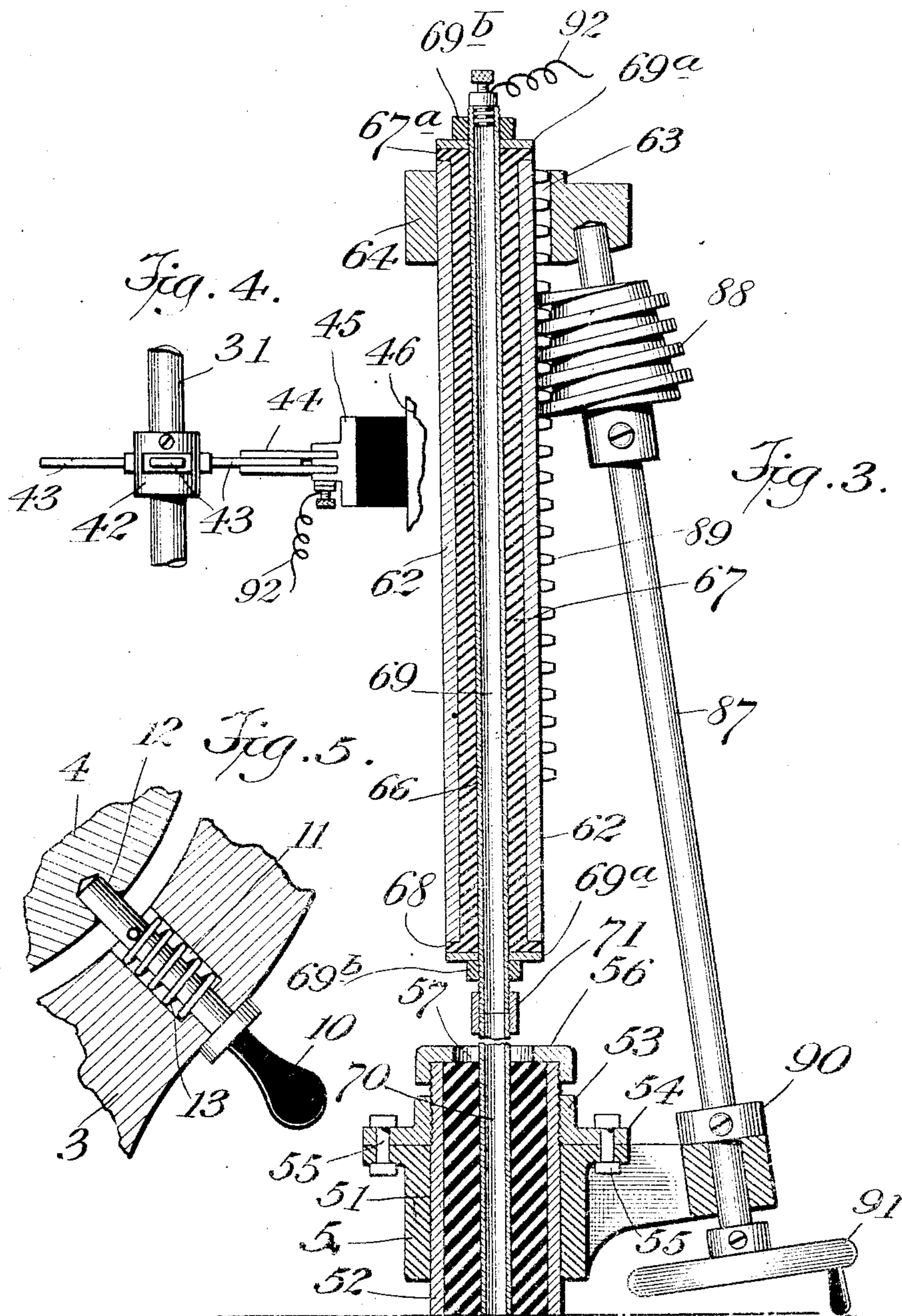
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