

No. 706,430.

Patented Aug. 5, 1902.

J. H. MANN.

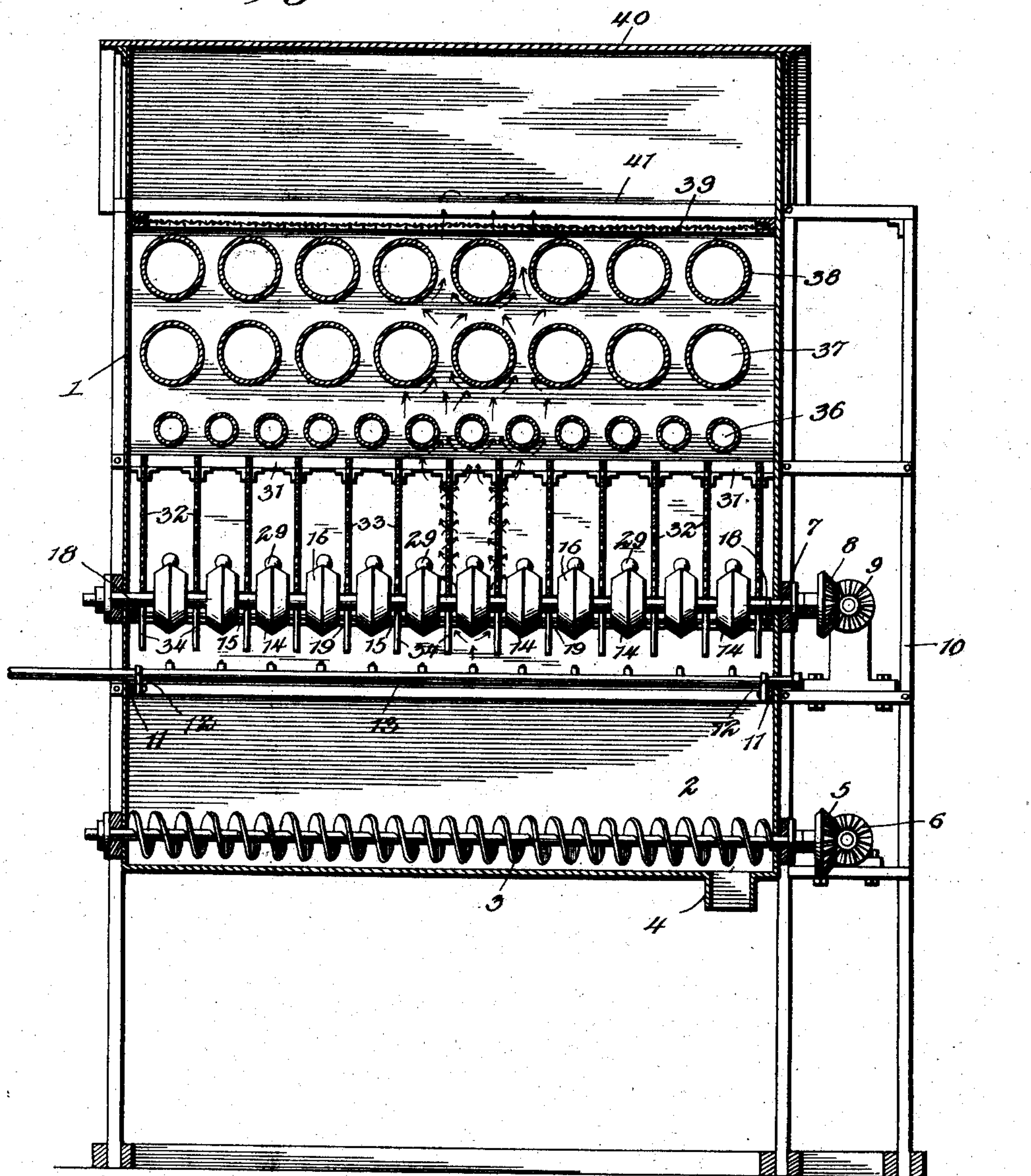
APPARATUS FOR MAKING CARBON BLACK.

(Application filed Apr. 26, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

Fig. 2.

