

(No Model.)

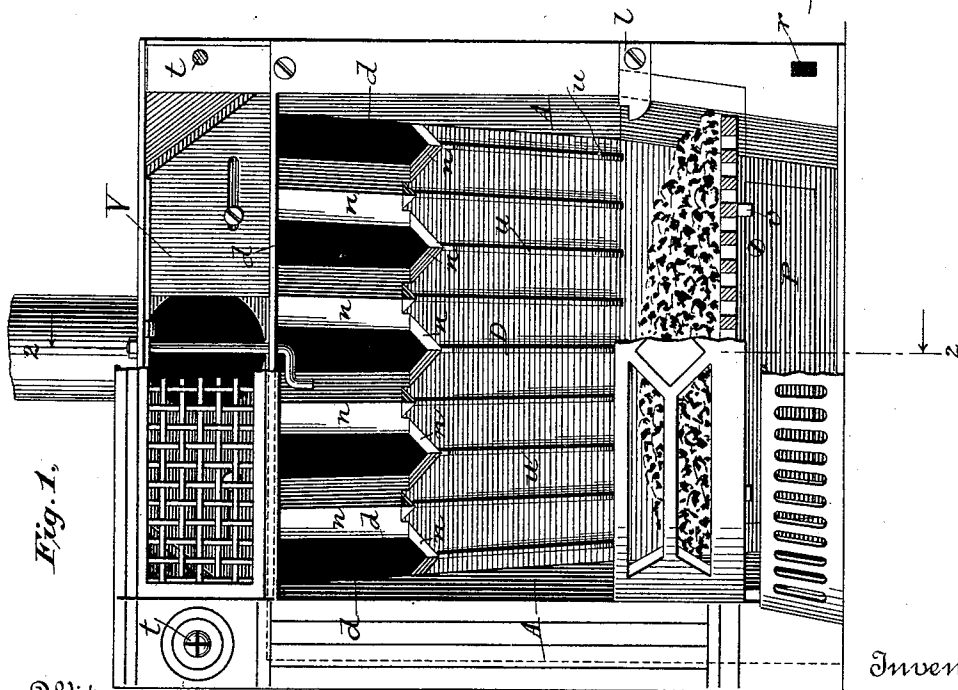
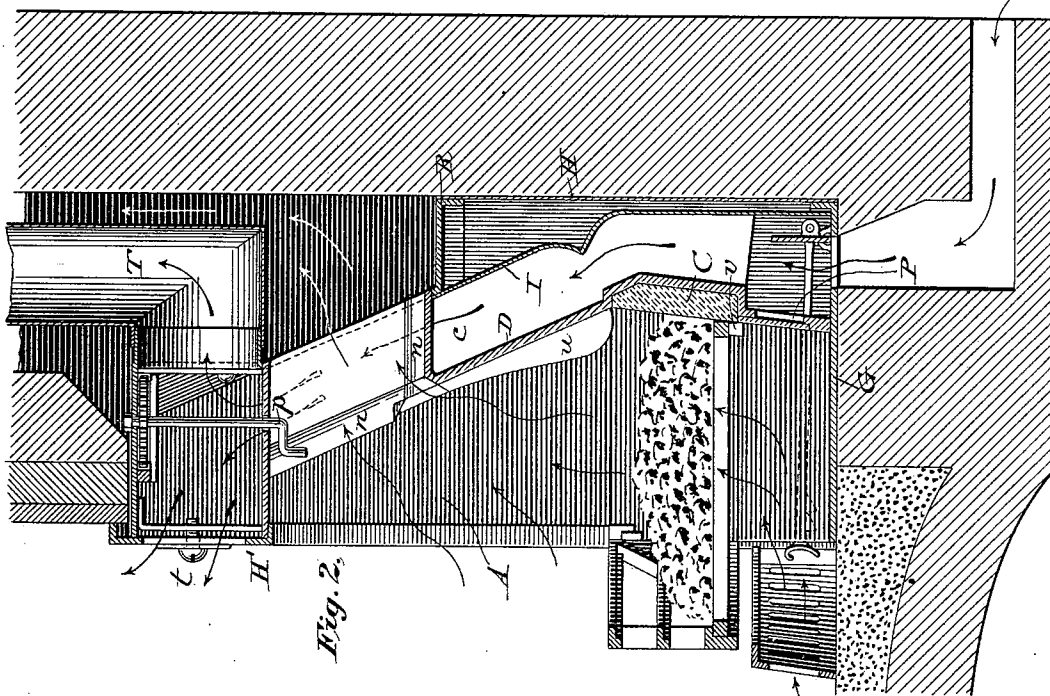
3 Sheets—Sheet 1.

