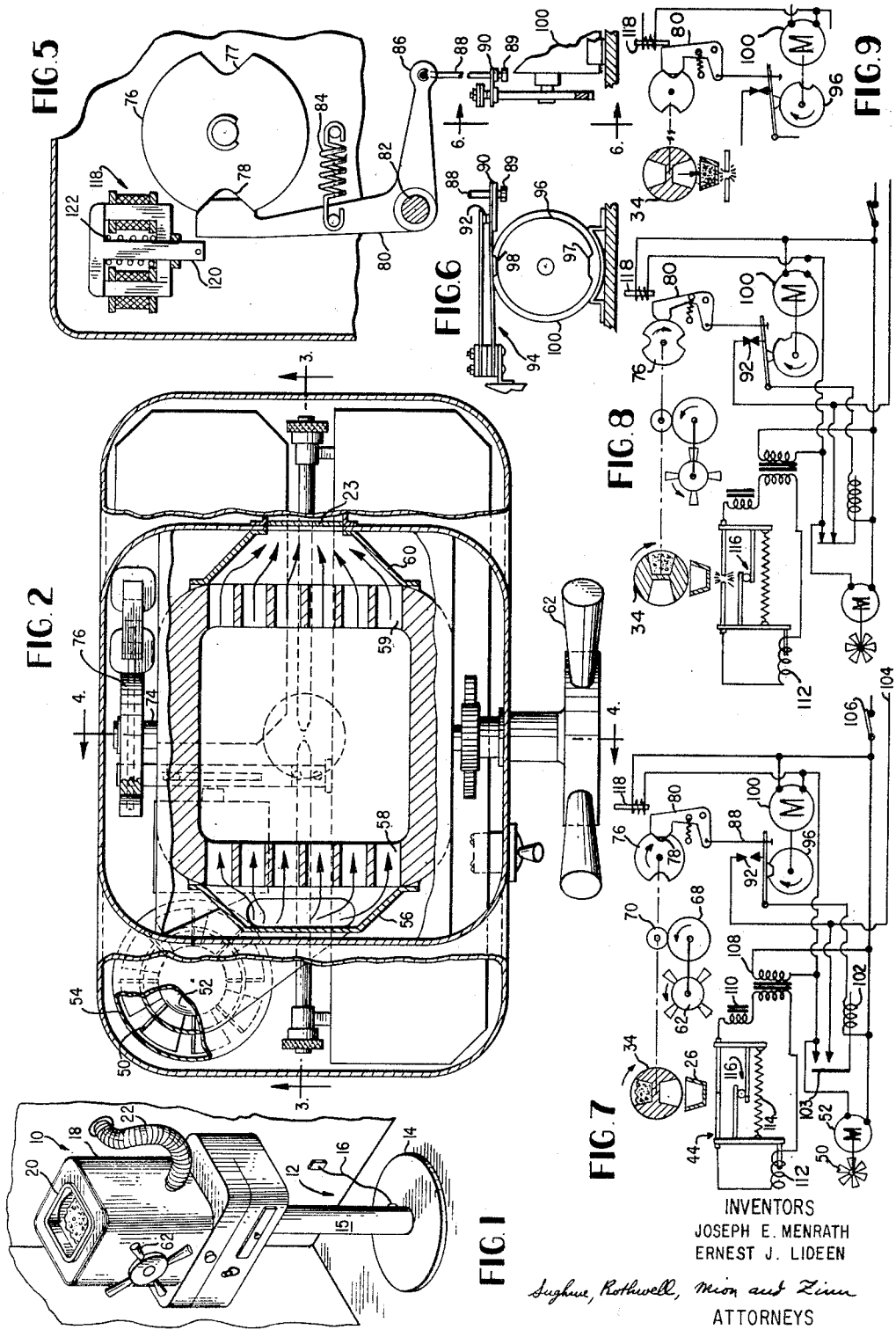
March 16, 1965 J. E. MENRATH ETAL 3,173,388

