

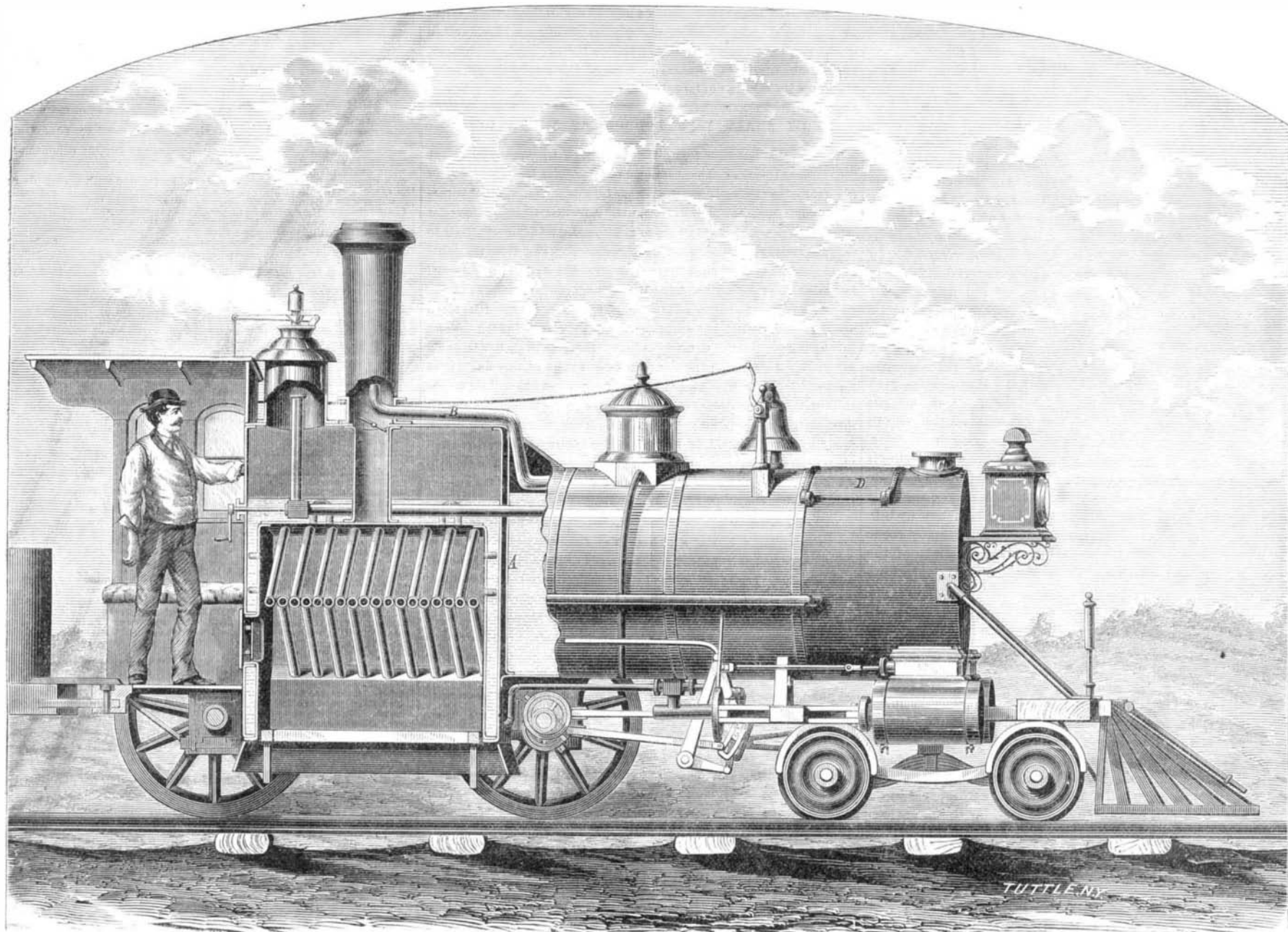
CASEMENT'S IMPROVED METHOD OF BURNING FUEL.