E. A. JACKSON.

HEATING AND VENTILATING GRATE.

No. 394,653.

Patented Dec. 18, 1888.



Witnesses
Geo. W. Drexler.
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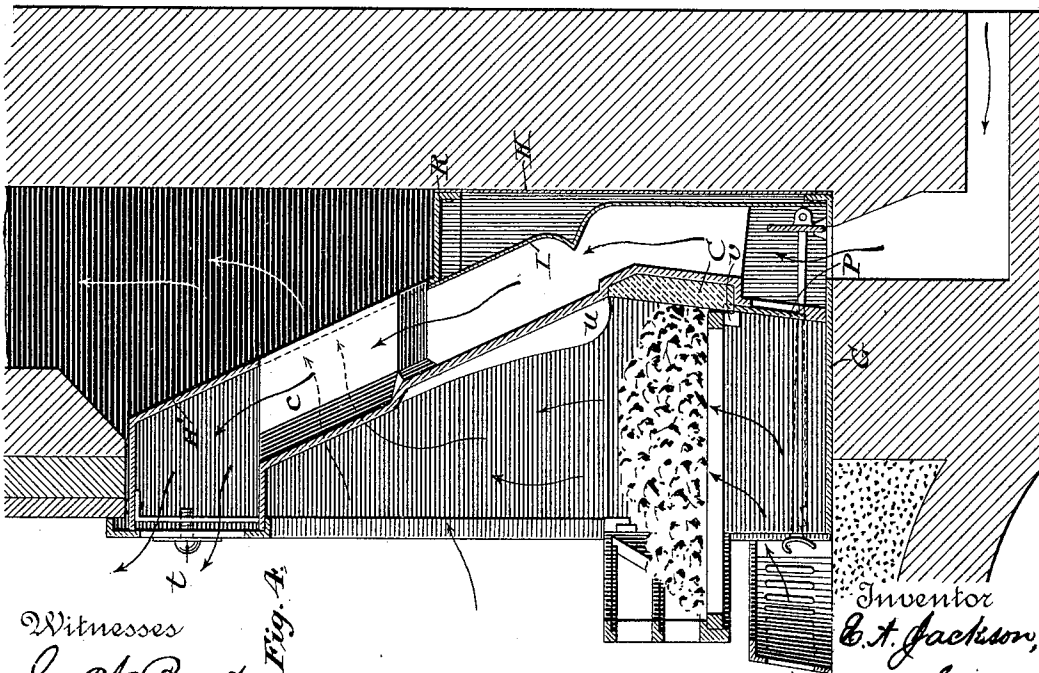
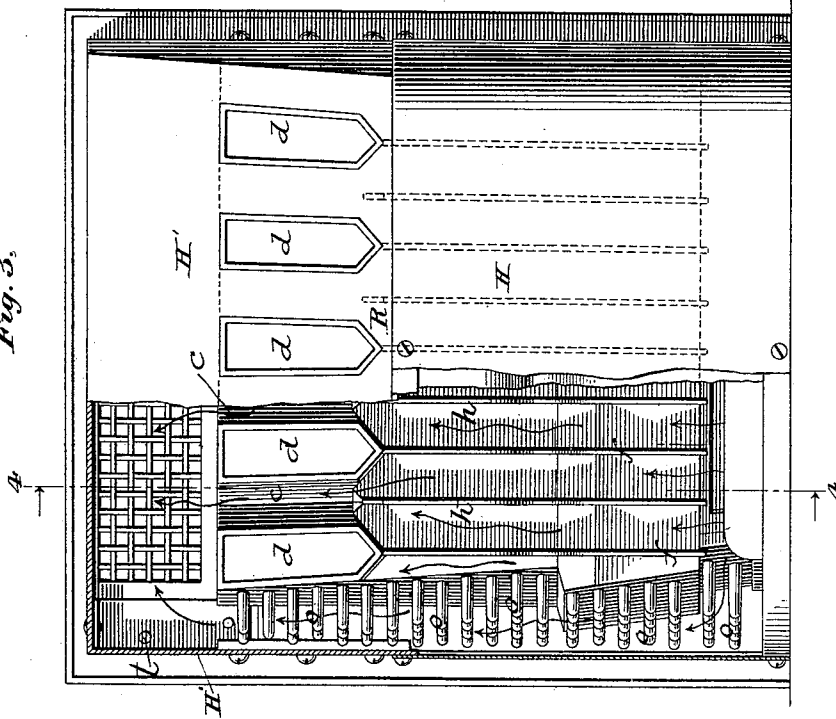
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Fig. 3.



