

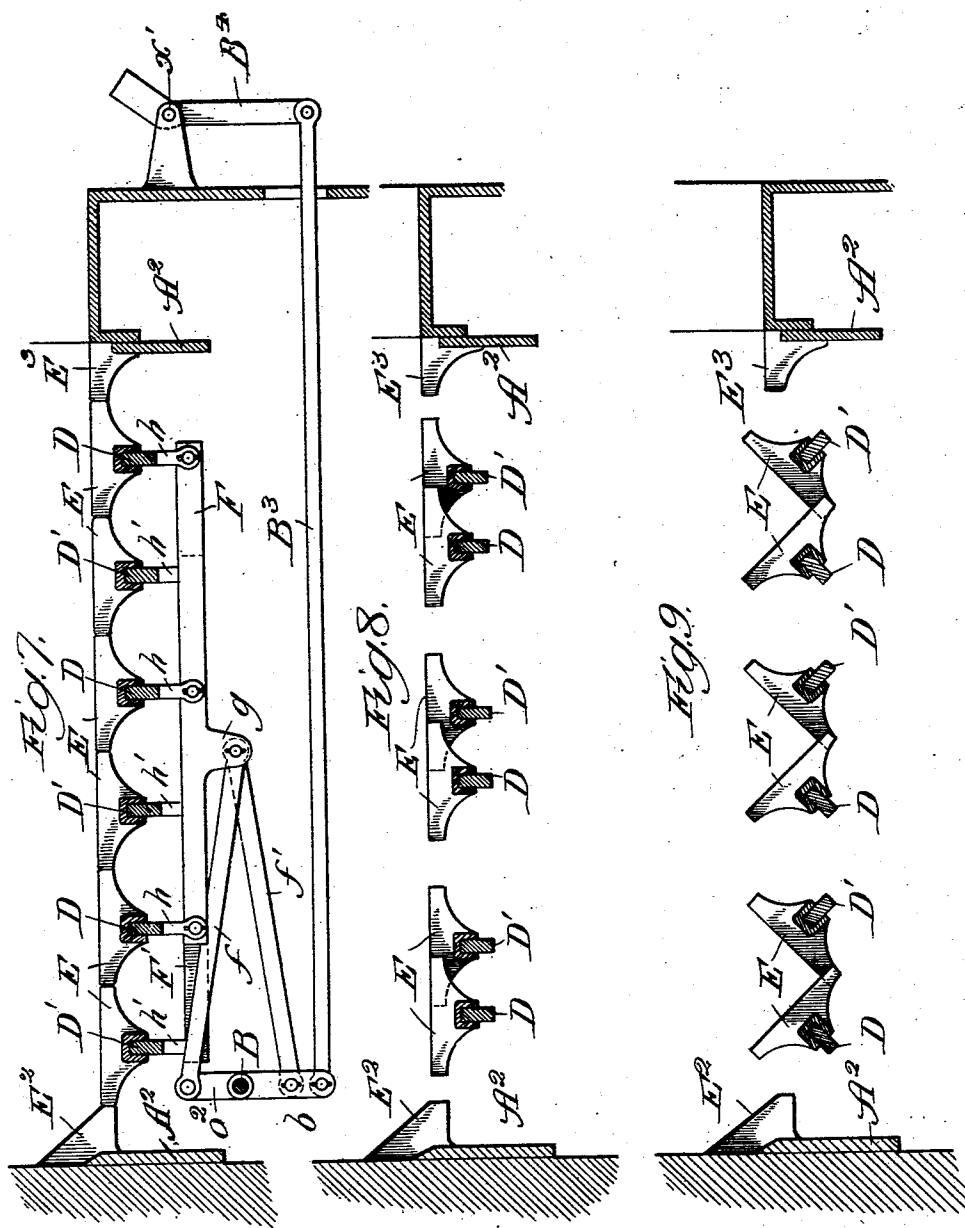
(No Model.)

4 Sheets—Sheet 2.

F. W. JARVIS
FURNACE GRATE.

No. 569,205.

Patented Oct. 13, 1896.