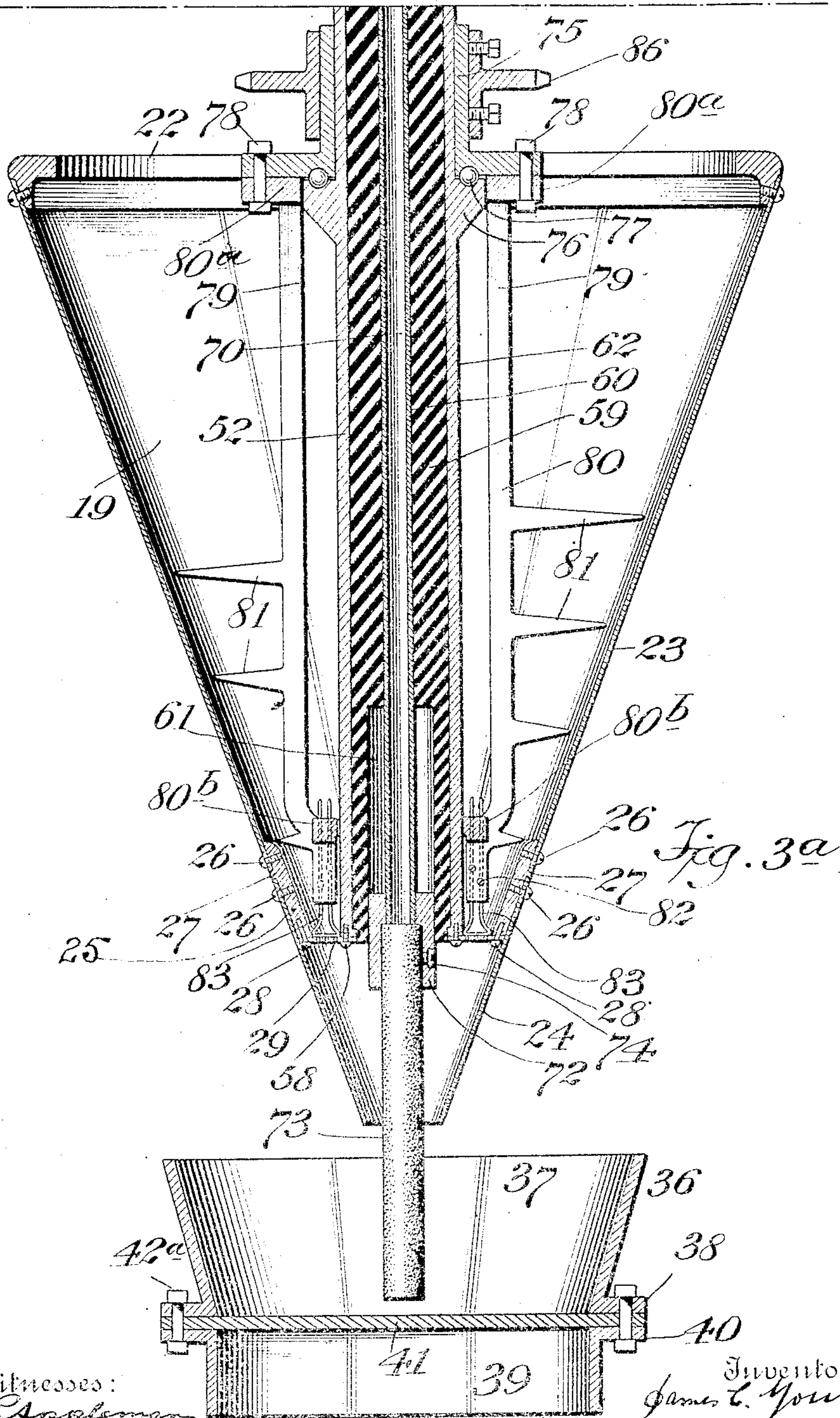
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UNITED STATES PATENT OFFICE.