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Fig. 4.

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Fig. 5.

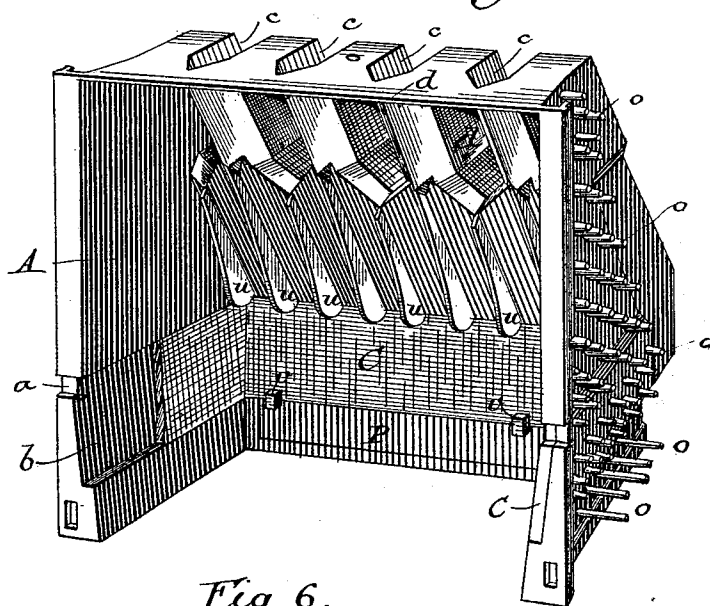
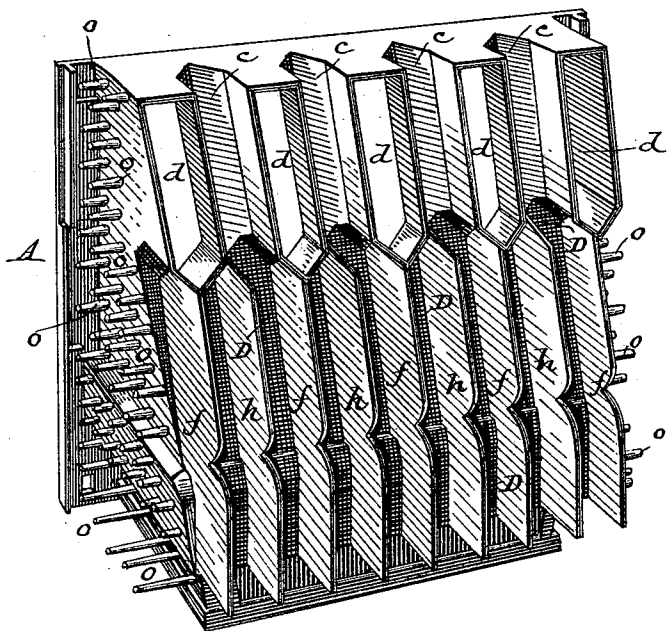


Fig. 6.



Attest.

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UNITED STATES PATENT OFFICE.

EDWIN A. JACKSON, OF NEW YORK, N. Y.

HEATING AND VENTILATING GRATE.

SPECIFICATION forming part of Letters Patent No. 394,653, dated December 18, 1888.

Application filed June 12, 1888. Serial No. 276,797. (No model.)

To all whom it may concern:

Be it known that I, EDWIN A. JACKSON, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Heating and Ventilating Grates, of which the following is a specification.