Witnesses:
Edw. S. Shylock
John J. Allen

Inventor:
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Attys

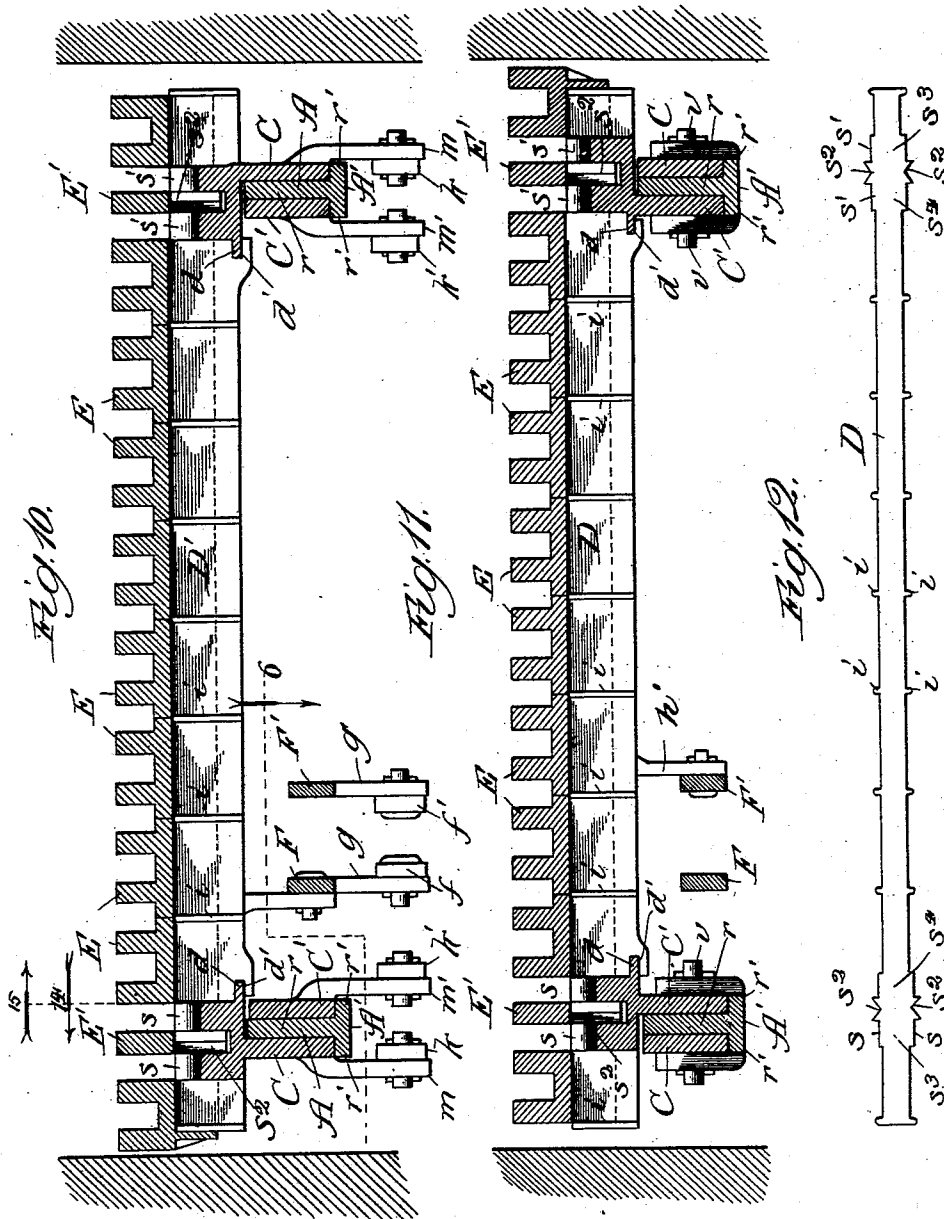
(No Model.)

4 Sheets—Sheet 3.

F. W. JARVIS.
FURNACE GRATE.

No. 569,205.

Patented Oct. 13, 1896.



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(No Model.)