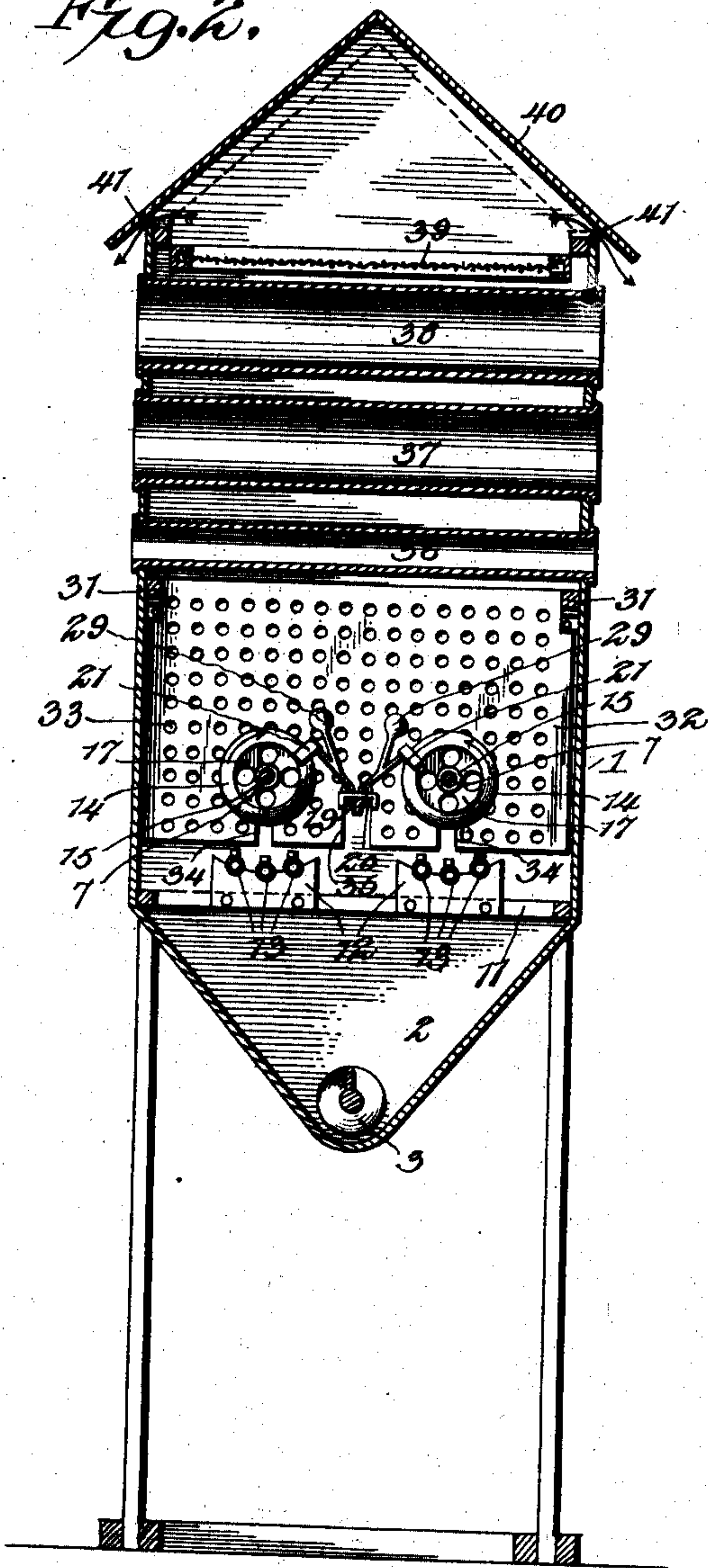


Fig. 3.

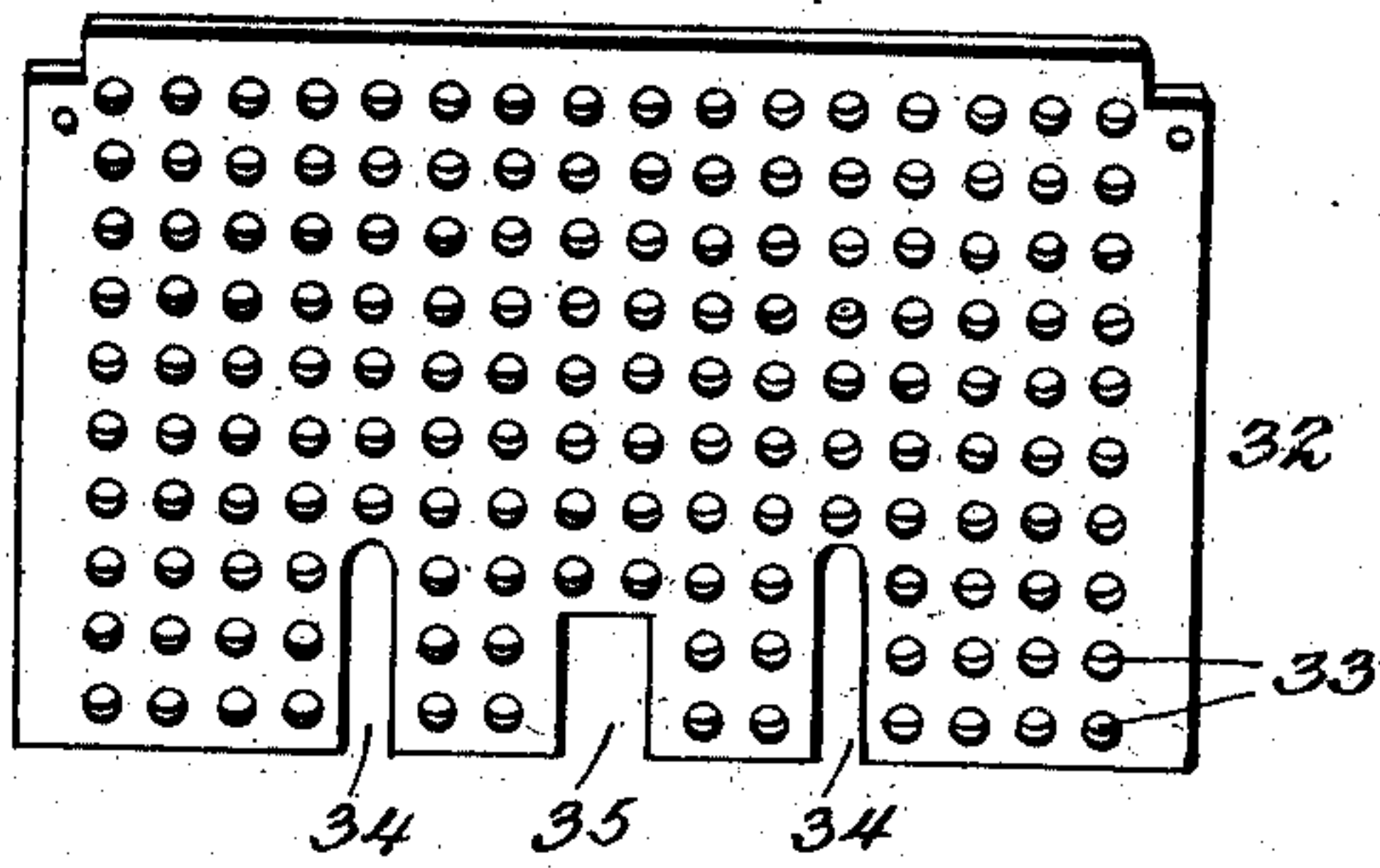


Fig. 4.