My present invention relates to fire-place grates of that class which are designed to warm and ventilate rooms by the introduction of a current of fresh air, which is warmed by bringing it in contact with the back and side walls; and the invention consists in certain improvements in the construction in the cast-iron back or body of the grate or heater, as hereinafter more fully described.

Figure 1 is a front elevation with a portion in section. Fig. 2 is a transverse vertical section on the line 2 2 of Fig. 1. Fig. 3 is a rear elevation with a portion of the outer casing removed. Fig. 4 is a transverse vertical section on the line 4 4 of Fig. 3. Fig. 5 is a perspective view from the front of the cast-iron body complete and detached. Fig. 6 is a similar view from the rear.

Several patents have heretofore been issued to me for grates or fire-place heaters designed to ventilate and warm rooms by the admission of a current of air brought from the exterior of the building and warmed by contact with the back and sides of the body of the grate, and which have proven very successful in use. By long experiments with grates of this character I have found that there are certain difficulties to overcome, and which hitherto have not been fully accomplished. As the height of these grates is but about thirty inches, and as the air can be held in contact with the heating-surface during only the time that it is passing from the bottom to the top of the grate, it is difficult to heat the air to the extent desired, especially when it is used for warming rooms above. Attempts have been made to remedy this by obstructing the air-passages by plates, &c., arranged to deflect the current of air, causing it to pass around and under or over these obstructions, frequently turning it at a right angle or more from its direct line of movement; but when this is done the flow of the air is so retarded that the amount which enters the room is greatly reduced, and thus the desired warming and

ventilation are prevented. It is also common to make these grates of separate plates or parts and then fasten them together with bolts or screws. It is next to impossible without great expense to do this and make the joints perfectly tight; and even if so made at first the joints soon become more or less open by the heating and warping of the parts, and then the noxious gases from the fire passing through the open joints into the air-passages mingle with the air that is brought into the room.

Now, the object of my invention is to remedy these difficulties, and to that end I construct the cast-iron back or body A of the grate of a single piece in the form shown in Figs. 5 and 6. The sides are made somewhat flaring outward toward the front, the back being nearly vertical for a distance equal to the height of the fuel when in use, and from that point the part D of the back is inclined forward, as shown in Figs. 2, 4, and 5. A recess, b, is formed in the sides and back, as shown in Fig. 5, for the reception of fire-brick, C. Near the top of the back five or more flues, d, are formed for the passage of the smoke, the front walls of these flues being beveled or inclined all around, as at n, Figs. 1 and 5, to permit the more ready entrance of the smoke, as I have found that a flat surface at that point is apt to cause the grate to smoke, this being due to the fact that the air which enters the grate from the room and near the top, impinging on the flat surface, obstructs the flow of the smoke and tends to cause more or less of it to puff out into the room, which, when it occurs, is a great annoyance.

In order to produce the largest possible amount of heating-surface for the air to be brought in contact with and at the same time not obstruct its flow, I make on the back side of the body A at its upper portion an air passage or flue, c, between each adjoining pair of the smoke-flues d, as shown in Figs. 5 and 6, these flues c being formed by the extension rearward of the side and bottom walls of the smoke-flues d. These air-flues c are extended down to the bottom of the back, or nearly so, by plates f, which are united to the lower V-shaped edge of the wall of the smoke-flues d, as shown in Fig. 6, and which project rearwardly from the back, as shown.

In order to secure an increase of the heating-surface for the passing air to be brought in contact with, I locate in each of the air-flues *c* a similar plate or flange, *h*, of the same size and shape, these plates *h* terminating at their upper ends on a line with the bottom of the smoke-flues or a little above, thus dividing each air-flue *c* into two flues or passages from the bottom of the smoke-flues downward, the object, however, being to produce more heating-surface, as the plates *f* and *h* will both conduct the heat throughout the entire extent of their surfaces and of course furnish a large increase of heated surface, against which the air impinges as it passes upward. If desired, this may be still further increased by increasing the number of plates *h*. For instance, there may be two of them in each flue *c*, or there may be a shorter plate located in the flue *c* on each side of the plate *h*, thus increasing still more the heating-surface. It will be obvious to any one skilled in the art that there is no limit to the number of these plates that may be used, provided there are not so many as to materially obstruct the passage of the air.