4 Sheets—Sheet 4.

F. W. JARVIS.
FURNACE GRATE.

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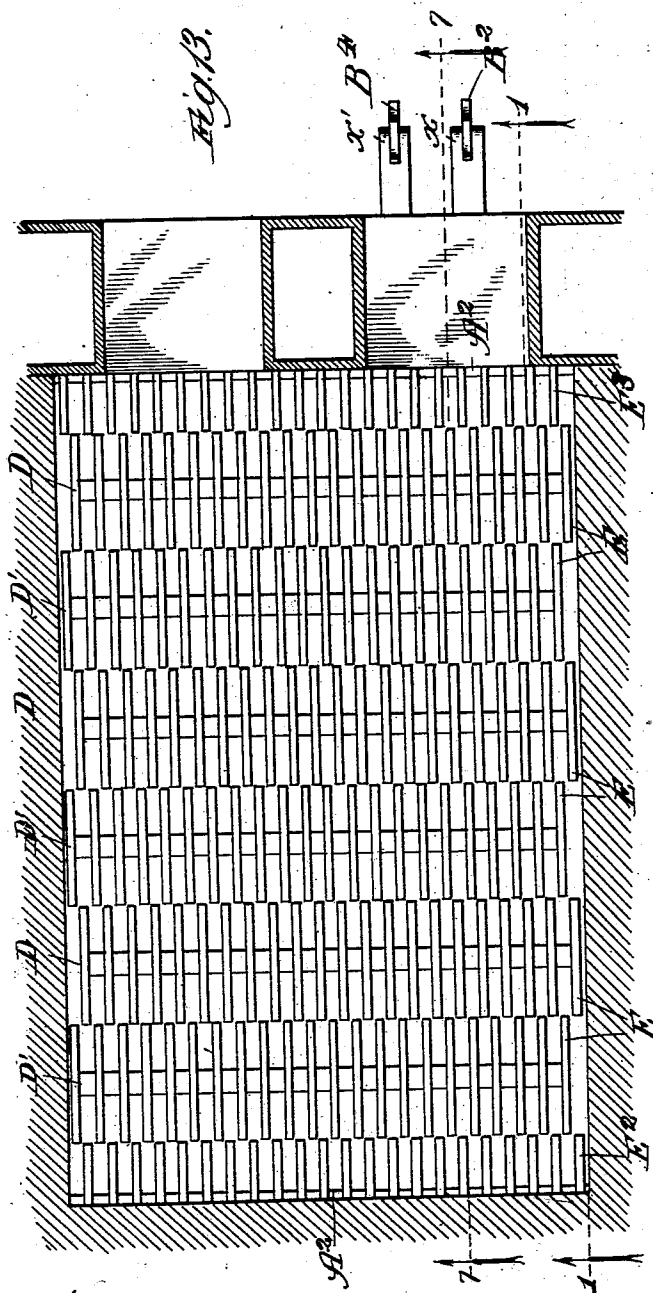


Fig. 17.



Fig. 19.



Fig. 16.

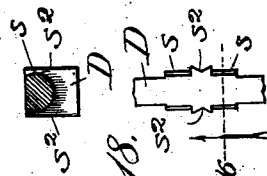


Fig. 15.

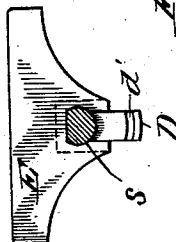
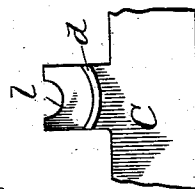


Fig. 18.

Fig. 14.



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UNITED STATES PATENT OFFICE.

FRANKLIN W. JARVIS, OF CHICAGO, ILLINOIS.

FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 569,205, dated October 13, 1896.

Application filed February 26, 1896. Serial No. 580,818. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN W. JARVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Furnace-Grates, of which the following is a specification.

My invention relates to an improvement in the class of furnace-grates used in stationary and locomotive engines.

My object is to provide a construction of grate in the class referred to whereby it shall be adapted, in shaking it, not only to cause the grate-bars carrying the fingers to rock, but also to be reciprocated horizontally in relatively opposite directions, and thus enable the grate to be relieved readily of clinkers.

