

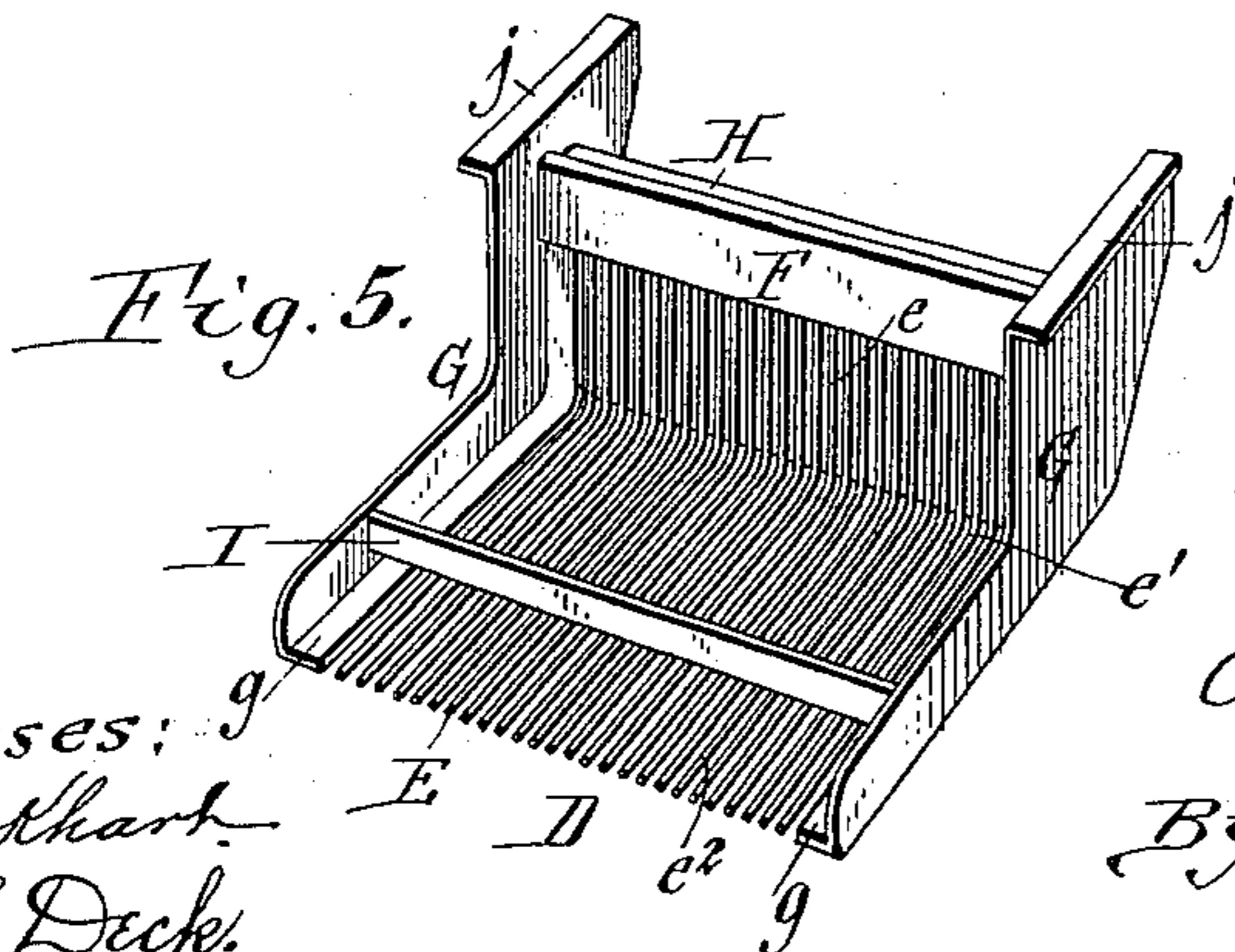
