A.D. 1850 . . . . . N° 13,331.

Manufacture of Charcoal.

KNOWLES' SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, Sir FRANCIS CHARLES KNOWLES, of Lovell, in the County of Bucks, Baronet, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her Royal Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Ninth day of November (One thousand eight hundred and fifty), in the fourteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Sir Francis Charles Knowles, my exors, admors, and assigns, Her especial licence, full power, sole privilege and authority, that I, the said Sir Francis Charles Knowles, my exors, admors, and assigns, or such others as I, the said Sir Francis Charles Knowles, my exors, admors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, in the Islands of Guernsey, Jersey, Alderney, Sark, and Man, and in all Her Majesty's Colonies and Plantations abroad, my Invention of "IMPROVEMENTS IN THE MANUFACTURE OF CHARCOAL;" in which said Letters Patent is contained a proviso that I, the said Sir Francis Charles Knowles, shall cause a particular description of the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, to be inrolled in Her Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Knowles' Improvements in the Manufacture of Charcoal.

NOW KNOW YE, that in compliance with the said proviso, I, the said Sir Francis Charles Knowles, do hereby declare that the nature of my said Invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the Drawing hereunto annexed, and to the figures and letters marked thereon, that is to say :—

My Invention or process consists in the carbonization of spent tanners' bark, bog peat, and other ligneous matter, without the necessity of employing external fireing ; and I also obtain the faculty of collecting all gaseous or other volatile products that are attainable by the process of dry distillation.

Description of the Drawing.

Figure 1, a circular furnace or cupola, built of brickwork, made parallel at the upper part, as at A, A, the lower part B, B, being made conical, and resting or terminating on an oblong cast-iron box C, C, open at the top. D, a spindle fitted and passing through the box, on to which are fitted a circular plate E at each end of the inside of the box, see Figure 2. F, F, F, wrought iron bars fitted into the end, placed round about two thirds of the circumference, and extending the length of the box, forming a set of fire bars when the bars are upwards, as seen in Figure 2. When the charge is required to be drawn the bars are turned downwards, when the space inside the bars will be filled through the opening between the bars from the cupola above. The bars are then brought back into their former position, and the contents of the drum of bars falls into the coned part of the iron box H, from which it is discharged through the flap I. J, a hand wheel fixed on the spindle K for giving motion to the drum of fire bars. L, a worm working into the wheel M fixed on the spindle D. N, N, N, carriage for carrying the spindle. I, an iron flap, air-tight when closed, fitted with spindle, lever, and counterbalance weight O. P, a cover with projecting ring to drop into a circular ring Q, to form a water joint for closing the top of the cupola. R, a pipe through which the vapour, gas and air are exhausted from the cupola by any well-known means, such as pumps or fan, &c. &c. S, counterbalance with rope T and pulleys U, U. Into the furnace already described and exhibited in the annexed Drawing put a quantity of dry shavings, so as to cover the semicircular revolving grate or box, Figure 2, and when lighted add dry spent tanners' bark, dry or compressed bog peat, or any of the particular substance to be operated upon. At the time when the strata of ignited matter is about two or three feet thick or deep, add, in small quantity, from time to time, fresh spent bark or other substance intended to be converted into charcoal, say from one to two bushels at each time. The pumps are now set to