Referring to the accompanying drawings, Figure 1 is a broken section taken at the line 1 on Fig. 13 and viewed in the direction of the arrow, showing my improved grate construction in elevation; Fig. 2, a view in side elevation showing one of the sliding bearing-bars for the grate-bars in elevation with grate-bars indicated thereon by dotted lines and its connection with the rock-shaft; Fig. 3, a similar view of another of the sliding bearing-bars; Fig. 4, a broken view, in side elevation, of a portion of the base-frame of the grate; Fig. 5, a top plan view of the portion of the base-frame presented in Fig. 4; Fig. 6, a section taken at the line 6 on Fig. 10 and viewed in the direction of the arrow; Fig. 7, a section taken at the line 7 on Fig. 13 and at the line 7 on Fig. 6 and viewed as indicated by the arrows; Fig. 8, a sectional view, diagrammatic in its nature, showing the grate-bars with their imposed fingers in pairs with the members of the pairs overlapping each other as to the finger portions in the positions they are caused to assume by bringing the reciprocating feature of my improvement into play; Fig. 9, a similar view illustrating the rocking function in my improved grate; Fig. 10, a section taken at the line 10 on Fig. 1 and viewed in the direction of the arrow; Fig. 11, a section taken at the line 11 on Fig. 1 and viewed in the direction of the arrow; Fig. 12, a plan view of one of the grate-bars; Fig. 13, a sectional plan view of my improved grate; Fig. 14, a broken section taken at the line 14 on Fig. 10 and viewed in

the direction of the arrow; Fig. 15, a section taken at the line 15 on Fig. 10 and viewed in the direction of the arrow; Fig. 16, a section taken at the line 16 on Fig. 18 and viewed in the direction of the arrow; Fig. 17, a view in side elevation of a single-finger detail; Fig. 18, a broken plan view of a section of a grate-bar near one end thereof, showing its rounded bearing-surfaces; and Fig. 19, a bottom plan view of the finger presented by Fig. 17.

A is the base or supporting frame for the grate, which I prefer to form of two T-shaped bars A', disposed parallel to each other, with their web portions *r* extending upward, and their head portions *r'* thus affording extended bases secured at their opposite ends to legs *q*; and the bars A' are connected at their ends by flat bars A², extending at right angles to the inverted-T-shaped bars. In the legs *q* at one end of the frame is journaled a rock-shaft B, carrying near its opposite ends inside the frame the cross-heads *o* and *o'* to rock with the shaft. At the outer side of each bar A', projecting upward from the edges of the bases *r'* of which are the pairs of lugs *t*, is supported a sliding bar C, provided with elongated slots *n*, a pendent lug *m*, and with upward-projecting bearings *l*, concaved at their upper extremities to afford seats for the grate-bars hereinafter described.

At the inner side of each frame-bar A' is supported on the base *r'* a sliding bar C', having a pendent lug *m'*, elongated slots *n'*, and upward-projecting bearings *l'*, like the bearings *l* on the bars C. The sliding bars C and C' are connected together on each frame-bar A' through its web *r* by bolts *v*, passing through the coincident slots *n* *n'*, and each pair of the sliding bars has its members relatively so placed that the bearings *l* and *l'* alternate with each other, those on the opposite bars C coinciding with each other and those on the opposite bars C' similarly coinciding. Each lug *m* is connected by a link *k* with the adjacent cross-head at a point below the rock-shaft B, and each lug *m'* is connected with the adjacent cross-head by a link *k'* at a point above the rock-shaft, and from the lower end of the cross-head *o* there extends to the front end of the grate a rod B', connected at its outer end with the operating-lever B², which is fulcrumed at *x*.

D and D' are the grate-bars, each being of the following construction: Between its ends and throughout the larger portion of its extent this grate-bar is rectangular in cross-section, as also at its end portions, while between the angular portions it is provided near its opposite ends with the cylindrical sections s and s' , at the opposite sides of which are formed the V-shaped recesses s^2 .

The rounded portions of each grate-bar at the outer sides of the recesses s^2 afford journals s^3 and the similar portions at the inner sides of the recesses afford journals s^4 . The bars D seat at their journals s^3 in the bearings l of the sliding bars C, while the bars D' seat at their journals s^4 in the bearings l' of the sliding bars C'. At equal intervals on the opposite sides of each grate-bar are provided the vertical ribs i , affording spacing means for the grate-fingers E, each comprising a pair of fingers extending from a base containing a rectangular socket i' , extending transversely of the fingers and affording a seat to straddle the angular portion of a grate-bar on which it is confined against lateral play by the ribs i .