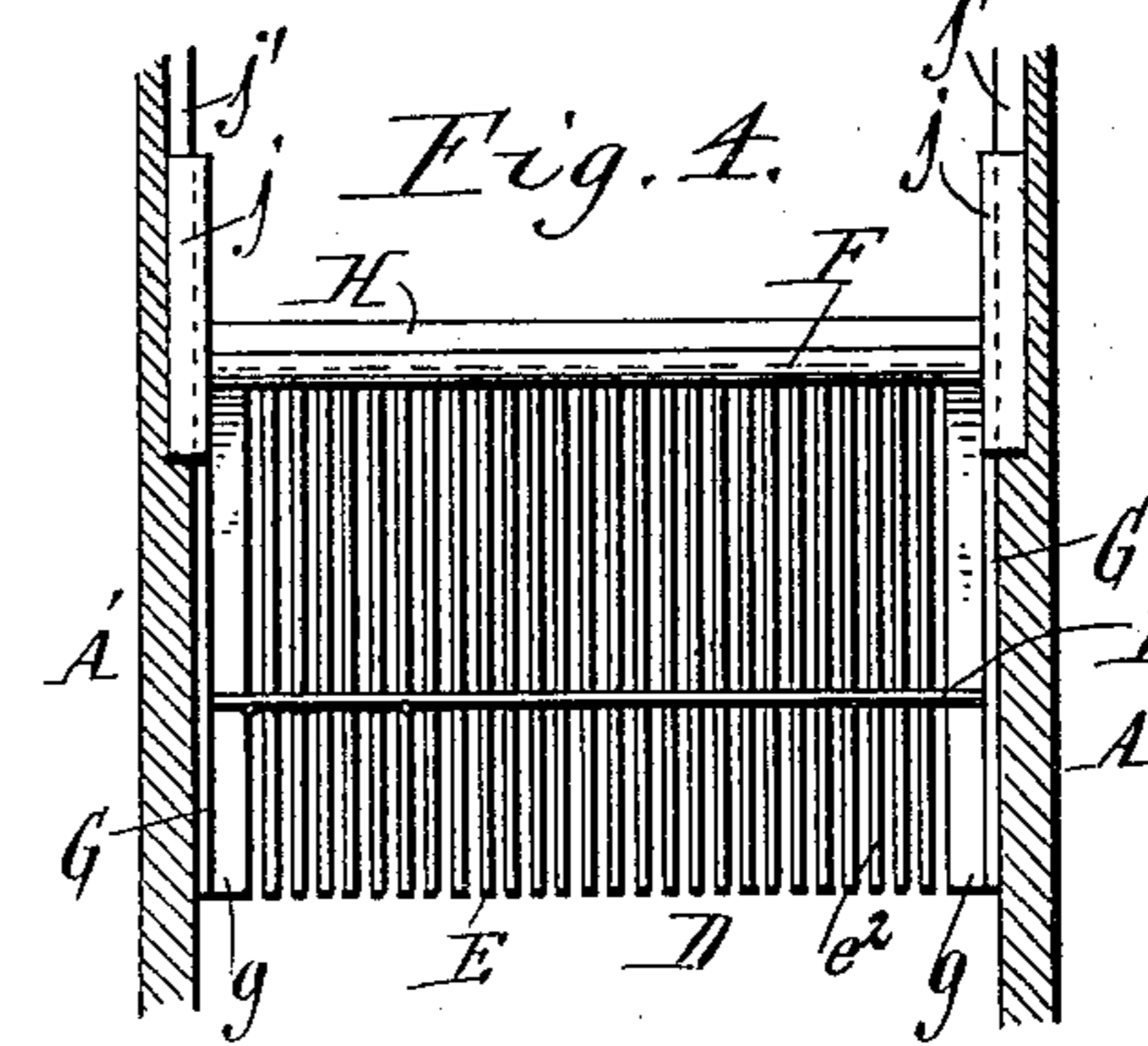
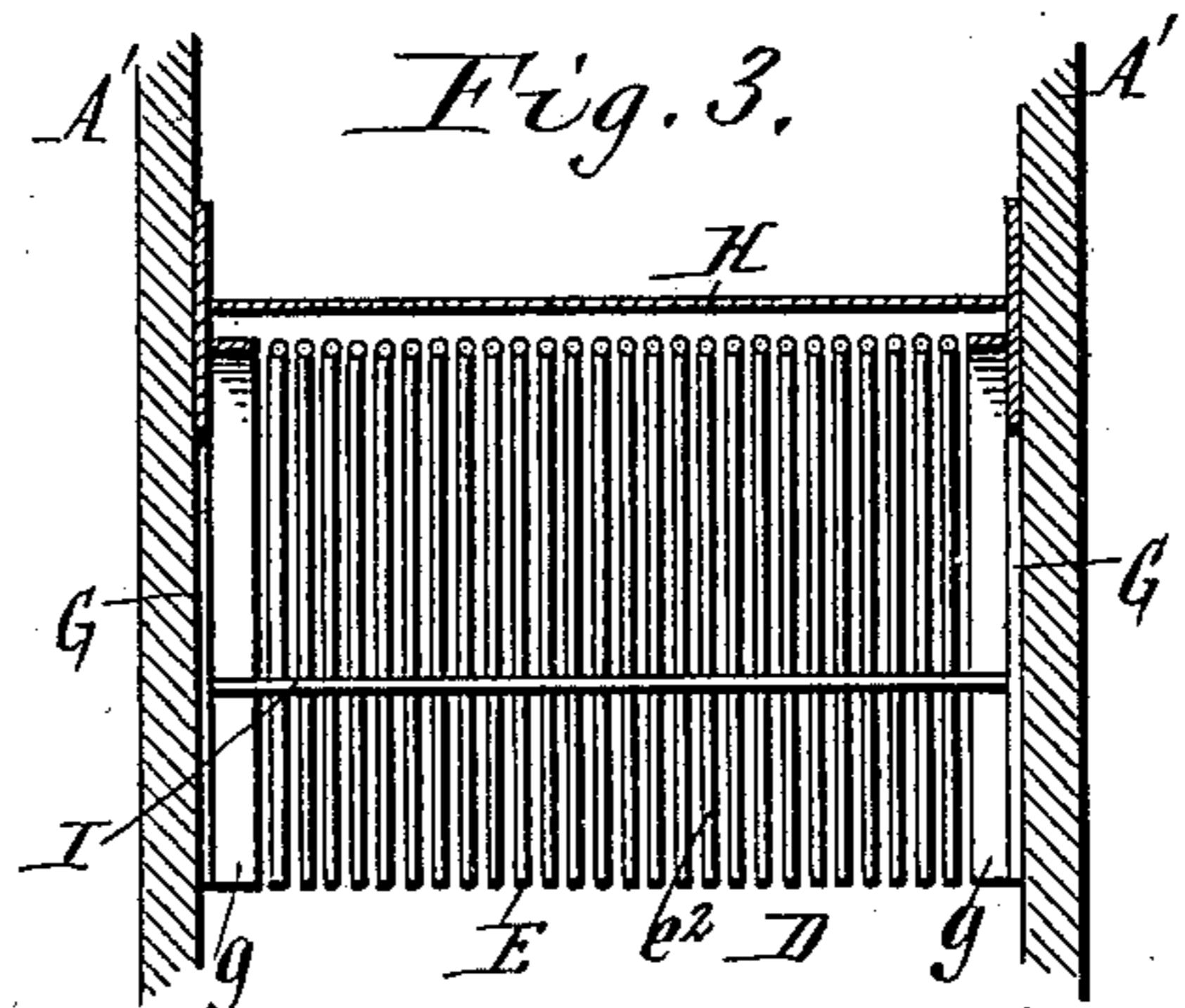
