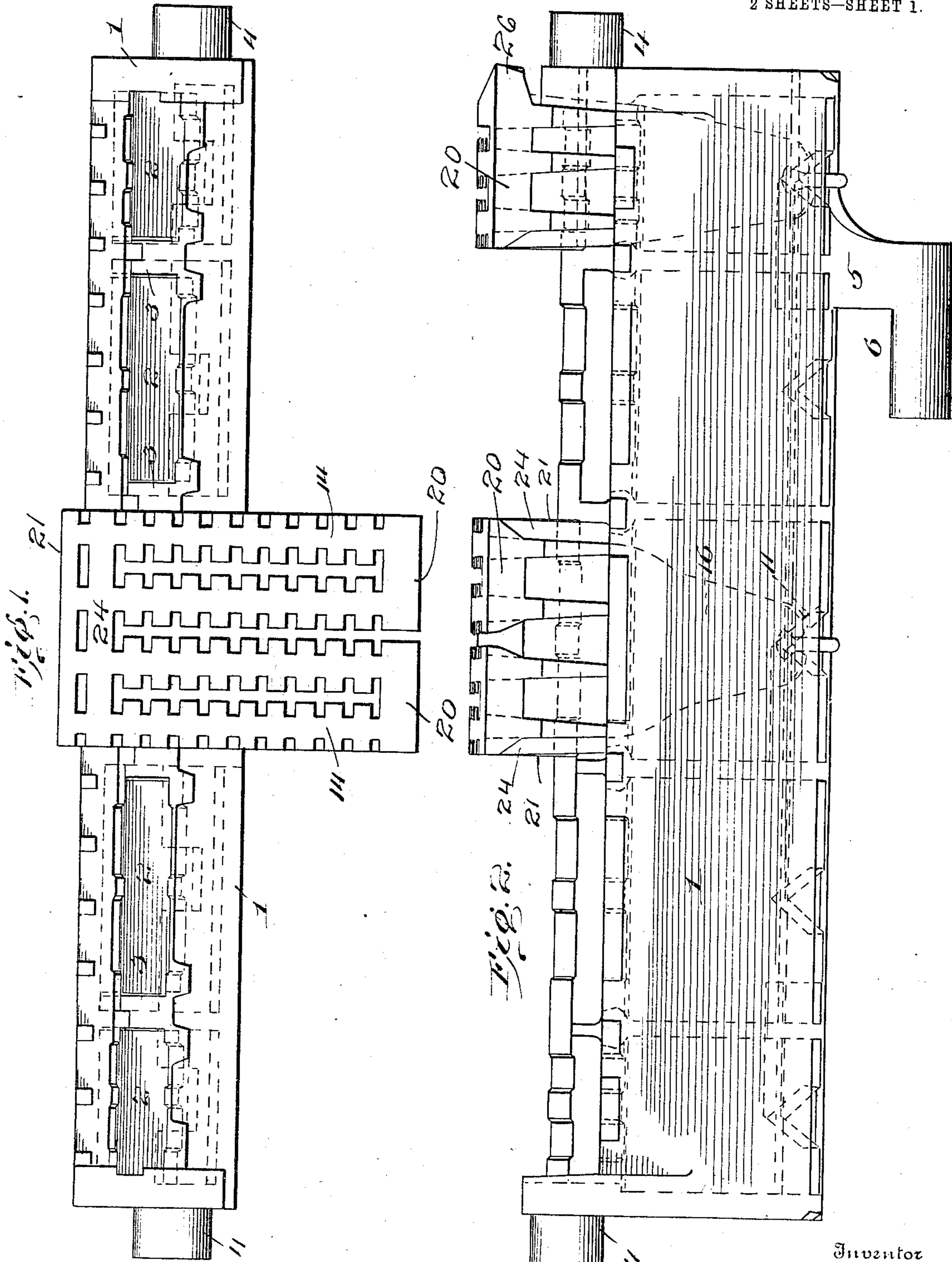


No. 812,071.

PATENTED FEB. 6, 1906.