The bars D and D' are so arranged relatively that the fingers on one alternate with those on the next, and so on throughout the grate.

Depending from each grate-bar D, to one side of its center, is a rigid hanger h , and to the lower ends of these hangers is pivotally connected a bar F, having a pendent lug g , from which it is connected by a link f with the upper end of a cross-head o^2 , loosely fulcrumed upon the rock-shaft B. Depending from the grate-bars D' are the rigid hangers h' , carrying pivotally at their lower ends a connecting-bar F', having a depending lug g' , from which it is connected by a link f' with the cross-head o^2 below the rock-shaft, and the cross-head o^2 is connected by a rod B³ with an operating-lever B⁴ at the front end of the grate and fulcrumed at x' . For the purpose of locking each grate-bar at its opposite ends to the sliding bars C' the latter are provided below their bearings l with inward-projecting arc-shaped flanges d to enter recesses d' , formed on the base portions of the grate-bars.

Where a grate-finger seats in the recesses s^2 near the opposite ends of each grate-bar, it is formed single, as shown at E' in Fig. 17, with V-shaped projections i^2 on the inner sides of its socket i' to enter the recesses s^2 when the single grate-finger is placed in position on the grate-bar to straddle it.

From the foregoing it will be seen that when the levers B² and B⁴ are simultaneously actuated to "shake" the grate the effect of rocking the shaft B is to slide the bars C and C' in opposite directions, thereby moving the grate-bars D and D' with their imposed grate-fingers in pairs toward each other into the relative positions illustrated in Fig. 8, wherein spaces are afforded between them for the evacuation of clinkers, and the intermeshing

fingers clean out between them and toward each other into the normally relative positions in which they are represented in Fig. 7. It will also be understood that by working the lever B⁴ alone the grate-bars are rocked, thereby tilting the members of the respective pairs toward each other into the relative positions illustrated in Fig. 9 and turning them back into the normal positions in which they are represented in Fig. 7 for the purpose of clearing the grate of ashes and breaking up the bed when caked.

Stationary fingers E² and E³ project inward from the side bars A² of the frame A to extend over the spaces between the grate-fingers on the end bars D' D and the respective adjacent ends of the grate. Moreover, the upward inclination of the stationary fingers E², which are over an air-space b at the inner end of the grate, permits the upper portions of these fingers to extend above the plane of the fire-bed, whereby air, in entering the fire-chamber through the stationary fingers, is diffused and strikes the products of combustion in their path over the bridge-wall, thus materially enhancing the combustion.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace-grate, in combination with a supporting-frame, grate-bar-sustaining bars supported in pairs at opposite sides of the frame to slide lengthwise thereon, means for sliding said sustaining-bars in relatively-contrary directions, grate-bars on said sustaining-bars, and grate-fingers supported to alternate with each other on the successive grate-bars, substantially as and for the purpose set forth.

2. In a furnace-grate, in combination with a supporting-frame, grate-bar-sustaining bars supported in pairs at opposite sides of the frame to slide lengthwise thereon, means for sliding the members of said pairs of sustaining-bars in relatively-contrary directions, grate-bars journaled on said sustaining-bars, means for rocking the members of pairs of said grate-bars in relatively-contrary directions, and grate-fingers supported to alternate with each other on the successive grate-bars, substantially as and for the purpose set forth.

3. In a furnace-grate, in combination with a supporting-frame, the pairs of bars C and C' having the members of each pair supported on the opposite sides of the side bars of said frame to slide lengthwise thereon, a rock-shaft B carrying the cross-heads o and o' , links k and k' connecting said bars C and C' with said cross-heads respectively at opposite sides of said rock-shaft, a rod B' extending from one of said cross-heads, an operating-lever B² connected with said rod, grate-bars on said bars C and C' and grate-fingers supported to alternate with each other on the successive grate-bars, substantially as and for the purpose set forth.