The improved steam boiler represented in the annexed engravings presents certain novelties in construction, by which it is the object of the inventor to utilize the largest possible portion of the fuel, and, by suitable mechanical means to render available, to the full extent, the heat of the ascending products of combustion. The imperfect utilization of the latter is a prolific source of waste, and for this reason

through their interstices. In the same proportion that they improve the combustion, they take up the greater heat produced thereby; and preventing the same from escaping by the flues, hold it, as the inventor claims, so that it is utilized by radiation, thus augmenting the power of the furnaces.

The principle upon which the invention is constructed is practically applicable to ordinary heating furnaces, stoves, or grates, and, as the inventor assures us, for any variety of

as much of the escaping heat as possible, a series of hollow dampers, shown at F, in Fig. 2, and in full detail in Figs. 3 and 4, are placed near the lower bend of the flues, D, and in chambers formed in the same. These dampers, which may be of any number, have for their shafts hollow tubes, which, passing through stuffing boxes in the shell, communicate with the water in the boiler, so that the dampers, in fine, being always full, form an additional amount of water



CASEMENT'S IMPROVED STEAM BOILER, LOCOMOTIVE, AND METHOD OF BURNING FUEL.

any device which may advance novel and useful ideas for preventing such loss may be considered as of important economical advantage.

The inventor proposes to conduct the products of combustion, rising from the fire, between and around a number of

fuel. The heat, it is asserted, absorbed and radiated by the balls, tends to increase the heat given off by the apparatus, while, at the same time, the amount of material consumed will be considerably reduced.

In Figs. 1 and 2 are shown longitudinal and transverse sectional views, from which the construction may be readily understood. Placed diagonally across the fire box, and intersecting each other, are two sets of water tubes. A, Fig. 2, the ends of which are expanded into plates forming the corners of the chamber. These tubes, while largely augmenting the heating surface and improving the circulation of the generator, have for their primary object the support of the balls, B, Fig. 2, which rest upon them. It will be observed that these balls are of varying sizes, the largest being underneath in each tier; by this means, it is believed, the entire substance carried up by the draft will be more effectually divided and brought into contact with the hot metal. C is the direct escape flue, which would, in practice, be used

space. Their location and arrangement, clearly indicated in Fig. 3, show that, when they are fully open, the escaping hot current is compelled to assume a zig-zag course, striking each damper in succession, thus, it is claimed, giving off its heat to the best possible advantage. These gates are connected by gear wheels, G, Fig. 4, so arranged that, by turning one, the motion will be communicated to the others, so that all are operated simultaneously. The grate in Fig. 2 is made vertically adjustable by mechanism which will be comprehended by a glance at the engraving. The racks, H, in the upper portion of the vertical bars of the supporting frame, engage with pinions which are connected by a single crank or similar means. By making the grate so that its distance from the balls may be graduated at will, the inventor states that the intensity of the heat acting upon the latter may be regulated; and in boilers having low fire space, more room can be obtained for the operations of firing, cleaning, etc. At I are shown a number of short return flues or sim-