JAMES C. YOUNG, OF JERSEY CITY, NEW JERSEY.

ELECTRIC SMELTING APPARATUS.

No. 865,285.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed January 16, 1907. Serial No. 352,483.

To all whom it may concern:

Be it known that I, JAMES C. YOUNG, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Electric Smelting Apparatus, of which the following is a specification.

My invention relates to an electric smelting apparatus, for combining elements to form compounds, such for instance as calcium-carbid, carborundum or compounds of a similar character and also for reducing refractory oxids.

It is well known that in proportion to the increase of heat in most electrical conductors of the first class their conductive properties are decreased, this being for the reason that heat destroys the density of its structure by causing a separation of the molecules thereof and the formation of numerous cells between them, therefore it is an object of my invention to construct the receptacles, in which the smelting process takes place, separate from one another so that the entire outer surface of each will be exposed to the cooling influence of the air and so that heat will not be conducted from one to another, thereby reducing the resistance, in the receptacles, to the passage of an electric current to the minimum.

Another object of my invention is to construct the receptacles, in which the smelting process takes place, with removable bottoms so that when the bottoms become burned out they may be removed and replaced by others, thus obviating the necessity of substituting entirely new receptacles and also allowing the bottoms to be formed of material best suited to stand the intense heat necessary for the smelting process, for instance wrought iron.

Another object of my invention is to provide means for feeding the mixture into the receptacles in such quantities that it will be thoroughly fused, thus insuring the formation of a perfect product and allowing a continuous operation.

Another object of my invention is to provide means for bringing the receptacles, in which the smelting process takes place, into position as required and removing them after the process has taken place to discharge the product and cool off previous to again being brought into use.

Another object of this invention is to provide an apparatus of this character embodying advantages in point of perfect operation and simplicity and inexpensiveness of construction.

In the drawings: Figure 1 is a side elevation of my apparatus. Fig. 2, a plan view thereof. Fig. 3—3^a a fragmentary detail transverse vertical sectional view, on an enlarged scale, showing the means for feeding the carbon, the hopper, the means for mixing the ingredients in the hopper and forcing them therefrom and one of the receptacles in which the smelting process

takes place. Fig. 4, a fragmentary detail sectional view on an enlarged scale, showing the knife contact. Fig. 5, a fragmentary detail sectional view, on an enlarged scale, showing the spring pressed locking pin for holding the hopper in place over the receptacles in which the smelting process takes place.

Like reference characters designate corresponding parts in the figures of the drawings illustrating my invention.

Referring to the drawings, 1 designates a base having a vertical standard 2 secured thereon the upper end 3 of which is curved and receives the rear curved end 4 of an oscillatory arm 5 provided with ears 5^a receiving a vertical shaft 6 rotatably supported on antifriction balls 7 interposed between its lower end and the base and in ears 8 on the vertical standard and antifriction balls 9 are interposed between the lower ear of the oscillatory arm and the ear on the standard just below it, thereby adapting the vertical shaft to be easily rotated and the arm to be easily oscillated on said shaft.

A pin 10 is slidably mounted in a bore 11 in the curved end 3 of the standard and normally held in engagement with a bore 12 in the curved end 4 of the oscillatory arm by a spiral spring 13 the outer end of which is secured to said pin and the inner end bearing against a shoulder in the bore 11, thereby providing means for locking said arm and a handle 14 is secured to said arm to provide means for oscillating it.

An electric motor 15 is secured to the base at the rear of the standard 2 and is operatively connected with the vertical shaft 6, so as to revolve it, by a worm 16 secured on its commutator shaft 17 and meshing with a worm-gear 18 loosely mounted on the shaft 6 and supported upon a collar 18^a secured to said shaft, the upper end having an interior conical recess adapted to be normally frictionally engaged by a spring pressed conical sleeve 18^b slidably mounted on the shaft 6 by means of a groove therein engaging a feather 18^c on said shaft and an exterior circumferential groove loosely engaged by a collar 18^d pivotally supported on the inner end of a foot-lever 18^e pivoted on the standard 2, from which it will be understood that the worm-gear 18 will be normally held fixed on said shaft 6 between the collar 18^a and the sleeve 18^b, but when the foot lever is pressed upon, the sleeve 18^b will be moved out of engagement with the worm-gear against the action of the spring and the worm-gear 18 allowed to turn on the shaft 6, the friction clutch thus provided being for temporarily stopping the agitator and scrapers.

A conical hopper 19 open at the top and bottom is suspended from the horizontal end 20 of the oscillatory arm by brackets 21 the lower ends of which are secured to a ring 22 secured to the top of the hopper and the upper ends to the under face of the oscillatory arm, said hopper being formed of an upper section 23 and

a lower section 24 secured together by a ring 25 bearing against the inner faces of said sections and being secured thereto by screws 26, said ring also having a circular shoulder 27 against the upper face of which the lower end of the section 23 abuts and against the lower face of which the upper end of the section 24 abuts, thus providing means for separably connecting said sections together and for properly adjusting the sections with relation to each other when fitting them together.