work, or the fan is put into revolution, by which the atmospheric air is drawn downwards and through the mass, and by so pumping or turning the fan we feed or supply the furnace with the dose or quantity of atmospheric air required to carbonize but not sufficient to burn or decompose the substance operated upon. Now adjust the extremity of the tube or outward delivery of the fan into the tube, pipe, or connection of a purifier of gas, and thence by pressure drive the gas, or any other volatile product that may be formed, into a fixed or portable gasometer, as circumstances shall require or determine, whereby to retain, collect, and purify any gases or other volatile product that may come over during the process of carbonizing already described. When the furnace is completely full of charred or ignited matter, draw out about one fifth part or twenty per centum of the contents by turning the circular hand wheel or lever J, and then by descending the valve I the charcoal will fall into the cooling boxes or cases which are provided with covers that seal nearly hermetically close; from these, when cool enough, the charcoal is transferred to bags, &c. After drawing any quantity of charcoal, it is best and advisable to supply the furnace at the top with an equal quantity of raw material; by this means, and pumping, we keep a regular circulation of caloric and matter, whereby I maintain an uniform intensity and obtain an uniform product. When the work of the day is terminated, I close the upper damper P, leaving only a small space, say one quarter of an inch, all round to permit the escape of vapour or gas during the night. The greatest care is required to be taken when at work to lute up the external joints, and also the lower valve or discharging point of the furnace. The best lute for this purpose is a mixture of linseed meal, pipe clay, and linseed oil, mixed up thick as mortar. The luting is most important, as every small hole, crack, or opening will let in oxygen enough to decompose a great quantity of charcoal, and to produce considerable loss to the manufacturer. When the contents of the furnace are very compact or dense, either from the nature of the raw material or the length of time the operation may have previously required, or from the quantity of aqueous matter that is yet remaining in the mass generally, or from any other cause, unlute the lower valve and open it fully, and if the draught of air is not visibly improved thereby, I turn the circular grate and discharge a few bushels of charcoal; in a few minutes a sharp upward current will be established, passing upward through the circular grate and escaping at the top of the furnace. When the air has pervaded and penetrated the whole mass, which is ascertained by the rapidity of the ascending current and the heat it communicates, I am certain that the whole mass is ignited and undergoing perfect combustion; if at this time a too great degree of heat is experienced, and white ashes form with rapidity at the surface of the

furnace, the lower valve must be closed and luted, and the upper damper must be closed entirely, and fresh bark added. When it is necessary to collect the gaseous or other volatile products, the damper on the top must be closed to such a degree as to permit air to enter, but nothing to escape outwards, and the fan or pistons must be worked constantly and with its greatest speed; by this means the whole of the gas, volatile vapours, &c. are drawn downwards through the ignited mass of charcoal, and then into the well of the fan or pumps, after which it may undergo the ordinary purification common to gas, &c., and thence pass into a fixed or portable gasometer for consumption and use.

Another part of my Invention consists of compressing spent tanners' bark in moulds, and then saturating the same with tar in a boiling or highly heated state, by immersing the blocks so moulded or compressed in the heated tar till they are saturated. The blocks are then allowed to drain, and charcoal is made therefrom by the means above described, or by placing the blocks in ordinary retorts heated externally.

I claim, first, the means herein described of providing charcoal from light porous vegetable substances, such as spent tanners' bark, compressed or air-dried bog peat, or other ligneous substance of small specific gravity.

Second, the means and power of collecting the gaseous and volatile products that are formed during the dry distillation or decomposition of the raw material without employing external fireing or heating.

In witness whereof, I, the said Sir Francis Charles Knowles, have hereunto set my hand and seal, this Eighth day of May, in the year of our Lord One thousand eight hundred and fifty-one.

FRANCIS C. (L.S.) KNOWLES.

AND BE IT REMEMBERED, that on the Eighth day of May, in the year of our Lord 1851, the aforesaid Sir Francis Charles Knowles came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Enrolled the Ninth day of May, in the year of our Lord One thousand eight hundred and fifty-one.

JEFFERSON.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1857.