Fig. 2

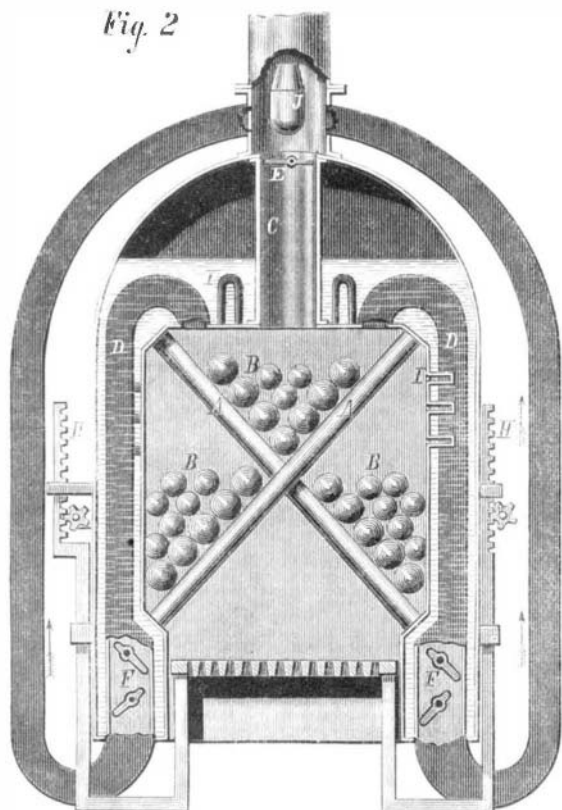


Fig. 3



Fig. 4

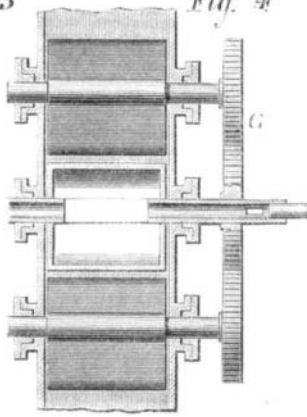
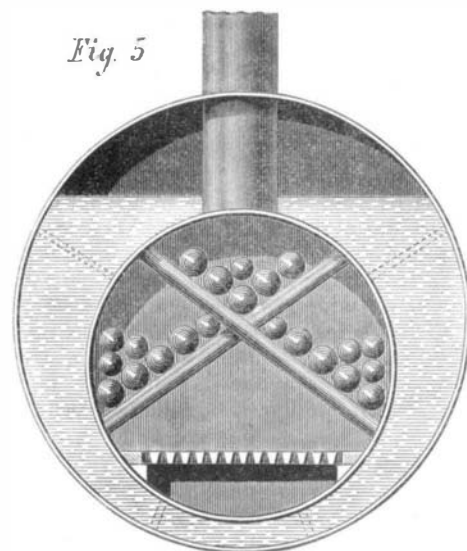


Fig. 5



balls or blocks of metal or other material; so that, the latter being intensely heated, the smoke, gases, etc., coming in contact with them, become entirely consumed. These balls are suitably disposed directly in the upper portion of the fire box, and in such manner as not to obstruct the draft which passes

in starting fires, or when a powerful draft was necessary. Ordinarily, however, it is proposed to employ the return flues, D. These open through the crown sheet of the boiler, pass down through the water space, thereby carrying the heat through the cold water near the bottom, thence return upwards and enter the direct flue, C. At E is a damper in the latter, by which its draft may be shut off when the return flues are in action. In order to regulate the draft, and also to take up

ly sockets let into the walls of the fire box and the crown sheet, in order to increase the heating surface, and at J is the extremity of the exhaust pipe from the engine, the escaping steam from which increases the upward current in

the uptake. In Fig. 5 is represented the application of a similar arrangement of tubes and balls to the ordinary cylindrical boiler. The construction is quite obvious from the engraving, so that no especial explanation is deemed necessary.

Referring once more to Fig. 1, in that illustration is shown both the improved boiler applied to a locomotive and also a peculiar construction of the latter machine. The form of the generator, it is clearly evident, does not comprise the large cylinder, which forms a part of the ordinary boiler, and the larger portion of the body of the motor; and consequently it is proposed to convert the same into a simple tank completely separated from the boiler by the double partition, A. The object of this is to render the locomotive adjustable in the matter of weight, by filling this receptacle with water or heavy solid material. To illustrate, the inventor considers it unnecessary, and in fact a waste of iron, to run a thirty-five ton locomotive over a road of varying grades, where its full tractive power is needed only on heavy up slopes, while a fifteen ton engine would do all the necessary pulling on levels or down inclines. With a light and compact boiler, with a tank as represented in the locomotive in our engraving, the total weight of the machine need not exceed fifteen tons; but by filling with water or other material, the same may be quickly increased to any desired extent up to the limit, say of thirty-five tons. At C, a small funnel is erected which is designed to receive the spout from water stations; and at D a door is placed, which may be used for gaining access to the interior of the tank, or for more conveniently throwing in weights. One or both of these apertures may be employed at will; and by the materials added, the weight of the locomotive may be quickly augmented or lessened in proportion to the load it is to draw and other circumstances. In case of a line having many ascending grades, rendering it necessary to change the weight of the engine quickly, while in motion, it is proposed to place troughs between the rails at the bottom of the slope and let the water be taken up into the tank in the ordinary manner now in use on many roads for filling the tender. On arriving at the summit of the grade, this water is discharged, and the locomotive once more rendered light.

The various parts of the machine, as shown in Fig. 1, are of the usual description and require no explanation. B is the exhaust pipe, to which we have already referred as entering the uptake at J, Fig. 2.