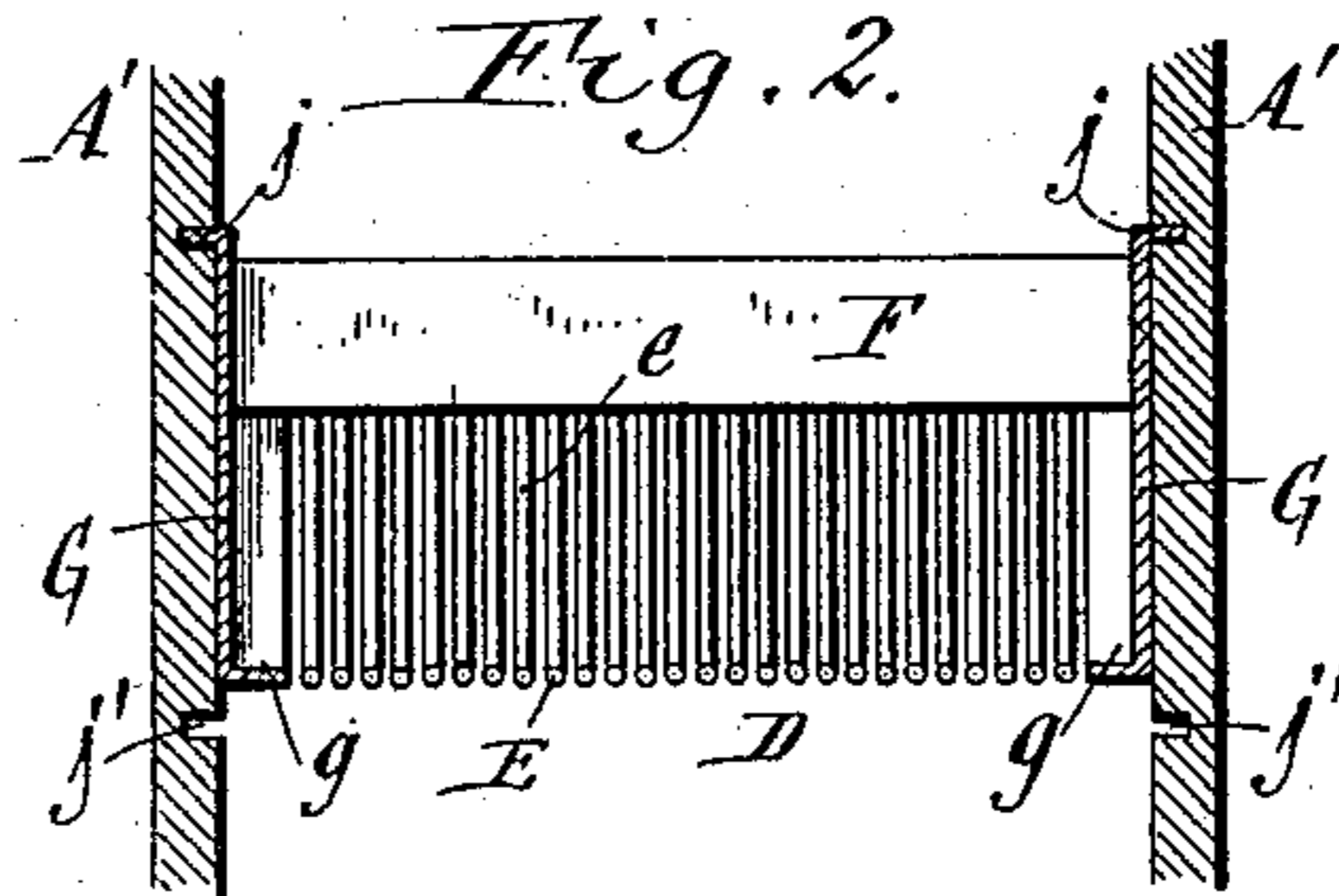