CARBON ARC INCINERATOR

Filed Oct. 8, 1962 2 Sheets-Sheet 1



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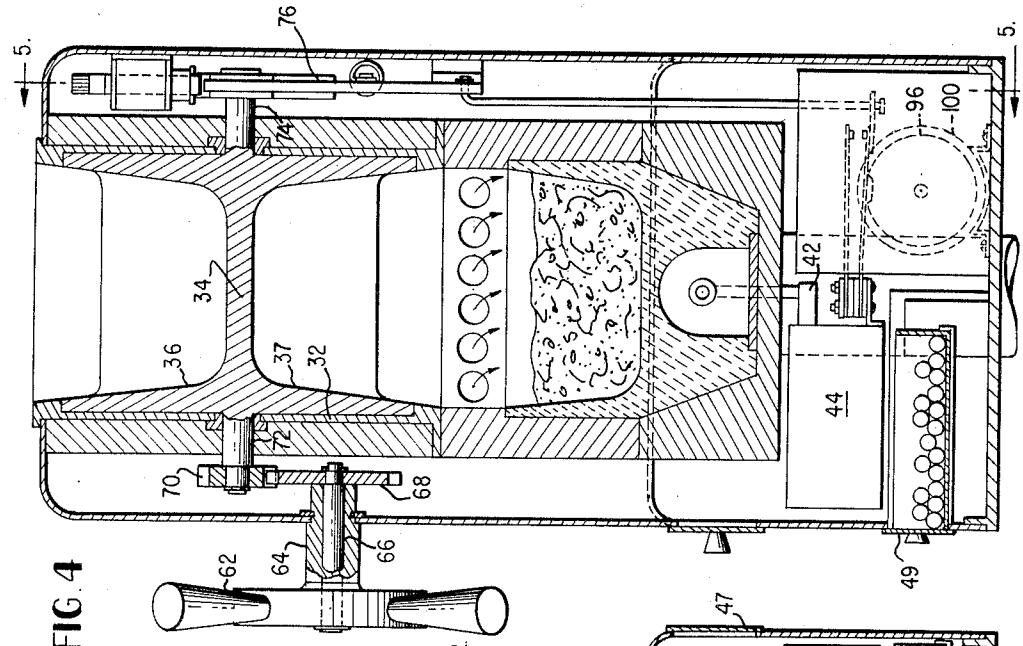