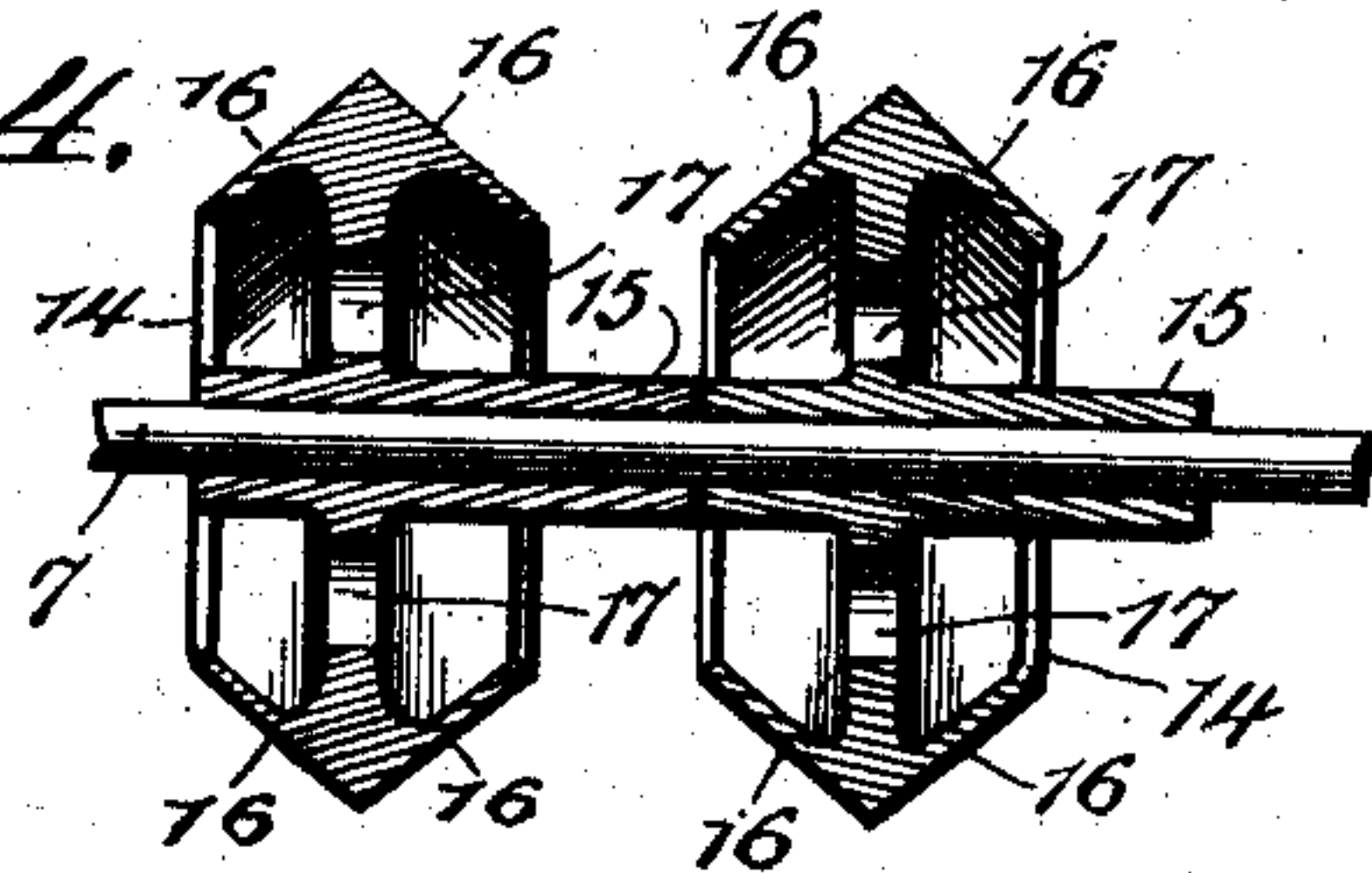


Fig. 5.

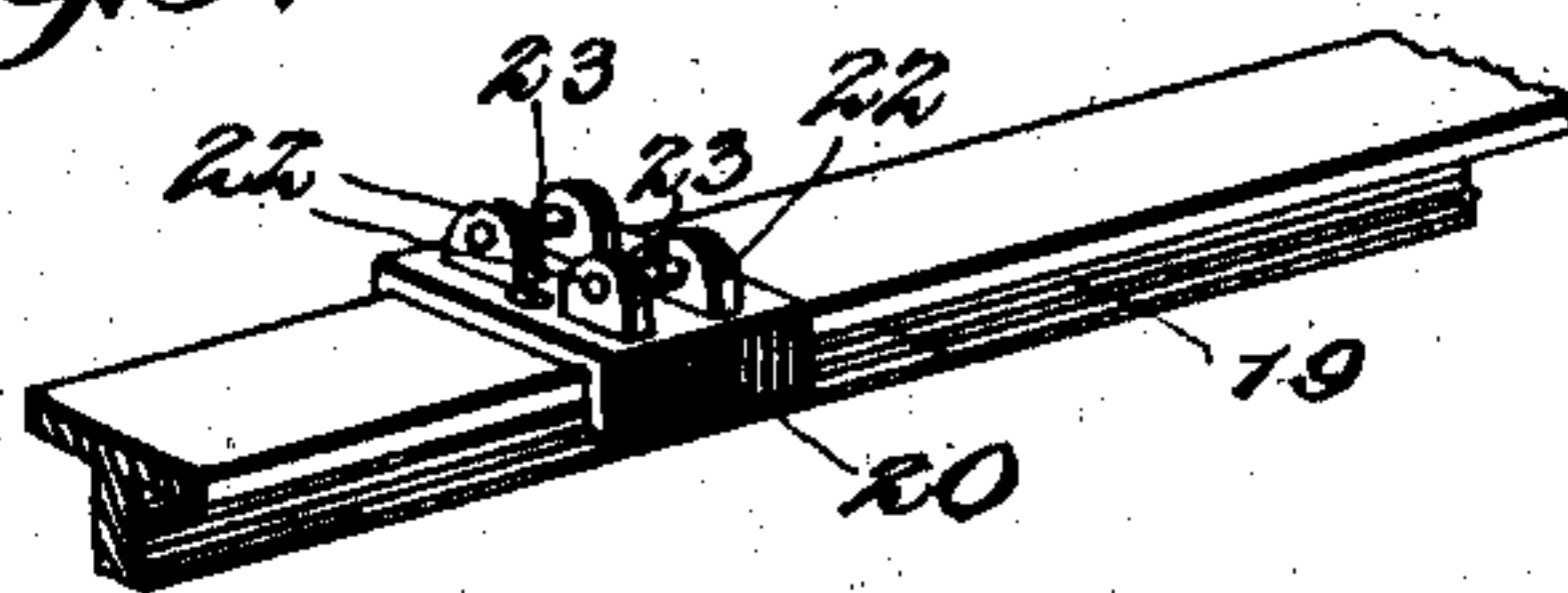


Fig. 6.