The construction of the boiler and the peculiar arrangement of the locomotive are made the subjects of separate patents, and the credit of the inventions is due to Mr. Daniel T. Casement, of Painesville, Lake county, Ohio, who has patented them, through the Scientific American Patent Agency, in the United States, Canada, England, Australia, and most of the countries of Continental Europe. Letters for further information should be directed, for the next three months, to the patentee, at the Fifth Avenue Hotel, New York city.

Prizes offered by the Paris Society for the Encouragement of National Industry.

In addition to the grand annual medal of commerce, Chaptal prize, a prize of 2,000 francs in the class of cotton industries, the Society offers the following prizes for the year 1874:

Table listing prizes for various categories such as 'For a small motor for home industries', 'Dressing of millstones', 'Practical and economic production of oxygen', etc., with corresponding prize amounts.

Details of these and other prizes to be obtained on application to the secretary, No. 17 Rue de l'Abbaye, Paris.

Bronze Casting under Artificial Pressure.

A French officer, Colonel Lavroff, has given his attention to the casting of bronze guns under a more efficient pressure than has hitherto been employed—a parallel operation with that of Sir Joseph Whitworth in the case of iron and steel.

A cast iron platform is laid on foundation walls; and upon the former rests, first, the ground plate of the mold, and secondly the mold itself, which is of great strength. This mold is surrounded by a heavy cast iron jacket, which is bolted to the platform; springs are arranged to protect the bolts and the other part of the apparatus against the effects of the dilatation of the mold after the running. The cover is furnished with a cylinder formed of clay or other bad conductor of heat, and on this is placed a metallic piston with a pocket or receptacle. The piston and pocket form one solid piece, which is supported in its position at the required level by iron bands. The opening for the metal as well as the pocket is lined with fire clay.

The upper part of the metallic mold and the inferior surface of the cover are also lined with fire clay, in order to retard as much as possible the cooling of the upper part of the casting. The air and gases escape from the mold by means of several conical vents. The apparatus producing the pressure consists of a frame formed of two cast iron cross pieces connected together by means of bolts. This frame, while embracing the mold, is at the same time freely suspended to the chain of a crane by means of an iron ring. The frame is furnished on its under side with a piece of metal,

which serves to close the opening through which the metal is run, and to transfer the pressure to the piston. This pressure is produced by means of an hydraulic press fixed to the lower part of the platform, its piston in its descent drawing down the frame.

The conditions laid down by Colonel Lavroff are as follows: (1) Each transversal section of the interior of the mold should be at least equal to any section above it. (2) The upper part of the casting ought to be preserved as much as possible from loss of heat, by means of a non-conducting lining within the mold. (3) Finally, the piston acting on the molten metal should present to it a non-conductor, and, moreover, should act upon the central portion of the liquid column and not over its whole surface.

HOW SHALL I INTRODUCE MY INVENTION?

This inquiry comes to us from all over the land. Our answer is: Adopt such means as every good business man uses in selling his merchandise or in establishing any business. Make your invention known, and if it possesses any merit, somebody will want it. Advertise what you have for sale in such papers as circulate among the largest class of persons likely to be interested in the article. Send illustrated circulars describing the merits of the machine or implement to manufacturers and dealers in the special article, all over the country. The names and addresses of persons in different trades may be obtained from State directories or commercial registers. If the invention is meritorious, and if with its utility it possesses novelty and is attractive to the eye, so much the more likely it is to find a purchaser. Inventors, patentees, and constructors of new and useful machines, implements, and contrivances of novelty can have their inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN. Civil and mechanical engineering enterprises, such as bridges, docks, foundries, rolling mills, architecture, and new industrial enterprises of all kinds possessing interest can find a place in these columns. The publishers are prepared to execute illustrations, in the best style of the engraving art, for this paper only. They may be copied from good photographs or well executed drawings, and artists will be sent to any part of the country to make the necessary sketches. The furnishing of photographs, drawings, or models is the least expensive, and we recommend that course as preferable. The examination of either enables us to determine if it is a subject we would like to publish, and to state the cost of engraving in advance of its execution, so that parties may decline the conditions without incurring much expense. The advantage to manufacturers, patentees, and contractors of having their machines, inventions, or engineering works illustrated in a paper of such large circulation as the SCIENTIFIC AMERICAN is obvious. Every issue now exceeds 42,000 and will soon reach 50,000, and the extent of its circulation is limited by no boundary. There is not a country or a large city on the face of the globe where the paper does not circulate. We have the best authority for stating that some of the largest orders for machinery and patented articles from abroad have come to our manufacturers through the medium of the SCIENTIFIC AMERICAN, the parties ordering having seen the article illustrated or advertised in these columns. Address

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Inventions Patented in England by Americans.