To the lower end of the ring 25 is secured by screws 28, a perforated disk 29 through which the mixture to be fused is fed to the receptacles in which the smelting process takes place, the lower section 24 serving to deliver the mixture in a circular mass around the carbon, to be described, and thereby assuring that the mixture will be properly fused.

Vertical standards 30 and 30^a are secured to the opposite end of the base from that of the standard 2 and are provided with insulated bearings in their upper ends in which a horizontal shaft 31 is rotatably mounted and has a hub 32 secured thereon, between the standards 30 and 30^a, said hub having radial arms 33 provided with square sockets receiving the squared ends of the handles 34 which are removably secured therein by set screws 35 and provided on their outer ends with receptacles or ladles 36 in which the fusing process takes place.

Each receptacle embodies an upper conical shaped ring 37 having a flange 38, a lower circular ring 39, having a flange 40 and a circular bottom 41 interposed between the flanges of the rings and secured in place by bolts 42^a having nuts thereon, thereby providing for the removal of the bottom, when it becomes burned out, and the substitution of a new bottom.

A sleeve 42 is secured to the shaft 31 adjacent the standard 30^a and provided with blades 43 one of which is adapted, each time a receptacle is brought into the proper position under the hopper by the rotation of the shaft 31, to engage the blades 44 secured to a plate 45 which is insulated from and secured to the upper end of a vertical standard 46 secured to the base, and to disengage said blades 44 when said receptacle is moved out of position by the further rotation of the shaft 31, said blades constituting a knife switch.

A disk 47 is secured to and insulated from the shaft 31 and provided with notches 48 adapted to be engaged by the end of a gravity arm or dog 49, pivoted on the upper end of the standard 30, to lock the shaft 31 and thereby hold one of the receptacles in position under the hopper and one of the blades 43 in contact with the blades 44.

A hand wheel 50 is secured to the outer end of the shaft 31 to provide means for rotating it when it is desired to bring a receptacle into position under the hopper and to contact the blades of the knife switch or to move a receptacle out of position and separate the blades of the knife switch.

The arm 5 is provided with a vertical bore 51 through which the upper threaded end of a metallic sleeve 52 projects and is secured by a threaded collar 53 screwed thereon and having a flange 54 secured to the arm 5 by bolts 55 having nuts thereon, the upper end of said sleeve having a threaded cap 56 screwed thereon and provided with a central hole 57.

The lower end of the sleeve 52 is secured to the perforated disk 29 by screws 58 and said sleeve has a filling of insulating material 59 provided with a bore 60 of small diameter leading from the top into a bore 61 of larger diameter in its lower end.

The upper end of a metallic sleeve 62 extends through a bore 63 in the vertical yoke 64 secured on the arm 5 by bolts 65 having nuts thereon and said sleeve has a filling of insulating material 66 having a bore 67 of a diameter corresponding to that of the bore 60 in the insulating filling of the sleeve 52 and flanges 67^a and 68 bearing against the ends of the sleeve 62.

A metallic tube 69 is secured in the bore of the insulating filling of the sleeve 62 by means of washers 69^a on its ends bearing against the ends of said insulating filling and threaded nuts 69^b engaging threads on the ends of said tube and bearing on said washers and the lower end of the tube 69 is secured to the upper end of a metallic tube 70 of like diameter by a threaded sleeve 71 engaging threads on said tubes, said tube 69 being slidable in the bore of the insulating filling of the sleeve 52 and its lower end projecting into the large bore in the insulating material of said sleeve 52 and being provided with threads engaged by threads in the upper end of a collar 72 slidable in said large bore and receiving the upper end of the carbon 73 which is removably secured therein by a binding screw 74. A flanged sleeve 75 is rotatably mounted on a circular flange 76 of the sleeve 52 and antifriction balls 77 are interposed between said flanges to allow the sleeve 75 to move easily on the sleeve 52.

To the flange of the sleeve 75 is secured, by means of bolts 78 having nuts thereon, an agitator 79 embodying arms 80 connected together at their ends by rings 80^a and 80^b and having laterally extending lugs 81 for stirring up the mixture in the hopper and keeping it from forming into lumps and in holes in the lower end of the arms 80 are secured, by set screws 82, scrapers 83 which bear on the perforated disk of the hopper thereby keeping the holes open and forcing the mixture therethrough into the receptacles. A sprocket chain 84 connects a sprocket wheel 85 secured on the shaft 6 with a sprocket wheel 86 secured on the sleeve 75 and thereby transmits motion to the sleeve 75 when the shaft 6 is rotated.