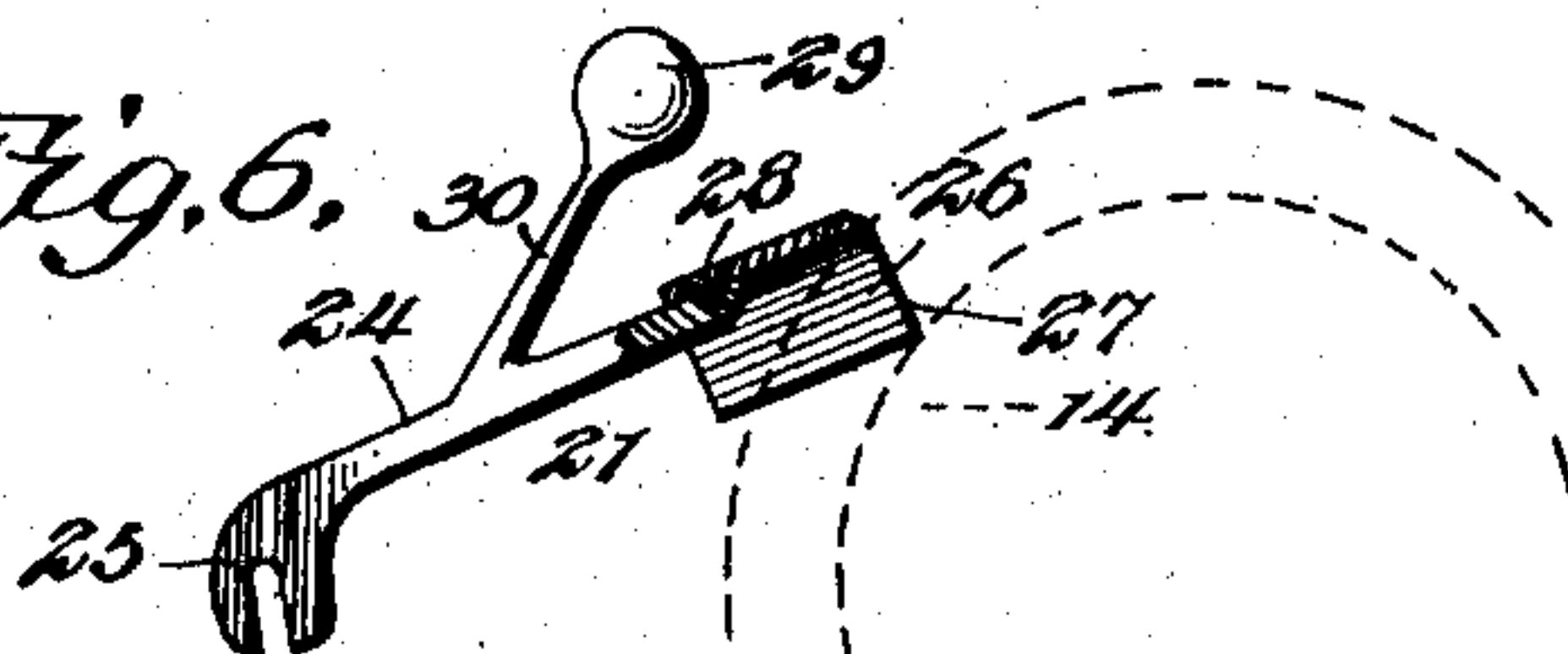
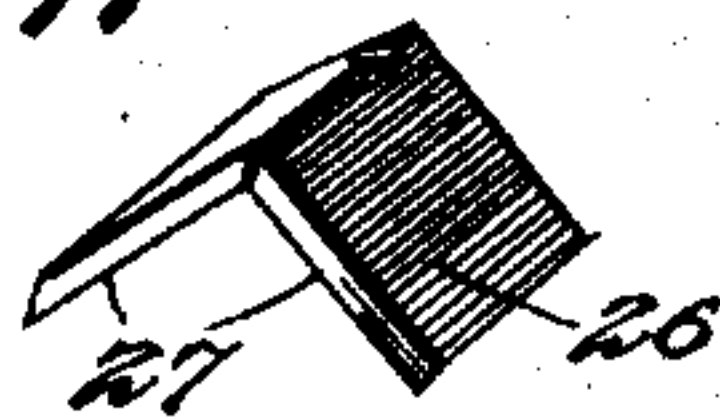


Fig. 7.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING CARBON-BLACK.

SPECIFICATION forming part of Letters Patent No. 706,430, dated August 5, 1902.

Application filed April 26, 1901. Serial No. 57,567. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENERY MANN, a citizen of the United States, residing at Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Apparatus for Making Carbon-Black, of which the following is a specification.

The object of this invention is in a simple, rapid, and thoroughly practicable manner to produce the maximum amount of carbon-black from a minimum quantity of gas and to effect saving of practically all of the carbon-black produced.

The accomplishments of the objects above stated are effected through the particular manner of arrangement of the gas-burners with relation to the carbon-collectors, by the peculiar construction of the carbon-collectors, by causing a constant upward movement of the products of combustion and elimination therefrom of any contained carbon and its conservation before escape from the apparatus.