- List of inventions including CONDENSED MILK, FILTER, FOG SIGNAL, MAKING LAMPGLASS, PIPE WRENCH, SHOE TIP, and VENTILATING AND WARMING.

DECISIONS OF THE COURTS.

Supreme Court of the United States.

BASE BURNING STOVE PATENT.—HAILES & TREADWELL vs. VAN WORMER et al. [Appeal from the Circuit Court of the United States for the Northern District of New York.—October Term, 1873.]

A new combination is patentable if it produces a new result, although all the elements were previously known and in use. But the new results must be something additional to the results which were separately produced complete before by the different parts of the combination; a mere aggregation of those results is not such new result, and does not render a combination patentable. A grouping together of devices in which each one produces its customary effect unmodified by the rest, and no more, and in which no result follows the union which was not previously produced by some of the elements, is a mere aggregation, and not a legitimate and patentable combination. No one can prevent others from using certain specified devices, either singly or together, because he was the first to use them together, unless he has secured a patent for the result which was effected by the action of the constituent parts, and was not merely an aggregate of the effects which were produced by those parts when operating by themselves. A claim to a combination which is defined to be "substantially as described" is thereby limited to the elements which are described in the specification as composing it. Mr. Justice Strong delivered the opinion of the court: The bill of the complainant is founded on two patents, for alleged improvement in the burning of fuel. One is a release, dated February 3, 1863, and the other is an original, dated Aug. 11, of the same year. The earliest asserts twelve claims, of which the first five only are charged to have been infringed by the defendants, and the second contains six claims, upon the first and second of which alone it is averred there has been an encroachment. The answer of the defendants denies both the novelty and the validity of the inventions claimed, and it denies also the infringement charged in the bill. The stove containing the improvements described in the patents held by the complainants, and that manufactured and sold by the defendants, belong alike to a class of stoves long known as "base burners" or self feeders, called such because they have a magazine or reservoir suspended above the fire pot, which may be filled with coal at its upper extremity, and which, when filled, is closed by a cover. The lower end of the reservoir or feeder is left open, so that the coal in the fire pot is consumed, and the reservoir falls and supplies the place of that consumed, the combustion being only in the fire pot, and not in the reservoir. Many such stoves had been made, and they were well known years before either of the complainants' patents was granted, and it is not claimed that, merely as base burning stoves, they are within the monopoly of the patents. The inventions claimed are alleged improvements in the structure and arrangement of such stoves, and the result of the combination is a new combination of old and known devices, producing a new manufacture—namely, a stove uniting in itself all the advantages of a reservoir stove, and those of a reversible draft stove, which prevents the products of the combustion in the fire pot from passing up around and over the reservoir, thereby heating the fuel therein, so as to expel its gases, and cause their explosion as well as their escape into the apartments where the stove may be placed. All the devices of which the result is claimed were necessarily novel, and no claim is made for any one of them singly, as an independent invention. It must be conceded that a new combination, if it produces new and useful results, is patentable, though all the constituents of the combination were well known and in common use before the combination was made. But the results must be a product of the combination, and not a mere aggregate of several results each the complete product of one of the combined elements. On this point the law is necessarily a novel result, nor are they an old result obtained in a new and improved manner. Merely bringing old devices into juxtaposition, and there allowing each to work out its own effect without the production of something novel, is not invention. No one by bringing together several old devices without producing a new and useful result, the joint product of the elements of the combination, and something more than an aggregate of old results, can acquire a right to prevent others from using the same devices, either singly or in other combinations, if he has not secured a patent for the combination, or if he has not secured a patent for the combination, or if he has not secured a patent for the combination, or if he has not secured a patent for the combination. If, now, we examine the patents held by the complainants, looking first