4. In a furnace-grate, in combination with a supporting-frame, grate-bar-sustaining bars

supported in pairs at opposite sides of the frame to slide lengthwise thereon, means for sliding the members of said pairs of sustaining-bars in relatively-contrary directions, 5 grate-bars journaled on said sustaining-bars, grate-fingers supported to alternate with each other on the successive grate-bars, a rock-shaft B carrying loosely a cross-head o^2 , a bar F pivotally suspended from alternate 10 grate-bars, a bar F' pivotally suspended from grate-bars alternating with those carrying the bar F, a link f connecting said bar F with said cross-head at one side of the rock-shaft, a link f' connecting said bar F' with said 15 cross-head at the opposite side of the rock-shaft, a rod B³ extending from the cross-head and an operating-lever B⁴ connected with said rod, substantially as and for the purpose set forth.

20 5. In a furnace-grate, in combination with a supporting-frame, the pairs of bars C and C' having the members of each pair supported on the opposite sides of the side bars of said frame to slide lengthwise thereon, a rock-shaft 25 B carrying, to rock with it, the cross-heads o and o' and, loosely, the cross-head o^2 , links k and k' connecting said bars C and C' with said cross-heads o and o' , respectively, at opposite 30 sides of said rock-shaft, a rod B' extending from the cross-head o , an operating-lever B² connected with said rod, grate-bars journaled on said bars C and C', grate-fingers supported to alternate with each other on the successive grate-bars, a bar F pivotally suspended from 35 alternate grate-bars, a bar F' pivotally suspended from grate-bars alternating with those carrying the bar F, a link f connecting said bar F with the cross-head o^2 at one side of the rock-shaft, a link f' connecting said bar F' 40 with said cross-head o^2 at the opposite side of the rock-shaft, a rod B³ extending from the cross-head o^2 and an operating-lever B⁴ connected with said rod, substantially as and for the purpose set forth.

45 6. In a furnace-grate, in combination with a supporting-frame, grate-bars each formed angular in cross-section between and at its end portions and rounded at its opposite ends between the angular portions, recesses s^2 in 50 the sides of said rounded portions and spacing-ribs i on the intermediate angular portion, double grate-fingers E having sockets i' at which they straddle said grate-bars between the ribs thereon and single grate-fingers E' having sockets i' provided with pro-

jections i^2 and at which they seat in said recesses s^2 , the grate-fingers alternating with each other on the successive grate-bars, substantially as described.

7. In a furnace-grate, the combination of a 60 frame A comprising the T-bars A', connecting-bars A² and legs q , slotted sustaining-bars C and C' supported on opposite sides of each T-bar to slide lengthwise thereon and connected by bolts v passing through their slots 65 and through the web of said T-bar, a rock-shaft B carrying the cross-heads o and o' , links k and k' connecting said sustaining-bars with said cross-heads respectively at opposite sides of said rock-shaft, a rod B' extending 70 from one of said cross-heads, an operating-lever B² connected with said rod, grate-bars on said sustaining-bars and grate-fingers supported to alternate with each other on the successive grate-bars, substantially as and for 75 the purpose set forth.

8. A furnace-grate comprising, in combination with a supporting-frame, the pairs of sustaining-bars C and C' provided, respectively, 80 with the upward-projecting bearings l and l' and having the members of each pair supported on the opposite sides of the side bars of said frame to slide lengthwise thereon and to cause said bearings on the members of the pairs of sustaining-bars to alternate with each 85 other, a rock-shaft B carrying the cross-heads o , o' and o^2 , links k and k' connecting said bars C and C' with said cross-heads o and o' , a rod B' extending from the cross-head o , an operating-lever connected with said rod, grate-bars D and D' journaled on said bearings l 90 and l' and locked to said bars C', grate-fingers supported to alternate with each other on the successive grate-bars, and stationary guide-fingers E³ and E⁴ at the opposite ends of the 95 grate, hangers h and h' depending, respectively, from the grate-bars D and D', bars F and F' pivotally connected, respectively, with said hangers h and h' , links f and f' connecting the bars F and F' with the cross-head o^2 , 100 a rod B³ extending from said cross-head o^2 and an operating-lever connected with said rod B³, the whole being constructed and arranged to operate substantially as and for the purpose set forth.

FRANKLIN W. JARVIS.

In presence of—

J. H. LEE,

RICHARD SPENCER.