In order to conduct the heat more effectually to these rear plates, *f* and *h*, I locate a corresponding series of vertical plates or projections, *u*, on the front face of the inclined portion *D* of the back, as shown in Figs. 1, 4, and 5. As there shown, these plates *u* extend from the bottom of the smoke-flues *d* down to the top of the fire-brick lining *C*, and will of course be highly heated and will conduct the heat to the back and to the plates *f* *h* on its rear. They may be more or less in number, and, as is obvious, the spaces between them will thus constitute a series of shallow flues, up which the smoke, flame, and gases will ascend in a direct line, and thus they will aid to prevent the smoke from being wafted sidewise by sudden gusts or currents of air and thus forced out into the room, as not unfrequently happens, especially when there happens to be a door near to and at one side of the grate. In addition to these heating-surfaces at the back a portion of the air is permitted to pass up in contact with the side walls of the back or body *A*, and, as shown in Figs. 5 and 6, these walls are provided with a series of projecting pins or studs, *o*, which serve to impart heat to the passing current of air in the same manner as the plates *f* and *h* do. These studs or pins *o* are also cast integral with the body in the usual manner—that is, by having the pattern provided with holes of a corresponding size, and then, while the pattern is in the sand-mold, after the top has been lifted off, thrusting a plug of the proper size through the holes from the inside of the pattern into the sand, and then withdrawing it, thus leaving a series of holes in the sand, into which of course the molten metal will flow when the casting is formed, and thereby producing the pins or studs.

While for convenience of description I have

spoken of the parts *f*, *h*, and *u* as “plates,” it should be understood that they are all cast integral with the body *A*. It is obvious that they might be made separate and then be fastened to the body; but that would add to the expense, and, besides, they would not conduct the heat so effectually, because their union with the body would not be so intimate or perfect. The body *A* is thus formed in one solid piece of metal, cast complete at one operation, and without the use of any dry-sand cores, care being taken to so form the pattern that it can be molded in green or moist sand and have all parts of it draw, leaving the cores; or, to use the technical terms of the molder, there is no “back-draft,” which would necessitate the setting in of separate or dry-sand cores, the use of which adds much to the expense, and also to the uncertainty of getting a good casting. To do this all recesses, depressions, or cavities in the pattern must have their sides made at nearly a right angle with the face that rests upon the “bed-board” when molding—as, for instance, the flues *d*, if on any other angle than the one shown, would not leave their cores in drawing the pattern from the sand, but would require separate or “dry-sand” cores to mold them in one piece with the body.

Just below the brick *C*, at the back, I make an oblong opening, which is closed by a plate, *P*, as shown in Figs. 2, 4, and 5, the object of which is to afford access to the air-chamber in the base in order to cement the joints around the air-opening in the base, so as to prevent the escape of air into the space or chimney in rear of the heater, and also prevent any dust or fine ashes from entering the air chamber or flues.

On the upper edge of this plate *P*, I cast two projecting lugs, *v*, which serve the two-fold purpose of holding the brick *C* in place, and also supporting the rear edge of the fuel basket or grate, the latter being supported at its front by a couple of small plates or lugs, *l*, which are secured in recesses *a*, made for them in the front edge of the side walls of the body *A*, as shown in Figs. 1 and 5. The body *A* thus formed in one piece without any joints I secure to a base-plate, *G*, as shown in Figs. 2 and 4, and which projects some distance in rear to the outer edges of the plates *f* and *h*, and is provided with an oblong opening for the entrance of the air to be warmed, and which, as usual, enters through a suitable opening or pipe from the exterior of the building. This opening is provided with a valve which has a rod connected to it, and which extends out at the front, as shown in Figs. 2 and 4, where it can be operated to close or open the air-passage at will.

To form a rear or outside wall to the air-passages at the back and sides of the body *A*, I provide a plate, *I*, which covers the back from the base-plate up to the bottom of the smoke-flues, as shown in Figs. 2 and 4, and over this I secure another plate of sheet metal,

H, which extends across the back and around both sides, it being securely fastened in place to the body A and the base-plate G. By this means I form a dead-air chamber in rear of the air-passages, which serves to prevent the radiation and loss of heat into the chimney or space which usually remains behind these grates when set in an ordinary fire-place, the chimney with these grates being used for the escape of the smoke, and which would therefore also permit the escape of whatever heat might be radiated or conducted into the space in rear of the heater.