The upper end of a shaft 87 is journaled in a lateral projection of the yoke and provided with a conical worm 88 engaging a rack 89 secured to the sleeve 62 and the lower end of said shaft is journaled in a lateral projection of the arm 5 and provided with a collar 90 secured thereon and holding the shaft in place and a hand wheel 91 secured thereon and by which the shaft 87 may be turned to raise and lower the carbon manually, although any suitable means may be employed for this purpose.

An electric circuit is provided for establishing the arc, which includes the electric conducting wires 92, a dynamo 93, a rheostat 94, a switch 95, the tubes 69 and 70, the collar 72, the carbon 73, the receptacles and their handles, the horizontal shaft 31, the blades 43 and 44 of the knife switch and the plate 45.

The operation of my apparatus, for instance, to form calcium-carbid is as follows: Simultaneously one of the receptacles 36 is moved into position and the blades of the knife switch connected by turning the

hand wheel 50 and said receptacle and the blades of the knife switch automatically locked by the engagement of the dog 49 with one of the notches of the disk 47, the hopper 19 is moved into position by means of the handle 14 and automatically locked by the pin 10, a mixture of pulverized carbon and lime is fed into the hopper, the carbon 73 is lowered into contact with the bottom of one of the receptacles, the motor 15 is started revolving the agitator and the scrapers, which force the mixture from the hopper into the receptacle beneath it, the switch 95 is closed, the rheostat is thrown on and the carbon raised simultaneously, thus establishing an arc between the receptacle and the carbon, whereupon the mixture will become fused forming calcium-carbid and when the receptacle becomes filled with calcium-carbid, the current is then switched off by means of the switch 95 the carbon raised, the hopper unlocked and swung out of the way and finally the receptacle is unlocked and revolved out of the way, which causes it to turn upside-down and discharge its contents and this operation is repeated until sufficient calcium-carbid is formed.

I do not wish to be understood as limiting myself to the precise details and arrangements of parts shown and described, but reserve the right to all modifications within the scope of my invention.

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

1. In an electric smelting apparatus, a carbon forming one pole and a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, substantially as described.

2. In an electric smelting apparatus, a carbon forming the one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, and means for feeding material to said arc, substantially as described.

3. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, and a hopper adapted to feed material to said arc, substantially as described.

4. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, and a laterally movable hopper adapted to feed material to said arc, substantially as described.

5. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, a hopper adapted to feed material to said arc and means for agitating the material in said hopper and forcing it therefrom, substantially as described.

6. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted be-

tween said receptacles, one at a time, and the carbon, a hopper adapted to feed material to said arc and means rotatable in said hopper for agitating the material and forcing it therefrom, substantially as described.

7. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, a laterally movable hopper adapted to feed material to said arc and means rotatable in said hopper for agitating the material and forcing it therefrom, substantially as described.

8. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, a hopper having a perforated bottom and adapted to feed material to said arc, substantially as described.

9. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, the carbon, a laterally movable hopper having a perforated bottom, and adapted to feed material to said arc, substantially as described.

10. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, a laterally movable hopper having a perforated bottom and adapted to feed material to said arc and means rotatable in said hopper for forcing the material therefrom, substantially as described.

11. In an electric smelting apparatus, a carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and the carbon, a laterally movable hopper having a perforated bottom and adapted to feed material to said arc, and means rotatable in said hopper for agitating the material and forcing it therefrom, substantially as described.

12. In an electric smelting apparatus, an adjustable carbon forming one pole, and a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and said carbon, substantially as described.

13. In an electric smelting apparatus, an adjustable carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and said carbon and means for feeding material to said arc, substantially as described.

14. In an electric smelting apparatus, an adjustable carbon forming one pole, a series of spaced receptacles mounted for rotation in a vertical plane and forming the other pole, whereby an arc is adapted to be established or interrupted between said receptacles, one at a time, and said carbon, means for agitating the material and means for feeding said material to said arc, substantially as described.

Signed at New York city, in the county of New York and State of New York, this 10th day of January, A. D. 1907.

JAMES C. YOUNG.

Witnesses:

A. B. BLACKWOOD,
A. R. HODLER.