Generally stated and as defining one form of apparatus for carrying my invention into effect, the invention may be said to be characterized by carbon-collectors combined with a suitable gas-supply, the carbon-collectors to be of such construction as to obviate retardation of flame from the gas-burners, while at the same time presenting the greatest obtainable surface in a comparatively small area for catching and retaining the carbon-black. Combined with the carbon-collectors are scrapers, which operate to free the surfaces impinged by the gas from the deposited carbon-black. As a matter of specific improvement the gas-service pipes and the carbon-collectors are to be spaced apart such distances as will be requisite to afford free passage of air between these parts, to permit the carbon detached from the collectors to drop to the conveyer, and also to permit movement of the air through the apparatus, thereby to carry toward the roof of the apparatus the products of combustion. To intensify this upward current of the products of combustion, there are associated with the carbon-collectors on each side thereof perforated partitions through which the prod-

ucts of combustion travel, and against these partitions or deflectors a portion of the carbon-black not caught by the carbon-collectors will be deposited, thus effecting a second conserving of the escaping carbon. From the partitions the products of combustion pass upward to the top of the apparatus and are here caused to impinge against collecting-cylinders, where a third conserving of any carbon-black contained in the products of combustion is effected, and combined with the collecting-cylinders and above the same is a screen through which the products of combustion must pass on their passage to the exit, and at this screen the final conserving of any small particles of carbon that have thus far escaped retention is effected. By the successive carbon-eliminating treatment to which the products of combustion are subjected it will be seen that practically all, if not all, of the carbon is removed from the products of combustion, so that with a given quantity of gas the highest possible amount of carbon-black will be produced, and this will be found of the highest and finest grade.

Further and more specific points of novelty and advantages accruing from the employment of the apparatus herein illustrated will hereinafter be more fully described, and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification, and in which like numerals of reference indicate corresponding parts, I have illustrated a form of apparatus capable of carrying my procedure into effect, it being understood that the apparatus herein displayed may be changed as to arrangement, proportion, and general shape of the parts without departing from the spirit of the invention, and in these drawings—

Figure 1 is a view in sectional elevation of an apparatus constructed in accordance with my invention. Fig. 2 is a view in vertical transverse section. Fig. 3 is a detached detail view of one of the deflecting plates or partitions. Fig. 4 is an enlarged detail sectional view of a pair of adjacent carbon-collectors. Fig. 5 is a detached detail view in perspective, exhibiting one of the scraper-bearings and a section of the T-rail upon

which it is mounted. Fig. 6 is a view in elevation, partly in section, of one of the scrapers complete. Fig. 7 is a detail perspective view showing the scraper or knife detached from its supporting-arm.

Referring to the drawings, 1 designates generally the casing of the apparatus, the same being constructed of any suitable material, as metal, and provided throughout its length and near its lower portion with a hopper 2, in which works a conveyer-worm 3, one end of the hopper being provided with a chute 4, down which the carbon escapes to a place of collection. The shaft of the worm is suitably journaled in the framework of the casing and carries at one end a beveled gear 5, with which meshes a similar gear 6, receiving motion from any suitable source of power, (not shown,) the shafts 7, carrying the carbon-collectors, being similarly driven through gears 8 and 9. The driving mechanism for only one of the shafts 7 is shown herein, it being understood that this mechanism will be duplicated for the other shaft, and as this will be readily understood detailed illustration is deemed unnecessary. To present suitable supports for the actuating-gears 5, 6, 8, and 9, the casing is extended on one side, as shown at 10, for this purpose, so that the gears will be upon the outside of the casing proper, and thus free from any accumulation of carbon. Upon a cross-sill 11 at each end of the casing are secured two plates 12, carrying the gas-service burner-pipes 13, these being arranged in this instance in groups of three below each of the series of carbon-collectors and practically in the arc of a circle, so that the flames will conform to the periphery of the carbon-collectors, and thereby cause even deposit thereon of carbon from the series of burners. The service-pipes extend out through one side of the casing, as shown through Fig. 1, and lead to any source of supply, either coal-gas or hydrocarbon gas, as may be preferred.

The carbon-collectors 14, which constitute one of the salient and most important features of the present invention, consist each of a wheel having a wedge-shaped or angular periphery or face, as shown in Fig. 4, each wheel by preference comprising a hub 15, to be keyed or otherwise secured to one of the shafts 7, a wedge-shaped face or carbon-collecting surface 16, and spokes or spiders 17, connecting the face or rim with the hub. It will here be noted that each carbon-collecting wheel has two flat collecting-surfaces which are separated by the intermediate flange formed by the intersection of these surfaces, said flange forming a flame splitting or deflecting device, as will appear hereinafter. As here shown, the parts of these carbon-collectors are integral; but it is to be understood that I do not limit myself to this precise construction, as the hub and spokes may be cast in one piece and the rim or face secured thereto as a separate element, or the

collectors may be made in three or more parts and be suitably assembled. As shown in Fig. 4, one end of the hub terminates flush at one side of the carbon-collector and the other end projects some distance beyond the same. The object for providing the elongated portion of the hub is to present a ready means by which either a set-screw or key may be positioned for holding the collectors on the shafts and also to space the several wheels at regular intervals, as each wheel bears against the projected hub portion of the next adjacent wheel. The gas-burners are arranged in line with the edge of the carbon-collectors, so that the flame from the burners in impinging the carbon-collectors is split or divided, thereby permitting uninterrupted escape or passage of the flame past the collectors, the collectors being spaced apart on the shaft at such distances as will be calculated to effect the best updraft.