W. McCLAVE.
SECTIONAL GRATE BAR.
APPLICATION FILED NOV. 3, 1904.

2 SHEETS—SHEET 1.



Witnesses
J. M. Fowler Jr.
Ruth J. Mitchell

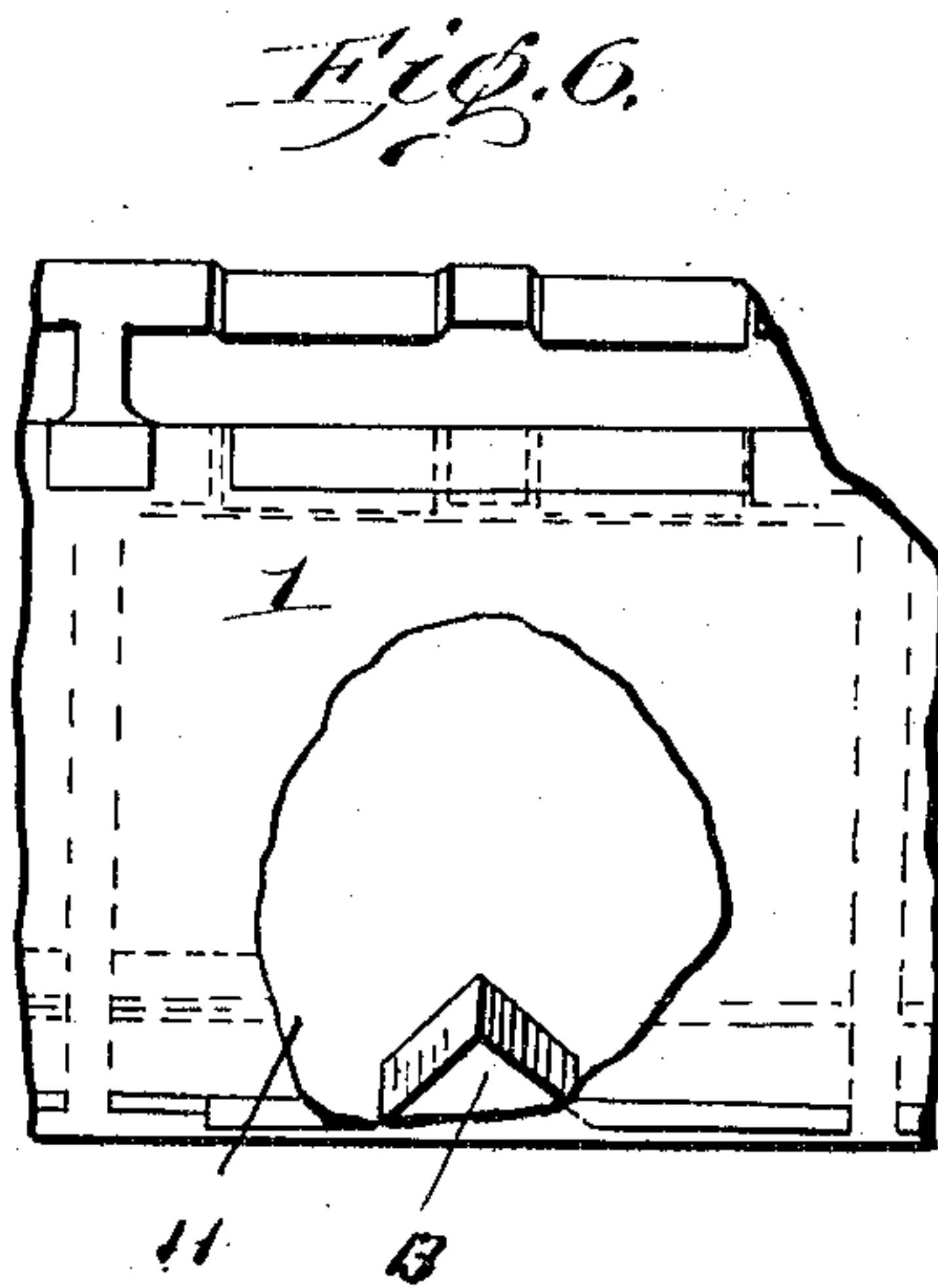