FIG. 4

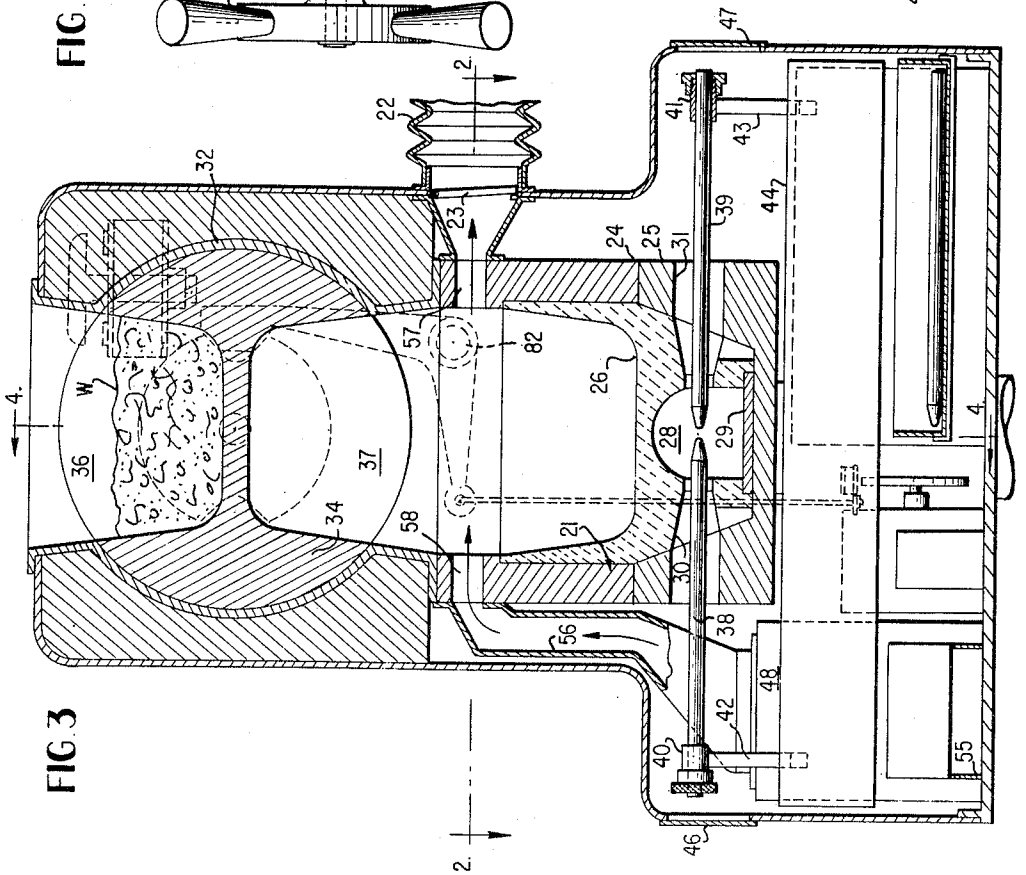


FIG. 3

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3,173,388

CARBON ARC INCINERATOR

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This invention relates to improvements in incinerators, and more particularly, to a unique incinerator apparatus especially for use in hospitals and the like in which the heat for incineration is supplied by means of a carbon arc.

One of the major problems in hospitals is the prevention of the spread of disease within the hospital. The disposal of hospital waste from the various hospital wards including surgery, is extremely important in the prevention of the spread of disease and the waste must be disposed of completely, safely, efficiently and rapidly. It is an object of this invention to provide such a waste disposal incinerating apparatus which is especially adapted to hospital use, although not limited thereto.

It is desirable that a waste disposal apparatus require a minimum of attention for cleaning, emptying or the like. It is an object of this invention to provide such an apparatus which uses no flushing liquids or other additives, and which immediately disposes of waste material without storage, which is self-cleaning in use and which requires no emptying service.

It is a further object of this invention to provide an apparatus which incinerates wastes and reduces them to sterile and harmless gases and fly ash which may be discharged to the atmosphere, and in which the incineration is provided by the high temperature of a carbon arc, thus the operation presents no fire hazard or danger to the user.

It is a further object of this invention to provide an incinerating apparatus for hospital wastes or the like, which is cyclical in operation and is locked during an incinerating cycle which is automatic following an initiating manual operation and which completes a disposal cycle in short time to make the apparatus available for subsequent use with minimum delay.

It is an additional object of this invention to provide a carbon arc incinerator which is compact in size and will require a minimum of service connections, so that it is readily portable and adapted to a variety of installations, and which will be economical and practical to manufacture and reliable in use.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose by way of example, the principle of the invention and the best mode which has been contemplated of applying that principle.

In the drawings:

FIGURE 1 is a perspective view of the portable carbon arc incinerator of this invention.

FIGURE 2 is a sectional plan view with portions broken away for the sake of clarity taken along line 2—2 of FIGURE 3.

FIGURE 3 is a longitudinal vertical sectional view taken along line 3—3 of FIGURE 2.

FIGURE 4 is a transverse vertical sectional view taken along line 4—4 of FIGURE 2.

FIGURE 5 is a fragmentary sectional view taken along line 5—5 of FIGURE 4.

FIGURE 6 is a detailed view taken along line 6—6 of FIGURE 5.

FIGURE 7 is a schematic view of the major components of the apparatus combined with an electrical circuit diagram showing the condition at the start of a cycle.

FIGURE 8 is a view similar to FIGURE 7 showing the condition of the apparatus after the cycle has started.

FIGURE 9 is a view of a portion of FIGURE 8 showing the condition of the elements at the completion of an incineration cycle.

In general, this invention concerns an incinerator especially adapted for hospital use in incinerating hospital wastes or the like. The incinerator includes an incinerator crucible for receiving the wastes from a rotatable waste material feeding valve positioned above the crucible and within a housing for the incinerator. The rotatable valve cyclically drops waste material into the crucible and an electric carbon arc heating means quickly raises the temperature of the crucible high enough to incinerate the waste material while a motor driven fan moves a stream of air over the waste material being incinerated in the crucible for combustion and for the disposal of the products of combustion through a vent. After rotating the valve to dump the waste in the crucible the operation for a cycle of incineration is completely automatic and the valve is locked during the incineration cycle.