Extending longitudinally of the casing and bolted to the under side of cross-pieces 18 is a T-rail 19, (clearly shown in Fig. 5,) whereon are secured bearings 20 for the scrapers 21. The bearings 20 each comprise a plate bolted to the T-rail, the plate carrying four lugs or projections 22, suitably spaced apart and carrying journals 23 for the scraper. The scraper (shown partially in section in Fig. 6) comprises an arm 24, having at one end a slotted head 25, the slot to engage one of the journals 23, as clearly shown in Fig. 2. The other end of the arm carries a scraper 26, the same being in elevation of an inverted-V shape and at its front edge provided with chisel scraping edges 27 to bear upon the wedge-shaped face of the carbon-collector to remove therefrom the carbon as deposited. To facilitate removal of the scraper or blade 26 from the scraper-arm when it becomes necessary to sharpen the same, the scraper is secured to the arm by a screw or bolt 28, one only being shown in this instance, although it is to be understood that two or more may be employed, if necessary. By providing the head 25 with the slot for engaging the journals 23 the scraper-arm may be readily detached from the bearing when a scraper is to be repaired, thereby obviating the necessity for removing the journals or the bearing-plate, which would be necessary were the connection between the scraper-arm and the journals an ordinary pivot connection. The scraper-arm carries a weight 29, arranged on a projection 30, inclined toward the knife, this weight to be sufficient to cause operative coaction between a scraper and the carbon-collector to effect perfect removal of the carbon therefrom. As here shown, the scraper-arm, weight, and projection are all integral; but it is to be understood that they may be made in separate parts and assembled; but from a standpoint of simplicity and cheapness the arrangement exhibited will be generally employed.

The essential object of employing a plurality of comparatively small carbon-collecting

wheels having individual pivotal scrapers in coöperative relation to the respective wheels is to overcome the defects incident to a long continuous cylinder, which becomes warped or uneven under the influence of the heat, and thus it is impossible for the scrapers to effectually scrape all portions of a cylinder, thereby losing a considerable quantity of the carbon-black.

Depending from longitudinal beams or braces 31 on each side of the casing are deflecting plates or partitions 32, the same being constructed of a sheet of metal provided with numerous perforations 33. The bottom edge of each plate is recessed, as at 34 and 35, the two first-named recesses being provided to permit the partitions to be passed over the shafts 7 and the last-named recess to pass over the T-rail 19. These plates depend a sufficient distance below the carbon-collectors so as to separate the wheels and the burners and also to act as directors to guide the jets of gas against the faces of the carbon-collectors, there being one of these plates on each side of each of the collectors.

Above the deflecting-plates and extending from side to side of the casing are three series of collecting cylinders or tubes, (numbered, respectively, 36, 37, and 38,) the cylinders 36 being the smallest and arranged contiguous to the space formed by two of the deflecting plates or partitions 32. The other series of collecting-cylinders are of much greater size—say two or three times greater in diameter than the cylinders 36—all of the cylinders being open at both ends to permit of the passage of cold air therethrough. The lowest series of cylinders constitute what I term "breakers," as it is against these that the upgoing currents of products of combustion impinge, are momentarily retarded, and then split and deflected toward the other two series of cylinders.

Arranged above the upper series of cylinders and contiguous thereto is a screen 39, suitably supported in position and extending from side to side and end to end of the casing, and just above the screen there are provided under the eaves of the roof 40 of the casing escape-passages 41. (Clearly shown in Fig. 2.)

The operation of the device is as follows: The burners being lighted, the flames of the jets immediately impinge the carbon-collectors and, as stated, are split and pass up around both sides of the same and between the deflecting-plates 32. The bulk of carbon is caught by the wedge-shaped faces of the carbon-collectors and is removed by the scrapers 26 and dropped between the service-pipes 13 into the hopper, whence it is removed by the worm 3 to the chute 4. The products of combustion escaping around the carbon-collectors pass upward and through in a tortuous manner the openings in the deflecting-plates, and against these plates a small per cent. of the carbon contained in the products of com-

bustion is deposited, whence it may from time to time be removed. The products continue passing upward and out of the chambers 70 formed by the partitions and impinge upon the lower series of cylinders or breakers 36, where further elimination of carbon takes place, and from these pass upward to the succeeding series of cylinders or condensers 37 75 38, where practically all of the carbon is eliminated and caught on these surfaces, adherence thereto of the carbon-black being facilitated by reason of the fact that the cylinders are cold. Any small per cent. of carbon escaping these last separating steps is caught and retained by the screen 39, and from time to time, as requisite, the carbon may be removed from the series of cylinders and the screen. After passing through the screen the 85 products of combustion pass out through the escape-passages 41 under the eaves of the roof of the casing.

The carbon-collectors, as herein exhibited, rotate in opposite directions, (in this instance 90 toward each other,) so that the two series of scrapers may be held for operation by a single support; but it is to be understood that I do not limit my invention to this precise arrangement, as the carbon-collectors may be 95 driven in the same direction, in which case the scrapers would have to be arranged on two separate supports. Generally, however, the arrangement shown will be preferred on account of effectiveness in operation and reduction in the number of parts of the apparatus. 100

I have found in practice that by the successive carbon-conserving steps to which the products of combustion are subjected, as heretofore pointed out, all or practically all of the carbon-black is saved, so that it will be apparent that with a minimum quantity of gas the maximum amount of high-grade carbon-black will be produced. 110

As before intimated, an apparatus constructed on the lines herein given would perform the functions designed; but it being obvious that in actual practice changes in many of the ordinary parts would often take place 115 it is to be understood, therefore, that I do not limit myself to the structure and arrangement of parts herein shown, as it will be obvious that even pronounced changes in the construction and aggroupment of the different parts would not evade the broad and underlying idea of invention. 120

In a companion application, Serial No. 66,300, the carbon-collecting wheels are provided with T-shaped peripheries. It is therefore desired to be understood that the expression "flame-dividing means" is to include either wheels with wedge-faced peripheries or T-shaped peripheries. 125

It will be noted that the open-ended cylinders constitute a secondary carbon-collector located intermediately between the primary carbon-collector—i. e., the wheels—and the top or roof of the chamber. 130