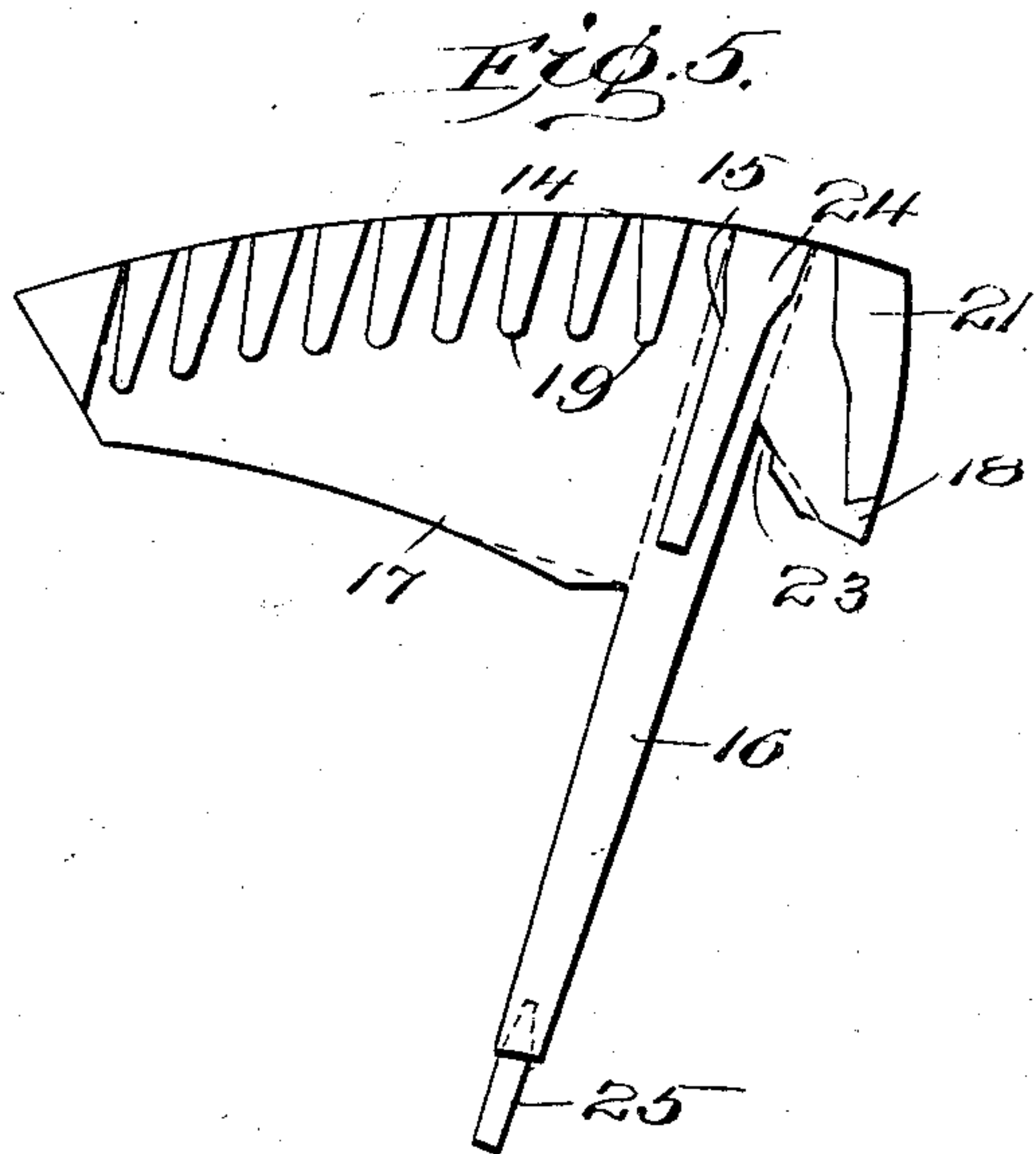
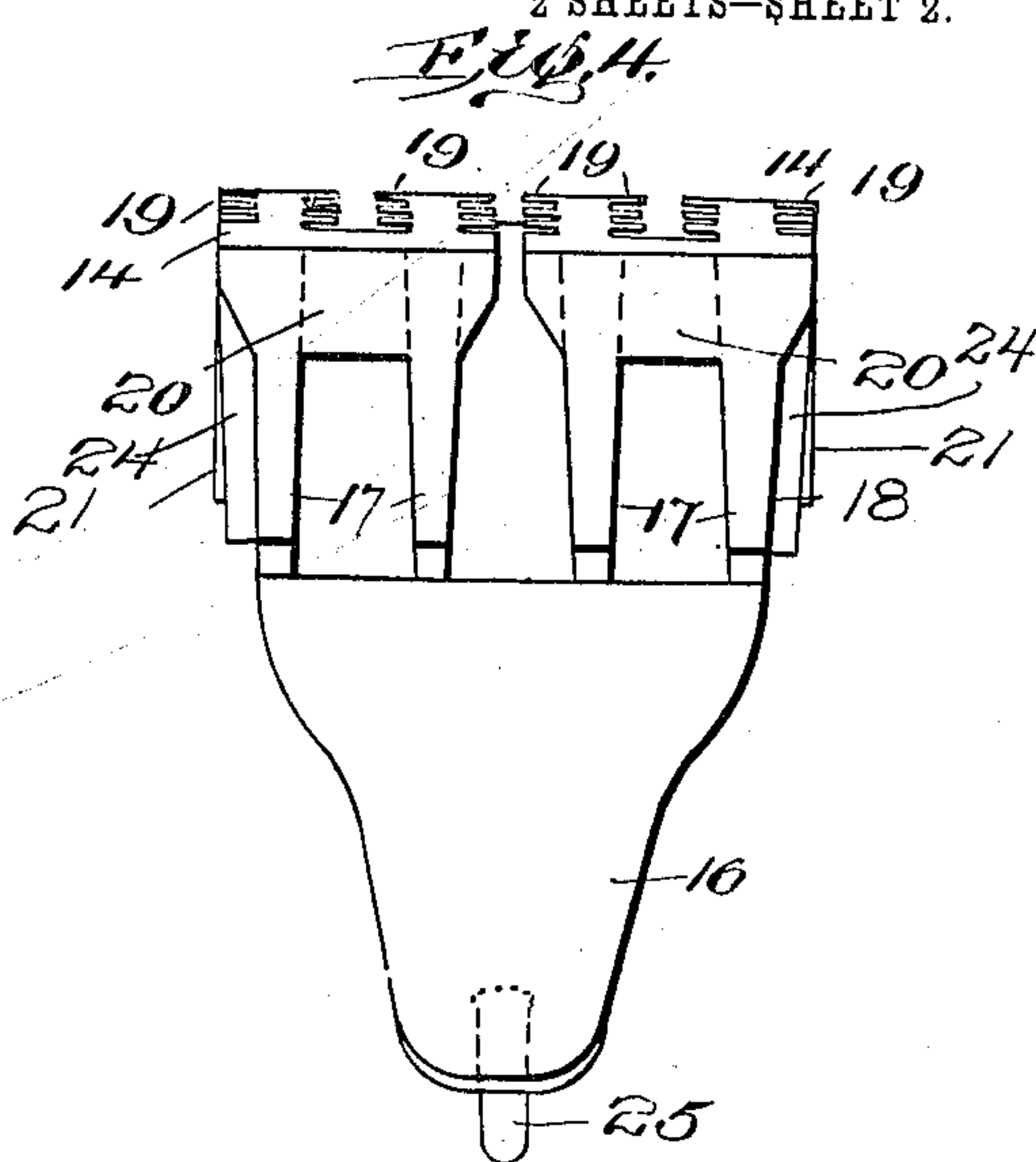
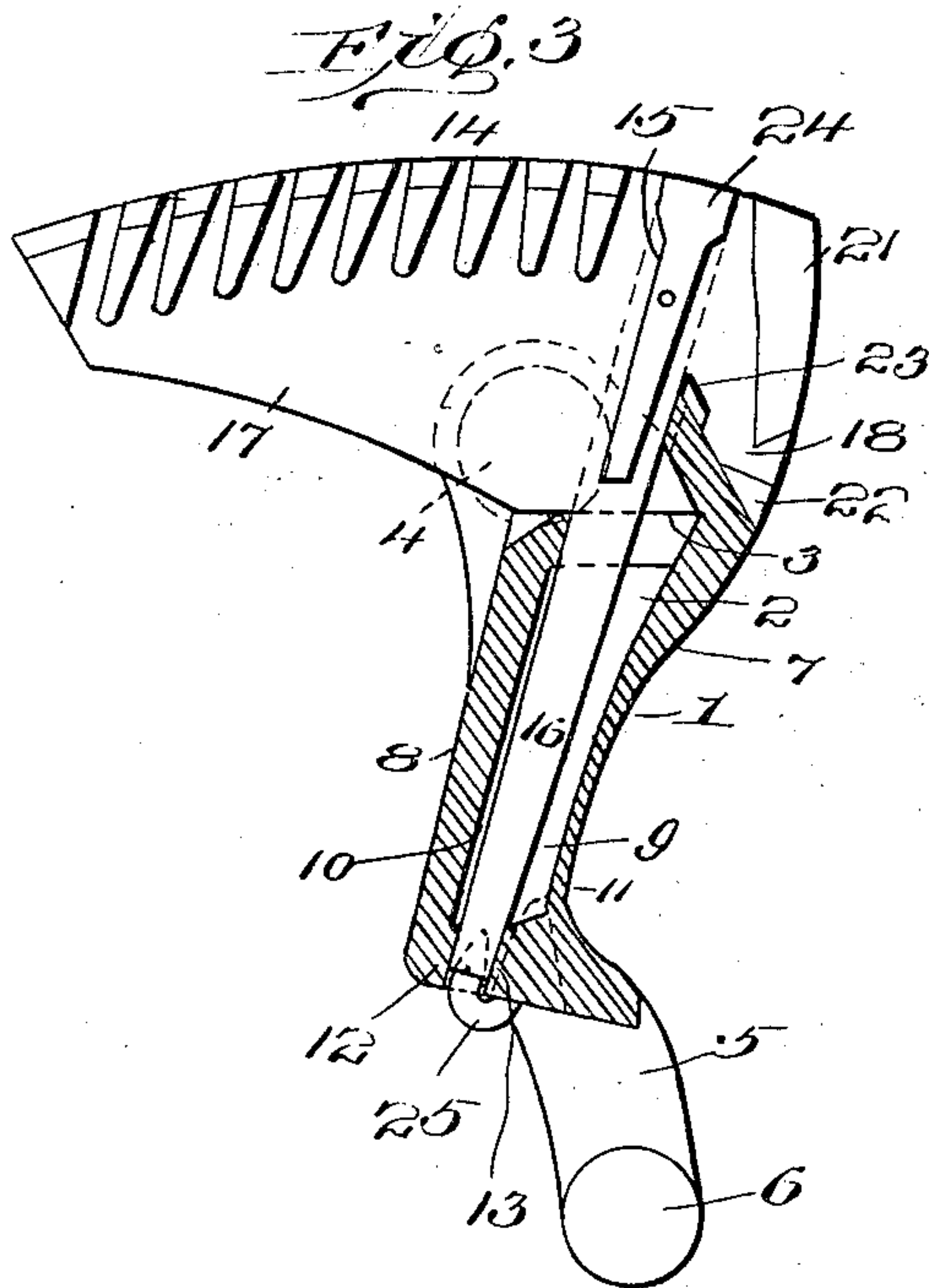
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UNITED STATES PATENT OFFICE.