Referring now to the drawings for a detailed description of the preferred embodiment, the entire incinerating apparatus **10** may be portable as illustrated in FIGURE 1. The incinerator **10** may include a support **12** comprising a base **14** and a pedestal **15**, although of course other suitable supports could be used. Electrical energy used for heating and moving air within the incinerator and for automatically controlling the incinerator may be supplied through an electrical cord **16** plugged into a suitable electrical outlet.

The incinerator is enclosed within a housing **18** which has a top opening **20** for insertion of the waste material to be incinerated. The incinerated products of combustion, which are mainly vapor and fly ash, are discharged through a flexible vent hose **22** which may be connected to any suitable chimney outlet as shown in FIGURE 1 for venting the harmless products of combustion to the atmosphere. The flexible vent hose **22** may include a valve **23**, e.g., a swinging check valve, which is normally closed but which may be opened by the pressure of an airstream during an incineration cycle.

A crucible holder **21** may be divided into two parts **24** and **25** and the bottom of the crucible holder may be suitably supported from the top of the pedestal **15**. The crucible holder parts **24** and **25** enclose a crucible **26** which is constructed of a suitable material capable of withstanding the high temperatures of incineration. Below the crucible **26** there is an arc chamber **28** which may be closed at the bottom by a plate **29**. Aligned holes **30** and **31** in the crucible holder part **25** are provided leading into the arc chamber **28** for access into the arc chamber of carbon arc sticks.

Above the top crucible holder part **25** is positioned and secured a rotary valve casing **32**, encasing rotary valve **34** and also creating a path to the valve from the top of the housing and from the valve **34** to the crucible **26**. The rotary valve **34** is constructed with a pair of valve pockets **36** and **37** capable of retaining waste material W to be incinerated, as shown for example in FIGURE 3. As the valve is rotated 180° the waste material W will be dumped directly into the crucible **26** as shown in FIGURE 4 and the valve **34** will seal the crucible from the top of the apparatus.

For quickly and effectively applying heat for incineration without creating any fire hazard and any liquid or gaseous fuel fire, there is provided a carbon arc heating assembly including a pair of carbon sticks **38** and **39** held by adjustable holder **40** and **41** respectively. Holder supports **42** and **43** are provided for holders **40** and **41** re-

spectively. A carbon arc feed mechanism 44 of a known and commercially available type is adapted to provide the feed of the carbon sticks to maintain the arc and for separating the carbon sticks to start the arc this known and commercially available feed mechanism 44 includes the usual means to insulate the electrodes from one another and from the apparatus. This feed will be described somewhat more in detail below, however the specific carbon arc feeding and heating mechanisms are not per se a part of this invention. For access to the carbon sticks for changing, a pair of doors 46 and 47 may be provided in the housing 18. Also, a drawer 49 containing additional carbon sticks may be included in the casing below the carbon arc feed mechanism 44.

At the time the waste material in crucible 26 is being incinerated, a motor driven fan assembly 48 is adapted to provide a stream of air across the material to aid in combustion and after the waste material is burned, to sweep the products of combustion, fly ash, smoke and vapors out through the check valve 23 and flexible vent hose 22. The motor driven fan assembly includes a fan 50 and a motor 52. An air inlet 54 is provided through the bottom of the housing for outside air and also an air inlet 55 is provided from within the housing for cooling and to withdraw additional vapors into the air intake and discharge them through the vent 22. An air inlet header 56 leads from the fan at an angle to the crucible holder top part 24 which in turn has a plurality of holes 58 therein, FIGURE 2, to allow the stream of air to enter the crucible chamber above the crucible and to sweep through the crucible chamber and out through similar holes 59 in the other side of the crucible holder 24. An air outlet header 60 leads to the flexible vent 22 from the opposite side of crucible holder 24.