Having thus described the invention, what I claim is—

1. In an apparatus for making carbon-black, carbon-producing means, a horizontally-disposed shaft, and carbon-collecting wheels carried thereby and spaced apart thereon and having wedge-shaped peripheries. 5
2. In an apparatus for making carbon-black, the combination with a series of gas-service burner-pipes, of a horizontally-disposed shaft, and carbon-collecting wheels carried thereby and spaced apart thereon and having wedge-shaped peripheries. 10
3. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft carrying a series of vertically-disposed rotary carbon-collectors spaced apart to permit passage of air between them, and deflector-plates arranged in the spaces between the collectors. 15
4. In an apparatus for making carbon-black, the combination with carbon-producing means, of a series of vertically-disposed rotary carbon-collectors spaced apart to permit passage of air between them, and perforated deflector-plates arranged in the spaces between the collectors. 20
5. In an apparatus for making carbon-black, the combination with a series of gas-service burner-pipes, of a horizontally-disposed shaft arranged above the pipes and carrying vertically-disposed carbon-collectors spaced apart to permit passage of air between them, and deflector-plates arranged between the collectors. 25
6. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft, wedge-faced carbon-collecting wheels carried by the shaft and spaced apart thereon, and scrapers coacting with the wheels. 30
7. In an apparatus for making carbon-black, the combination with carbon-producing means, a horizontally-disposed shaft, carbon-collecting wheels carried by the shaft and spaced apart thereon, and having wedge-shaped peripheries, and weighted scrapers having chisel scraping edges to coact with the wheels. 35
8. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed rotatable shaft, vertically-disposed carbon-collecting wheels carried by and spaced apart upon the shaft to permit a passage of air between the same, a support located adjacent to the shaft, and relatively fixed weighted scrapers independently mounted on the support in operative relation with the respective wheels, for the purpose described. 40
9. In an apparatus for making carbon-black, the combination of a series of gas-service burner-pipes, a horizontally-disposed shaft carrying a series of carbon-collecting wheels arranged above said pipes and spaced apart on the shaft and having wedge-shaped peripheries, and scrapers shaped to conform to the peripheries of and to coact with the collecting-wheels. 45
10. In an apparatus for making carbon-black, the combination of a series of gas-service burner-pipes, a horizontally-disposed shaft carrying a series of carbon-collecting wheels arranged above said pipes and spaced apart on the shaft and having wedge-shaped peripheries, and weighted scrapers having chisel scraping edges shaped to conform to the peripheries of and to coact with the collecting-wheels. 50
11. In an apparatus for making carbon-black, the combination with carbon-producing means, a horizontally-disposed shaft carrying a series of carbon-collecting wheels spaced apart on the shaft to permit passage of air between them, scrapers coacting with the collecting-wheels and shaped to conform to the peripheries thereof, and perforated deflector-plates arranged in the spaces between the collecting-wheels. 55
12. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft carrying a series of carbon-collecting wheels spaced apart on the shaft, deflector-plates arranged in the spaces between the wheels, and collecting-cylinders arranged above the spaces between the deflectors. 60
13. In an apparatus for making carbon-black, the combination of carbon-producing means, a horizontal shaft carrying carbon-collecting wheels spaced apart on the shaft to permit passage of air between them, scrapers coacting with the carbon-collecting wheels, perforated deflector-plates arranged in the spaces between the collecting-wheels, and collecting-cylinders arranged above the deflector-plates. 65
14. In an apparatus for making carbon-black, the combination of carbon-producing means, a horizontally-disposed shaft carrying carbon-collecting wheels spaced apart thereon to permit passage of air between them, scrapers coacting with the carbon-collecting wheels, perforated deflector-plates arranged in the spaces between the said wheels, and open-ended collecting-cylinders arranged above the deflector-plates. 70
15. In an apparatus for making carbon-black, the combination of carbon-producing means, carbon-collecting wheels spaced apart to permit passage of air between them, scrapers coacting with the carbon-collecting wheels, perforated deflector-plates arranged in the spaces between the wheels, open-ended collecting-cylinders arranged above the deflector-plates, and a screen arranged above the upper series of collecting-cylinders. 75
16. In an apparatus for making carbon-black, the combination with carbon-producing means, of two shafts, each carrying a series of carbon-collecting wheels spaced apart on the shaft to permit passage of air between them, and being rotated in opposite directions. 80

tions, that is to say toward each other, scrapers coacting with the wheels, perforated deflector-plates arranged in the spaces between the wheels, open-ended collecting-cylinders arranged above the deflecting-cylinders, and a screen arranged above the upper series of collecting-cylinders.

17. In an apparatus for making carbon-black, a pair of substantially horizontal rotatable shafts, vertically-disposed carbon-collecting wheels carried by and rotatable with the shafts and separated by interspaces, carbon-producing burners disposed transversely of the shafts and located beneath the respective wheels, a support located between the shafts, and a series of independent weighted scrapers, one for each wheel, carried by the support and in frictional engagement with the respective wheels.

18. In an apparatus for making carbon-black, a pair of substantially horizontal rotatable shafts, carbon-collecting wheels mounted upon and rotatable with the shafts and separated by interspaces, carbon-producing burners arranged in groups transversely of the shafts and beneath the respective wheels, a support extending longitudinally between the shafts, and a series of individually-movable weighted scrapers, one for each wheel, and having their lower ends pivotally mounted upon the support and their upper portions inclined upwardly and outwardly and in frictional engagement with the respective collecting-wheels.

19. In an apparatus for making carbon-black, the combination of a series of gas-service burner-pipes suitably spaced apart, a horizontal shaft carrying a series of carbon-collecting wheels spaced apart upon the shaft, collecting-wheels arranged in the spaces between the collecting-wheels, and a plurality of series of open-ended collecting-cylinders arranged above the deflectors, the lowest series of cylinders being the smallest and constituting breakers operating initially to retard the currents of the products of combustion and then to direct such currents against the remaining series of collecting-cylinders.