at the objects sought to be obtained by the combinations for which the patents were granted, they are, as described in the specification, first, to prevent the passage of the products of combustion up, around and over the top of the coal supply reservoir, so as to heat a surrounding jacket thereof; and, secondly, to heat a circulating or ascending body of air by means of radiated heat from the fire pot, and at the same time to heat the base of the stove by means of direct heat circulating through descending flues which lead into the ash pit, or around it, and to the smoke and draft flue. A third avowed object is to secure economy by retarding the fall of the coal into the fire pot from the supply reservoir, and by causing the flame to circulate outside of the contracted discharge of the reservoir, and around the upper edge of the fire pot, and thence to descend around or under the base of the stove in its passage to the smoke and draft flue. Such are the avowed objects of the combinations claimed to have been devised by the patentees, and their effects they assert to be husbanding the radiated heat, and using it for the purpose of warming the upper part of the stove and the room, which is desired, as well as for heating air for warming rooms above, if desirable, and at the same time so confining the direct heat, and keeping it in contact with the base portion of the stove, as to insure warming it to a comfortable degree. A second effect claimed is relief of the incandescent coal from the weight of the body of superincumbent coal, thus preventing the compression of the burning coal in the fire pot, and during the flame free expansion, thus enabling it to act with greater heating effect upon the lower portion of the stove in its passage to the smoke and draft flue.

- List of devices employed to produce effects, including 1. A firing fire pot supported by a base, the diameter of the pot being larger at the top than at the bottom. 2. A magazine or reservoir for supplying coal, located over the fire pot, and having its lower end open to the fire pot. 3. Reversible passages of flues outside of the pot for the conduct of the products of combustion downward to the base of the stove, and thence to a main draft flue leading thereout. 4. A direct draft for such stoves as are constructed with reversible flues, the direct draft being obtained by a flue passing out above the fire pot, and provided with a damper to be closed after the fuel has been ignited.

These devices, with others, are brought together, and claimed as a new combination, and several combinations of some of them are also claimed as inventions producing novel and useful results. What those other devices are we need not specify, for it is not shown that they are employed by the defendants.

The stove of the defendants does, however, contain all those mentioned, and contains them in combination. That each of them was an old device, well known, and in public use before the patents of the complainants were granted, is abundantly proved by the evidence submitted. A firing fire pot, a supply reservoir with its lower extremity of smaller diameter than its upper, reversible flues, a place for flame expansion above the fire pot, the addition of a direct draft for use in lighting the fuel, provided with a damper, in the case of the interior of the stove and the insertion of mica therein, for the purpose of illuminating the room in which the stove may be with the light of the burning fuel.

There are other differences in the devices used both in the complainants' and the defendant's stoves, which we think are substantial, and not merely formal. The combination claimed by the complainants passes the products of combustion out of the chamber through perforations in the flange or through ears into flues leading downward, but wholly exterior to the fire pot, and not in contact with it. This arrangement makes it possible to introduce external air through perforations in the outer casing of the stove, and allow it, without contact with the fire, to pass up and around the descending flues, to escape from the top, accordingly the fire pot is perforated, and there is no closed magazine around the fire pot. But in the defendant's stove there is no such device, and no such effects are produced. There are no external downward flues separated from the fire pot. The whole space around the magazine and the fire pot is completely inclosed. There is but a single chamber around the reservoir, over the upper edge of the burning coal, and the fire pot, through this chamber the products of combustion pass, either through the direct draft flue, which is in use, or to the base of the stove, and thence outward. This arrangement also excludes the possibility of an effect claimed for the Hailes and Treadwell invention. It admits of no space around the fire pot to which the external air can have access.

It is not, then, the combination of old devices which the defendants use that Hailes and Treadwell have invented. It is not those old devices that produce the results claimed. The complainants' combination, on the other hand, it has a greater number of constituent elements. It consists in the employment of the devices used by the defendants, together with others they do not use, and the result of the entire combination is the production of a stove differing very materially from that of the defendants; and the defendant's combination cannot produce the results claimed for that of the complainants. We have said that the new results claimed, whatever they may be, are not the products of the combination of devices common to both stoves. The devices used by the defendants produce no new effects, because used in combination. The space around the fire pot leading to the base doubtless secures the beneficial results long known to follow the use of reversible flues. It may be conceded to be an equivalent for such flues; but the results of its construction are not changed by the fact that a firing fire pot and a supply reservoir, with a contracted discharge and a damper, and a direct draft, are used in the defendant's stove, still operate to conduct the products of combustion to the base and into the exit flue. No new operation is given to it by the combination. The same may be said of every other device employed by the defendants, which is also in the complainants' combination. Each produces its appropriate effect unchanged by the others. That effect has no relation to the combination; in no sense can it be called its product. Thus far nothing novel is produced, and no new result is obtained, by the combination of devices, and consequently the use of those devices, either singly or together, can be held to be any infringement of rights belonging to the complainants.