For initiating an incineration cycle there is provided an operating handle 62 mounted on a bearing support 64 extending from the side of housing 18. The handle 62 includes a shaft 66 which mounts a spur gear 68 on the end thereof within the housing. Spur gear 68 is in mesh with a pinion 70, providing a 1:2 drive, for example, and pinion 70 is secured to a stub shaft 72 rigid with rotary valve 34. At the other side of valve 34 a stub shaft 74 mounts a detent disc 76, see FIGURE 5. Detent disc 76 has a pair of notches 77 and 78 therein which are adapted to be contacted by a pawl 80 pivoted about pivot point 82 and biased into engagement with detent disc 76 by a spring 84. As shown in FIGURE 5, a crank extension 86 of pawl 80 carries a rod 88 having a flange 89 on the lower end thereof and this flange is adapted to contact a switch actuator plate 90 upon movement of the pawl 80 counter clockwise as viewed in FIGURE 5 about pivot 82. Switch actuator plate 90 controls switch contacts 92 of electrical switch 94. Also acting to control switch contacts 92, is a cycle timing cam 96, FIGURE 6, having a relief 97, therein. The switch actuating plate 90 has a follower 98 for dropping into relief 97, in the timing cam 96. An adjustable speed timing motor 100 is provided for driving the timing cam 96.

Within the portable apparatus in either the support or housing are positioned the remainder of the electrical components illustrated in FIGURES 7 and 8. These include a relay coil 102 controlling a relay switch 103 in series with switch 92, an incoming power line 104 controlled by an on-off switch 106 and associated electrical conductors shown in FIGURES 7 and 8. An A.C. transformer 108 and a choke coil 110 are provided in the power line. A carbon arc feed solenoid 112 and spring 114 as well as a rack and pinion carbon arc feed arrangement 116 may all be contained within the carbon arc feed assembly 44.

A latching solenoid 118, shown in detail in FIGURE 5 is also provided. The solenoid 118 is for the purpose of latching the pawl 80 by cooperating with the head of the pawl and is normally in unlatched position as shown in FIGURE 7 but may move to the latched position shown in FIGURE 9 when switch contacts 92 are closed, thus causing the solenoid coil to draw down the solenoid armature 120, FIGURE 5, down against the bias of armature spring 122.

In order to control and contain the heat generated by the carbon arc suitable thermal insulation (not shown) would be provided within the housing 18.

The operation of the incinerator will now be described, especially with regard to the components indicated schematically and the electrical circuit of FIGURES 7, 8 and 9. FIGURE 7 shows the device in the starting position when waste desired to be incinerated may be dumped into the upper pocket of rotary valve 34. In the starting position with power switch 106 closed, switch contacts 92 and relay contacts 103 are open, so that no power is applied to fan motor 52, timing motor 100, or to the carbon arcs which are in contact.

When waste W is in the valve pocket, the manual starting handle 62 may be rotated in either direction to start the cycle. As soon as it is rotated, gear 68 rotates gear 70 and this starts the valve 34 and the detent disc 76 rotating. A slight rotation of the handle 62 will cause the pawl 80 to move out of notch 78 in detent disc 76, thus causing rod 88 to pull up on switch actuator plate 90 and close switch contacts 92. With the power switch 106 closed, current will pass through relay coil 102 causing relay contacts 103 to close and applying the A.C. power to transformer 108 and to fan motor 52 while at the same time energizing the latching solenoid 118 so that armature 120 will be pulled down but it will contact the top of pawl 80 and will not hold the pawl from falling back into a notch in detent disc 76. The condition at this time is as shown in FIGURE 8. The power through the secondary transformer 108 operates the feed solenoid 112 for the carbon arc and the current flows through choke 110 while the feed solenoid separates the carbon sticks 38 and 39 and the arc is started. The rack and pinion assembly 116 centralizes the carbon sticks and the spring 114 biases the solenoid to return the carbon sticks together at the end of an incineration cycle. At the same time the carbon arc has started supplying a very intense heat for incineration the fan 50 is blowing air across the crucible 26. At this time the handle 62 has been rotated ⅛ turn while the detent 76 has been rotated ¼ turn and the valve 34 has been rotated ¼ turn as shown in FIGURE 8. Continued rotation of the handle 90° will dump the waste W to be incinerated into the carbon arc heated crucible 26 as shown in FIGURE 9 and incineration will take place in short order while the products of combustion will be carried out by the stream of air from fan 50. After the handle has turned 90° and the detent is turned 180° the pawl 80 engages the detent disc 76 and, for the remainder of the incineration cycle as shown in FIGURE 9, the magnetic latch holds the detent disc and hence the valve and handle to prevent any further attempt to start another incineration cycle until the first incineration cycle is complete.