WILLIAM McCLAVE, OF SCRANTON, PENNSYLVANIA, ASSIGNOR TO
McCLAVE-BROOKS COMPANY, A CORPORATION OF PENNSYLVANIA.

SECTIONAL GRATE-BAR.

No. 812,071.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed November 3, 1904. Serial No. 231,250.

To all whom it may concern:

Be it known that I, WILLIAM McCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Sectional Grate-Bars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in grate-bars, and especially to grate-bars which are designed for use in furnaces where it is necessary to support fuel which has to be subjected from time to time to a rocking movement of the grate, in which there is no increased opening into the ash-pit, and at intervals to a cut-out movement of the grate by which accumulations of ashes or clinkers are cut from the bed of fuel and deposited in the ash-pit.

The invention consists in certain novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a top plan view of a grate-bar having some of its fuel-supporting caps removed. Fig. 2 is a side elevation of the said bar. Fig. 3 is a vertical transverse sectional view through the bar, one of the removable fuel-supporting caps being shown in position in the socket of the bar. Fig. 4 is a view in elevation of one of the caps of the bar looking at the overhanging part of the said cap. Fig. 5 is a side elevation of one of the caps removed from the body portion of the bar. Fig. 6 is a detail view showing one of the inverted-V-shaped spacing-lugs employed in holding the lower end of the cap-shanks in place in a socket of the body portion of the grate-bar.

In successfully handling many kinds of fuel, and especially fine anthracite fuels, it is advantageous to employ grate-bars formed with removable caps, the said caps being carried by body portions having sockets therein which receive the stems or shanks of the said caps. It is especially advantageous in many instances to use grate-bars which are capable of a rocking movement while the fuel is being consumed upon the grate. This is true not only when it is necessary to impart movement to the fuel by the rocking of the grate-

bars, but when it is necessary at suitable intervals to cut out and discharge accumulations of ashes and clinkers from the bed of fuel and deposit the same in the ash-pit of the furnace. The present invention is especially adapted for use where there is need for that type of grate-bar which is capable of a rocking movement in acting upon the fuel and also of cutting out ashes and clinkers therefrom.

The grate-bar forming the subject-matter of the present application is, as illustrated in the drawings, formed with a supporting body portion 1, which is provided with a number of sockets 2. The body portion of the bar is made hollow, and in the space between the walls thereof the sockets are formed in which there is ample room for receiving the shanks of the caps and also to provide a considerable air-space around the said shanks when in place in said sockets. The sockets are formed by means of partitions 3, extending transversely of the body portion of the bar at suitable intervals and connecting the front and rear walls of the body portion. The body portion 1 is somewhat thickened at its ends and provided with outwardly-extending trunnions 4, which are capable of supporting the bar movably in position in a grate-frame. The trunnions 4 are made to fit in bearings formed in carrier-bars of any usual or desired type which are arranged in the combustion-chamber of the furnace. The bars are thus held in such a manner that they may be rocked back and forth upon the trunnions 4, the rocking operating to tip the body portion of each bar first in one direction and then in the other to a greater or less degree, as found necessary. The bars are provided with means by which they may be rocked, the said means preferably consisting in a depending arm 5, having a laterally-extending pivot pin or stud 6, which may be engaged by an operating-rod or other suitable device.

The bar of the present invention is preferably formed with caps which are approximately L-shaped in side elevation, as shown in Figs. 3 and 5, the projecting noses of the L-shaped portions being especially adapted for cutting out clinkers and ashes from the bed of fuel resting upon the grate-surface. In order to properly support and back up fuel-supporting caps of the type shown in the drawings, one wall of the body portion, as 7, extends upwardly a greater distance than the

other wall 8. The wall 7 is upon the opposite side of the shanks of the caps from the projecting noses of said cap. The upper edges of both of said walls 7 and 8 extend inwardly at an angle, so as to strengthen the body portions of the bars laterally and at the same time to afford such a bearing means upon the shanks of the caps that ventilating-spaces, as 9 and 10, are provided for permitting of the circulation of air through the said body portion of the bar.

The upper portion of the body portion of the bar is wider than the lower portion thereof and accommodates the upper portions of the shanks, which are larger than the lower ends thereof. The lower portions of the sockets are flared outwardly, as at 11, so that any accumulations of ashes or dust within the body portion of the bar may find ample outlet at the lower ends of the sockets. The lower edge of the wall 8 is formed with an inwardly-extending spacing portion 12, similar to the spacing portion at the upper edge of said wall. Upon the inner surface of the opposite wall 7 in each socket is a spacing lug or projection 13, which is made with inclined upper surfaces preferably like that of an inverted V. The shape of the lug is thus such that the siftings of ashes which pass through the sockets cannot accumulate upon the lug, but will slide upon the inclined upper surfaces thereof and pass out through the outwardly-flaring lower end portion 11 of the socket.