FIG. 1st

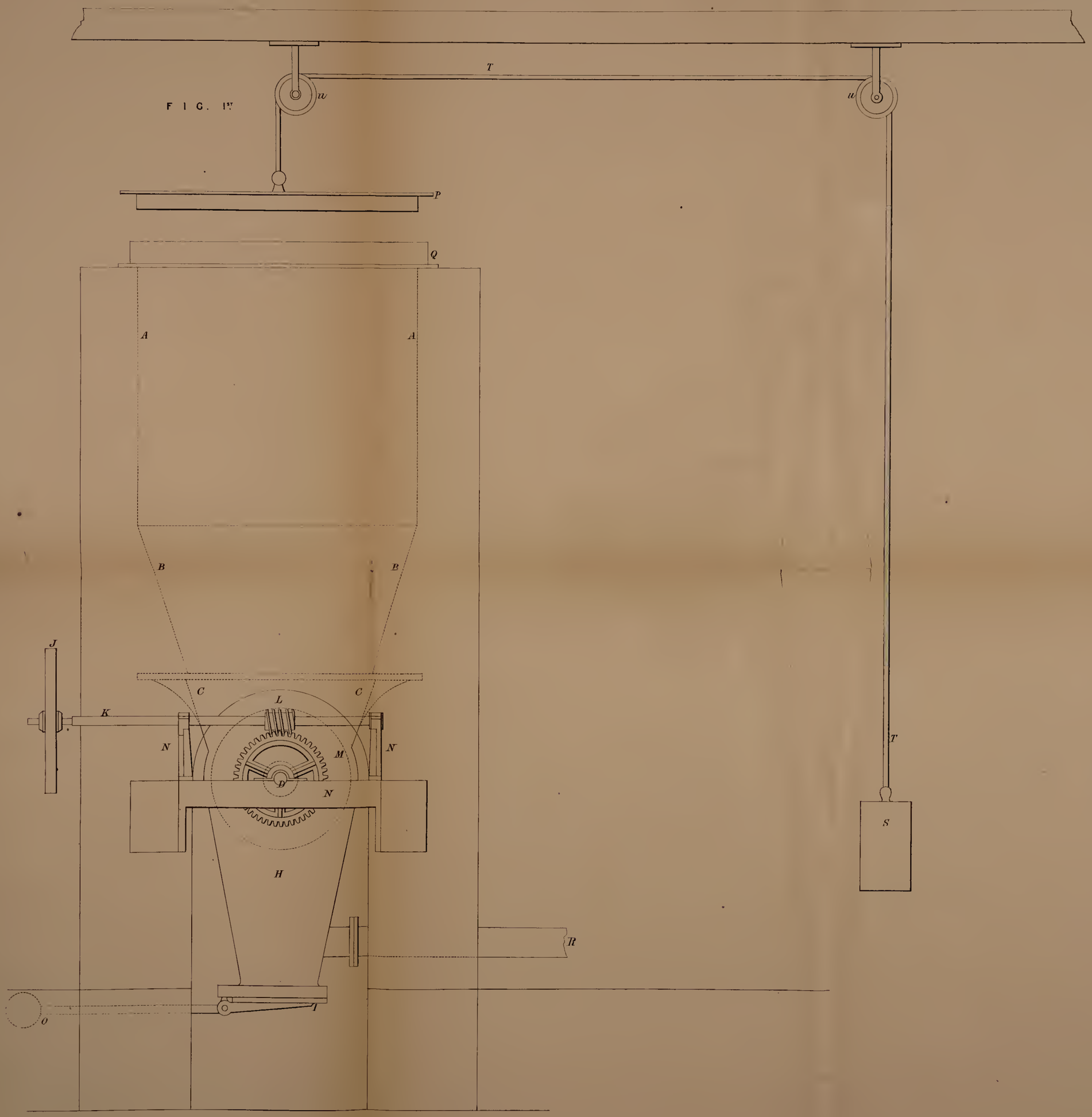
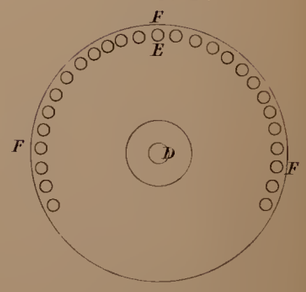


FIG. 2nd



The enrolled drawing is not colored.

Drawn on Stone by Malby & Sons

London Printed by George Edward Eyre and William Spottiswoode,
Printers to the Queen's most Excellent Majesty. 1857