All during the incineration cycle and after contacts 92 were closed, the timing motor 100 is running at a controlled rate. The time required for motor 100 and for timing cam 96 to make one revolution while holding switch contacts 92 closed, is the time of an incineration cycle and may be controlled by adjusting the speed of motor 100. After one revolution, the relieved portion 97 of cam 96 allows the contacts 92 to open and opening of contacts 92 allows the magnetic latch solenoid 118 to refract from behind the pawl 80 so that the pawl is again free to be forced out of its notch in detent disc 76 to again close contacts 92 and start another cycle.

While there have been shown and described and pointed out fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art with-

out departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

We claim:

1. An incinerator comprising, an incinerator crucible capable of withstanding high temperatures, a waste material feeding valve positioned above the crucible for feeding material to be incinerated and for closing the crucible from above during incineration, an electric arc heating means positioned adjacent but not inside a heating chamber defined by the valve and crucible for quickly raising the crucible to a temperature high enough to incinerate the waste material therein, and air moving means for moving a current of power driven air over the crucible during incineration for combustion and to entrain the products of combustion, and means synchronizing the operation of the feeding valve, heating means, and power driven air moving means upon initiation of an incineration cycle.

2. An incinerator for hospital wastes or the like comprising, a housing, an incinerator crucible capable of withstanding high temperatures supported within the housing, a rotatable waste material feeding valve position above the crucible and within the housing for cyclically feeding material to be incinerated and simultaneously closing the crucible from above during incineration, an electric carbon arc heating means positioned below the crucible within the housing to quickly raise the crucible to a temperature high enough to incinerate waste material therein, a motor driven fan within the housing for blowing a stream of air across the crucible and below the valve during the incineration for combustion and to entrain the products of combustion, and a vent for disposing of the entrained waste products of combustion.

3. An incinerator as defined in claim 2 further comprising control means for cyclically operating the incinerator upon rotation of the rotary feeding valve for starting the carbon arc heating means and the motor driven fan for a predetermined timed incineration cycle.

4. An incinerator as defined in claim 2 further comprising a rotary handle for rotating the feeding valve and for initiating the automatic cycle of incineration, and locking means for locking the handle and valve after the incineration cycle has been started and the waste material has been dumped into the crucible until the incineration cycle is completed.

5. An incinerator for hospital wastes and the like comprising, an incinerator crucible capable of withstanding high temperatures, a waste material feeding valve positioned above the crucible for feeding material to be incinerated and for closing the crucible during incineration, an electric carbon arc heating means positioned adjacent but not inside a heating chamber defined by the crucible and feeding valve for quickly raising the crucible to a temperature high enough to incinerate the waste material therein, and power driven air moving means for moving a current of air over the crucible during incineration for combustion and to entrain the products of combustion, flexible vent means for disposing of the entrained products of combustion, and automatic controls for starting the carbon arc heating means and power driven air moving means for a pretimed incineration cycle.

6. An incinerator for hospital wastes or the like comprising, a support, a housing on the support, an incinerator crucible capable of withstanding high temperatures supported by the support within the housing, a rotatable cylindrical waste material feeding valve positioned above the crucible and within the housing for cyclically feeding material to be incinerated and simultaneously closing the crucible from above during incineration, an electric carbon arc heating means positioned below the crucible within the housing to quickly raise the crucible to a temperature high enough to incinerate waste material therein, a motor driven fan within the housing for blowing a stream of air across the crucible and below the valve during the incineration for combustion and to entrain the products of combustion, a flexible vent with a normally closed valve openable with the stream of air from the fan for disposing of the entrained waste products of combustion, automatic control means for cyclically operating the incinerator when the rotary feeding valve is manually operated for starting the carbon arc heating means and the motor driven fan for a predetermined timed incineration cycle, a handle for operating the feed valve and initiating the automatic control means, and solenoid locking means for locking the handle and valve after the incineration cycle has been started and until the incineration cycle is completed.

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