The fuel-supporting portions of the grate-bar are made up of a number of removable caps 14. The said caps may be made of greater or less width, as desired; but the proportion of the surface offered by each cap to the heat of the burning fuel is preferably like that shown in the drawings. It is not well to present long lines of metal to the contraction and expansion of the varying degrees of heat attained in the furnace. Each cap is made with a central head 15, which is projected below and reduced in cross-sectional area toward its lower end to form a shank 16.

The head 15 and the extension thereof forming the shank preferably taper uniformly from top to bottom in a transverse direction, so as to form a wedge-shaped member extending parallel with the longitudinal plane of the body portion of the bar. Extending in one direction from the head 15 are webs 17, made of considerable length and extending beyond the walls 8 of the bar a sufficient distance to almost bridge the space between the body portion of the bar and the adjacent bar. Projecting from the other side of the head 15 of the cap are comparatively short webs 18. The webs 18 extend sufficiently to one side of the head 15 to overhang the upper edge of the wall 7 of the bar body portion and complete at their edges the curvature of the outer surface of said wall 7. The webs 17 are curved upon their upper edges preferably upon arcs

of circles, and projecting oppositely from each of said webs is a series of fuel-supporting teeth 19. I find in practice that the caps of the bars may be made sufficiently wide to be provided with about four of the webs 17, with the corresponding number of webs 18. The said webs 18 are generally arranged directly opposite to the webs 17. The teeth 19, which are arranged between the adjacent webs 17 of each cap, extend toward each other a sufficient distance to properly support the fuel which is placed upon the grate-surface without letting it run through. The mesh between the teeth, also upon the same web, is regulated with the same purpose in view. It will be apparent that for extremely fine fuels, such as some of the smallest anthracite fuels, it will be necessary to have quite small openings between the teeth 19 of the bar-caps, though the apertures between the teeth may be enlarged for larger fuels, it being always desirable to permit an ample supply of air to pass upwardly through the grate-surface. I usually connect at least two of the webs 17 at their outer ends or noses by connecting portions 20, though it will be understood that I may connect all the webs at their outer ends. These connections serve as ties for the outer ends of said webs and help maintain them in proper relation to each other.

The webs 18, projecting oppositely from the webs 17, are connected along their upper and side edges by a solid portion 21, the said solid portion 21 forming a tie for all of said webs as well as providing a suitable fuel-supporting portion above the deepest wall of the body portion of the bar. The lower ends of the webs 18 extend downwardly, so as to engage and rest upon the upper inclined surface of the wall 7. The lower ends of the said webs 18 rest upon abutment-lugs 22. The end edges of the webs 18 are also provided with notches or cut-away portions 23. These cut-away portions are formed adjacent to the point where the end edges of the webs 18 meet the surface of the body portion of the bar. These notches or cut-away portions 23 make it possible to obtain a perfect fit between the lower supporting edges of the webs 18 and the upper inclined edge of the bar body portion, the ends of the connecting tie portion 21 projecting a sufficient distance beyond the outer webs 18 to be flush with the ends of the outer fuel-supporting teeth 19. The head 15 of the cap is also extended in the form of a lateral tooth 24 at each end to bring the same flush with the ends of the portion 21 and the teeth 19.

Where the upper edges of the walls 7 and 8 are inclined inwardly toward the shanks 16 of the caps, the said edges are cut away, so that only portions of the walls touch the said shanks. In this manner ample space is provided for the passage of air through the body portion of the grate-bar and along the sur-

face of the cap-shanks. The space between the wall 7 and the lower end of the shanks is sufficient to permit ash or dust which may enter the openings at the top of the bar to pass out from the same at the bottom. Such discharge of accumulated materials is further facilitated by the flaring mouth of the outlet, as heretofore described. The shank 16 of each cap is also reduced in width toward the lower end, as clearly shown in Fig. 4, so that the spaces between the edges of the shanks and the ends of the sockets flare downwardly. This prevents the accumulation of ashes in the sockets or the clogging of the air-spaces which surround the shanks of the caps. The upper portion of each socket is contracted endwise, so as to bear against the edges of the shanks 16.