We pass now to consider more in detail the claims in the complainants' patents, which it is alleged the defendants have infringed. The first in the released patent, dated February 3, 1863, is unquestionably too broad to be sustained, unless limited to the means described in the specification. So it was doubtless intended by the patentee to be limited, for the claim speaks of the combination of certain elements as described in the specification. Thus limited, one of its essential elements is a closed combustion chamber over the fire pot, formed by a flange of the reservoir resting on the upper edge of the pot, and provided with perforations or ears connecting with two flues passing downward. This element is indispensable for the purposes asserted in the claim, as well as in the specification. And the peculiar construction of the chamber is more than formal. It is functional. It prevents the passage of the smoke and other products of combustion up, around and over the top of the reservoir, and thus being avowed subject of the invention, precisely the improvements patented. But this constituent of the combination the defendants have never used, nor have they used any corresponding device, or device producing the same results.

The second claim is for contracting the discharge end of the coal supply reservoir, expanding the fire pot, and extending the flame passage downward, and uniting operation of the base of the stove, and the fire pot, and the flange essentially as set forth. The means set forth for extending the flame passage downward are perforations through the flange, forming the lateral boundary of the closed combustion chamber, or ears leading thereout, and close flues extending from the ears or perforations downward at some distance from the fire pot, through a space bounded on one side by the fire pot, and on the other by an outer casing of the stove, perforated for the admission of external air. It might, perhaps, be claimed whether the device in the defendant's stove corresponding to this, by waiving the consideration of that question, it is very evident that the combination of the three devices named is not the work of invention. They have no relation to each other. Neither the form of the feeder nor the shape of the fire pot bears at all upon the direction of the draft passages. There is no novel result flowing from the joint operation of the three devices. The reversible flues have no more to do with a stove supplied by a chimney than they would have with a stove supplied by a direct draft, therefore, nothing in this claim that interferes with what the defendants have done.

An essential element of the combinations mentioned in both the third and fourth claims is the closed combustion chamber, formed in part by a circular flange extending outward and closing on the top of the fire pot, with perforations in it, or ears for connection with the downward flues, or it is those perforations or ears leading out of such a chamber to the descending passages. These devices the defendants do not employ, and they cannot be used in the defendant's stove. There has been, therefore, no infringement of these claims.

The fifth claim is the only remaining one contained in the release which the defendants are alleged to have infringed. It is constructing the fire pot of a base burning stove with an imperforated circumference, and in the form of a trumpet mouth, with its lower extremity, in combination with the descending flame passages, substantially as described, and for the purposes set forth. How in combination? As described in the specification, united by means of perforated flanges or ears of the pot, involving, of course, the presence of a closed combustion chamber constructed substantially as already described. Construing the claim thus, as we think it must be construed, the defendants have been guilty of no infringement.

Passing now to the second patent, issued August 11, 1863, we observe that its first claim was for a combination of the illuminating openings, flame expansion chamber, coal supply reservoir, fire pot, descending flue, and draft flue, substantially in the manner and for the purpose described. In the main, this is the same combination as that claimed in the released patent we have had under consideration. The only change is the addition of illuminating openings. These were a well known device applied to stoves long before either of the patents were granted. They performed a peculiar office in the new combination, and it is necessary to specify them, in order to effect, in the slightest degree, the results of that combination, whatever they may be. It is impossible to regard the mere addition of such openings to a stove containing the improvements described in the released patent as the formation of a new patentable combination. It is not invention. If, however, it were, the defendants have not trespassed upon it, for of the combination the peculiarly formed closed expansion chamber is an essential constituent, and that is a novel result, as found in the defendant's stove. The only remaining one alleged to have been infringed. All the elements of the combination have not been used by the defendants. The decree of the circuit court is affirmed.