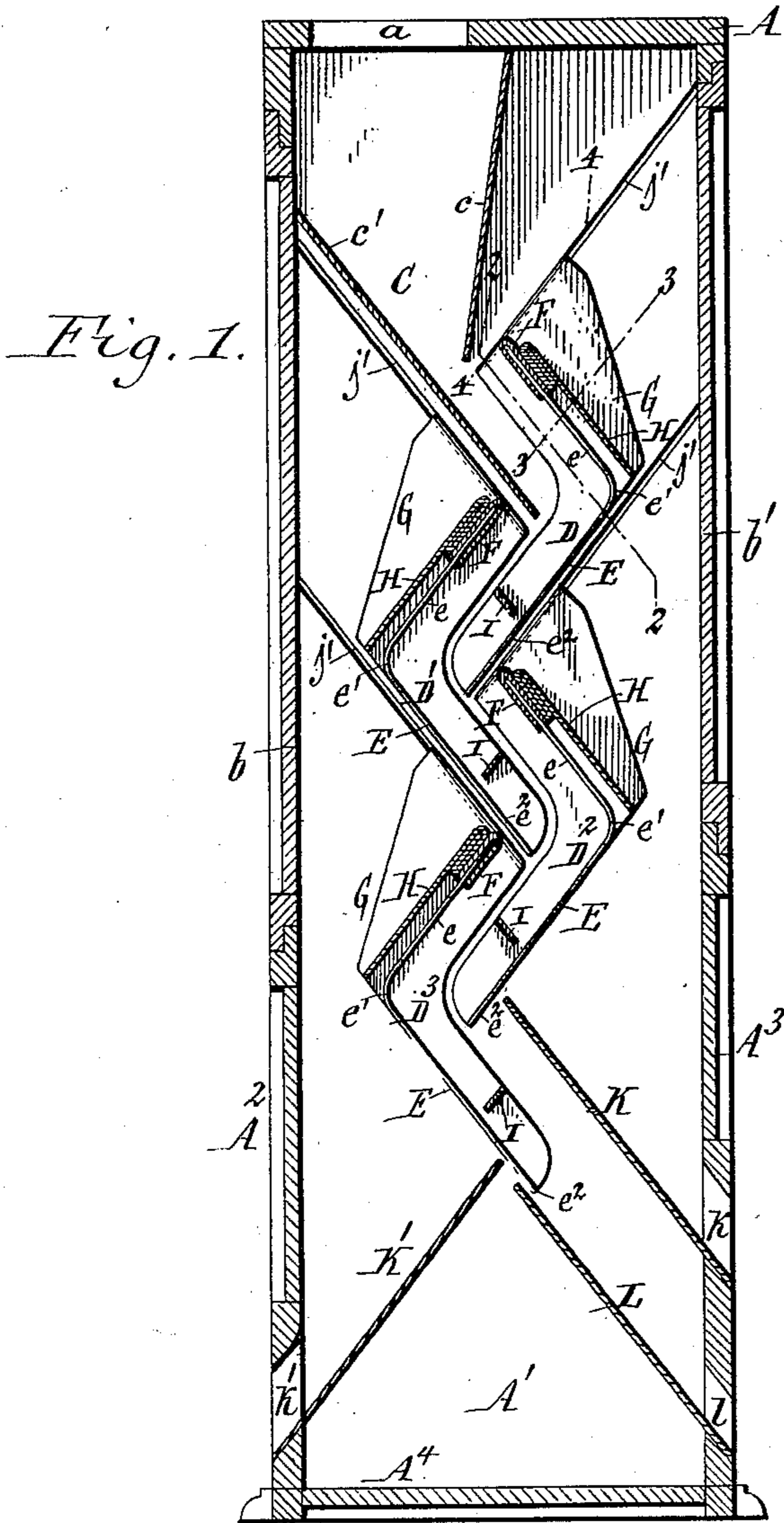
No. 658,109.