20. In an apparatus for making carbon-black, the combination of a series of gas-service burner-pipes suitably spaced apart, carbon-collectors spaced apart to permit passage of air between them, perforated deflector-plates arranged on each side of the carbon-collectors, series of open-ended collecting-cylinders arranged above the deflectors, the lower series of cylinders being the smallest, and constituting breakers operating initially to retard the currents of the products of combustion and then direct them against the remaining series of collecting-cylinders, a screen arranged above the upper series of collecting-cylinders, and escape-passages arranged above the screen.

21. In an apparatus for making carbon-black, the combination with a suitably-enclosed casing, a hopper formed in the bottom

thereof, a worm mounted in the lower portion of the hopper and operating to feed material to a chute arranged at one end of the hopper, carbon-collectors arranged within the casing and rotating in opposite directions, a series of gas-service burner-pipes arranged in a horizontal plane below the collectors and disposed in the arc of a circle with relation thereto, the collectors and gas-pipes being spaced apart to permit passage of air between them and also the deposition of carbon from the collectors past the pipes and into the hopper, scrapers coacting with the carbon-collectors, perforated deflector-plates arranged on each side of the carbon-collectors, a plurality of series of open-ended collecting-cylinders arranged above the deflectors, a screen arranged above the upper series of cylinders, and escape-passages formed in the roof of the casing adjacent to the screen.

22. In an apparatus for making carbon-black, a closed casing having its lower portion formed into a hopper provided at one end of the chute, a worm working in the hopper, a series of gas-service burner-pipes supported in horizontal position upon cross-sills within the casing, shafts carrying carbon-collectors spaced apart to permit passage of air between them, the actuating mechanism for the worm and for the carbon-collectors being on the exterior of the casing, thereby to protect such mechanism from an accumulation of carbon-black, scrapers coacting with the carbon-collectors, perforated deflector-plates arranged on each side of the carbon-collectors, open-ended collecting-cylinders arranged above the deflectors, a screen arranged above the upper series of the cylinders, and escape-passages formed in the roof of the casing adjacent to the screen.

23. In an apparatus for making carbon-black, the combination of carbon-producing means, and a vertically-disposed carbon-collecting wheel, the rim of which is formed with two opposite flat carbon-collecting surfaces, and a peripheral flame-dividing projection located at the junction of the carbon-collecting surfaces, the carbon-producing means being in alinement with the flame-dividing projection to direct the flame to opposite sides thereof and into coöperative relation with the carbon-collecting surfaces.

24. In an apparatus for making carbon-black, the combination with carbon-producing means, of a vertically-disposed rotatable carbon-collecting wheel, having its rim beveled inwardly from its opposite edges to provide opposite flat carbon-collecting surfaces, the pointed intersection of these faces forming a peripheral flame-dividing projection or partition.

25. In an apparatus for making carbon-black, the combination with carbon-producing means, of a plurality of vertically-disposed rotatable carbon-collecting wheels which are separated by interspaces, and partitions located in the interspaces between the

carbon-collecting wheels and projected downwardly below the latter and toward the carbon-producing means, and also projected above the wheels.

- 5 26. In an apparatus for making carbon-black, the combination with carbon-producing means, of a plurality of vertically-disposed rotatable carbon-collecting wheels located above the carbon-producing means and
10 separated by interspaces, vertical partitions in the interspaces and projected above and below the carbon-collecting wheels, and secondary carbon-collectors located above the wheels and opposite the spaces between the
15 respective partitions.
27. In an apparatus for making carbon-black, the combination of carbon-collecting wheels which are separated by interspaces, carbon-producing means located under each
20 wheel, scrapers for each wheel and vertical partitions situated in the interspaces and projected above and below the wheels.
28. In an apparatus for making carbon-black, the combination with carbon-producing
25 means, of carbon-collectors located above the same and separated by interspaces, vertical partitions located in the interspaces and projected above the carbon-collectors, horizontal series of secondary carbon-collectors
30 located transversely above the primary collectors and with one series above the other, the lowermost series having its members located opposite the space between adjacent partitions, and the members of the next-above
35 series being staggered with respect to the members of the lowermost series.
29. In an apparatus for making carbon-black, the combination of a casing, a horizontal shaft mounted therein, a series of carbon-
40 collecting wheels mounted thereon and spaced apart to permit the passage of air between the same, carbon-burners arranged beneath each carbon-collecting wheel, and perforated plates located between the burners
45 and the carbon-collecting wheels to separate the wheels from each other and direct the flame thereto.
30. In an apparatus for making carbon-black, the combination with carbon-producing
50 means, of a horizontally-disposed rotatable shaft located above said means, vertically-disposed carbon-collecting wheels carried by the shaft and having their hubs equally projected at corresponding ends to
55 form means for regularly spacing the wheels,

and independent scrapers in coöperative relation with the respective wheels.

31. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft 60 located above said means, vertically-disposed carbon-collecting wheels carried by the shaft and having their hubs provided with projected portions lying against the respective adjacent wheels and thereby spacing the latter, and independent scrapers in coöperative
65 relation with the respective wheels.

32. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft 70 located above said means, vertically-disposed carbon-collecting wheels carried by the shaft and having their hubs terminated flush at one end with the respective adjacent sides of the wheels, and the opposite ends of the hubs 75 projected beyond the sides of the wheels and adapted to lie against the flush ends of the hubs to form spacing devices for the wheels, and independent scrapers in coöperative relation with the respective wheels. 80

33. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft located above said means, a pair of vertically-disposed carbon-collecting wheels carried by the shaft, one of the wheels having a projected hub portion lying against the other wheel and forming a spacing device to separate the two wheels, and independent scrapers in coöperative relation with the respective
85 wheels. 90

34. In an apparatus for making carbon-black, the combination with carbon-producing means, of a horizontally-disposed shaft, vertically-disposed carbon-collecting wheels 95 carried by and spaced apart upon the shaft to permit a passage of air between the same, a support located adjacent to the shaft, and scrapers, one for each wheel, independently mounted on the support in coöperative relation with the respective wheels, for the purpose described. 100

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN HENERY MANN.

Witnesses:

T. A. HENAGH,
E. D. MCCALLY.