Each cap is preferably provided with a securing-pin 25, which is secured in the lower end of the shank 16 and made sufficiently long to be bent or turned over the edge of the bar, as clearly shown in Fig. 3.

As thus far described the caps are adapted for insertion in any of the intermediate sockets of the body portion of the grate-bar; but the caps which are fitted in the end sockets of the bar are usually made slightly different. Such caps, as shown in Fig. 2, are provided with outer overhanging edges, as 26. These overhanging edges are preferably made solid and are inclined upon their under edges.

The end caps may also be provided with a less number of laterally-projecting webs, if preferred, although of course they may have the same number of webs as illustrated with respect to the intermediate caps without departing from the spirit of the invention. Where the end caps are made narrower than the intermediate caps, the sockets in the bar are made of a corresponding length.

It will be seen that the formation of the cap is such that all of the parts taper in one direction—namely, downwardly—and in this way not only will everything which can pass through the mesh of the caps be free to drop into the ash-pit, but the caps themselves are rendered easy of manufacture, since they can be readily drawn from the sand in casting.

It will be further observed that the engagement of the wall 7 with the head of the cap and at a high point thereon, together with the overhanging webs 18, make it possible to move the caps in a cutting-out operation with great power and without material strain upon the parts. The upper inclined edge of the wall 7 and the abutment-lugs 22 form a strong backing for the caps in driving the noses 20 of the caps into clinkers or ashes.

The grate-bar above described is admirably adapted for handling fuels of small size, especially small anthracite fuels, which often burn out grate-surfaces when the said surfaces are not properly constructed. The

grate-bars, with the removable caps above described, are not only capable of the handling of such fuels without the likelihood of burning out, but are especially adapted for rocking movements in which no increase in size of openings between the bars is made and cut-out movements in which the bars are so rocked as to slice or cut out portions of the ashes and clinkers upon the surface of the grate.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grate-bar, comprising a body portion and removable caps provided with cutting edges, the body portion having walls of unequal heights, the higher wall engaging the caps at points opposite the cutting edges thereof with respect to the axis of the grate-bar and offering an abutment of great strength to them when the bar is rocked to cut out ashes and clinkers.

2. A grate-bar, comprising a body portion provided with sockets and caps provided with socket-engaging portions, said sockets flaring upwardly and downwardly from the central parts thereof, one longitudinal wall of said body portion being thickened at its upper portion to increase the strength thereof, and the flaring of the lower portions of the sockets facilitating the discharge of materials therefrom.

3. A grate-bar comprising a body portion having elongated sockets formed therein, the said sockets having flaring outlets at their lower ends, removable fuel-engaging caps mounted upon the bar and provided with shanks extending into the said sockets, the body portion being formed with V-shaped lugs arranged in each of said sockets projecting from one of the walls thereof to hold the lower ends of the shanks in position, and the inclined surfaces of the V-shaped lugs preventing the collection of ashes or dust in the sockets.

4. A grate-bar, comprising a socketed body portion having an abutment edge rising from one of its side walls and removable caps each having a shank formed to fit into a socket of the body portion of the bar and laterally-extending webs, some of which are formed with recesses capable of fitting upon said abutment edge of the cap portion of the bar.

5. A grate-bar, comprising a socketed body portion having an abutment edge rising from one of its side walls and removable caps each comprising a shank formed to fit into a socket of the body portion of the bar and laterally-extending webs, the webs upon one side of the shank being shorter than those upon the other side, the said short webs being formed with recesses capable of fitting upon said abutment edge of the body portion of the bar.

6. A grate-bar, comprising a body portion
and removable caps having ends adapted to
be driven into fuel and shanks engaging the
said body portion, the body portion having
5 walls of unequal heights, the higher wall en-
gaging the shanks at higher points, than the
lower wall, so as to be approximately oppo-
site the ends of the caps with respect to the

shanks and forming abutments for driving
the caps into the fuel when the bar is rocked. 10

In testimony whereof I affix my signature
in presence of two witnesses.

WILLIAM McCLAVE.

Witnesses:

CASELL SEVERANCE,
ARTHUR L. KITCHIN.