The covering-plates H and I, as shown in Figs. 2 and 4, extend up only to the bottom of the smoke-flues *d*, where it is fastened to a laterally-projecting flange, R, of a hood, H', which covers the upper part of the air-flues *c* and also the top of the grate, as shown in Figs. 1, 2, 3, and 4. This hood H', as shown in the drawings, is made to fit over and around the top portion of the grate, and is made to fit snugly around the rear edges of the smoke-flues, as shown in Figs. 3 and 4, thus forming a continuation of the rear walls of the air-flues *c*, while permitting the smoke to pass through the flues *d* into the chimney in rear of it. It is made to inclose the sides also, and is carried far enough above the top of the body A to form a chamber or large space over it, into which the air passes from the back and sides and from which it escapes through a guard or screen at the front, as usual, into the room.

When it is desired to use these heaters for warming a room above, then the hood H' is made with a collar for the attachment of a pipe, T, as shown in Fig. 2, through which pipe the warm air is conveyed in whole or in part to the upper room; and in order to regulate the quantity of air for each or either room a damper is arranged at the mouth of the opening, so it can be closed in whole or in part at will, this damper in this case consisting of two sliding plates, V, having each an arm provided with teeth which engage on opposite sides with a pinion, the shaft of which projects downward through a hole in the top of the body A, where it is bent in the form of a crank, as shown in Fig. 2, by which the pinion can be turned in either direction, and thus draw the damper-plates together or shove them apart at will.

By examining Figs. 2, 4, and 6 it will be seen that the rear edge of the plates *f* and *h* have a notch formed in them at a point just opposite the top of the fire-brick C, and that the back plate, I, is made to fit this configuration for the purpose of throwing the ascending current of air directly against the back at its hottest point in order to more effectually extract the heat therefrom, and thus prevent the back D and the plates *u* from being burned

out, they, necessarily, being subjected to the most intense heat, and this also heats the air more thoroughly.

The front frame (shown partly in Fig. 1) may be of any ornamental pattern, and is secured to the body by lugs which engage in holes *r*, Fig. 1, near the bottom, and by screws *t* at the corners above.

By this construction I produce a heating and ventilating grate the body of which can be cast complete in a single piece in ordinary sand molds without the use of dry cores, and which has no joints or cracks for the passage of dust, ashes, smoke, or noxious gases, with smoke-flues which permit the free passage of the smoke and prevent the smoke or gases from escaping into the room, and which at the same time secure an increase of the heating-surface, with the air-passages so arranged as to permit the air to flow freely in a nearly direct line and without obstruction.

Having thus fully described my invention, what I claim is—

1. The shell or body A for a heating and ventilating grate, having a series of smoke-flues, *d*, projecting horizontally backward from its upper part, with spaces *c* between said flues, and a rearwardly-projecting plate or flange, *f*, extending from the lower edge of each smoke-flue to the bottom of the body A, all constructed and formed as shown and described, whereby it is adapted to be cast complete in a single piece in an ordinary sand mold without the use of dry cores.

2. The body A for a heating and ventilating grate, having its back provided with a series of vertical flanges, *f*, and its front side with a series of vertical flanges, *u*, and having at or near its top a series of rearwardly-projecting smoke-flues, *d*, all cast complete in one piece, as herein set forth.

3. In combination with the grate-body A, provided with the horizontally-projecting smoke-flues *d* and the vertical flanges *f*, the inclosing-shell or plates H and the hood H', adapted to fit over the upper part of the body and around the separate smoke-flues, substantially as shown and described.

4. The herein-described body for grates, cast complete in one piece and having a series of horizontally-projecting smoke-flues, *d*, with their mouths or front edges beveled, and having a series of rearwardly-projecting plates or flanges, *f*, extending from the lower edge of the smoke-flues to or near the bottom of the back, substantially as shown and described.

In witness whereof I hereunto set my hand and the presence of two witnesses.

EDWIN A. JACKSON.

Witnesses:

SAML. K. J. THOMPSON,
JAMES J. McGRATH.