Patented Sept. 18, 1900.

A. HEINE.
GRAIN SEPARATOR.

(Application filed Nov. 25, 1898.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

AUGUST HEINE, OF SILVER CREEK, NEW YORK, ASSIGNOR TO LIZZIE HEINE, OF SAME PLACE.

GRAIN-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 658,109, dated September 18, 1900.

Application filed November 25, 1898. Serial No. 697,351. (No model.)

To all whom it may concern:

Be it known that I, AUGUST HEINE, a citizen of the United States, residing at Silver Creek, in the county of Chautauqua and State of New York, have invented new and useful Improvements in Grain-Separators, of which the following is a specification.

This invention relates to a separator mainly designed for separating grain, seeds, malt, &c., in which the screens are composed of elastic needles or thin bars which are fixed at their upper ends and free from their fixed upper ends to their lower ends and in which the material to be separated is delivered against these needles at such a distance from their fixed upper ends and at such an angle to the surface of the screen that the impact of the material against the needles causes a vibratory or trembling movement of the same, which prevents the screens from becoming clogged by lodged material and also facilitates and enhances the separating action.

The object of my invention is to improve the construction and operation of this class of separating-screens in several respects, which will be hereinafter fully explained.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a grain-separator provided with my improvements. Figs. 2, 3, and 4 are vertical transverse sections in lines 2 2, 3 3, and 4 4, Fig. 1, respectively. Fig. 5 is a perspective view of one of the separating-screens.

Like letters of reference refer to like parts in the several figures.

The inclosing case of the separator may be of any suitable construction. As shown in the drawings, it is composed of a top board A, having an opening *a*, through which the grain or other material to be separated enters the machine, side walls A', front and rear walls A² A³, and a bottom A⁴. The front wall A² is provided with a removable panel or door *b* and the rear wall A³ with a removable panel *b'*. The feed-opening *a* is arranged in the top A near the front wall A². Below this opening there is arranged the feed-hopper C, which has an inclined rear wall *c* and an inclined front wall *c'*, which latter extends rearwardly and downwardly beyond the lower end of the inclined rear wall *c*. The front and

rear walls *c c'* of the feed-hopper are arranged between the side walls A' of the casing.

D D' D² D³ represent four separating-screens arranged one below the other, zig-zag fashion, within the casing and below the feed-hopper. In the arrangement of screens shown in the drawings the uppermost screen D receives the material to be separated from the feed-hopper and the material passes from the tail or lower end of each screen to the next screen below. Each screen is mounted in a frame which is removably arranged in the casing, so that each screen and frame can be withdrawn from the casing for cleaning or making repairs upon removing the appropriate door or removable panel of the casing. Each screen is composed of thin bars, wires, or needles E, which are elastic or springy and which are secured at their upper ends side by side at the proper distance apart to a cross-head F, while their lower ends are free, so that these needles are free to vibrate under the impact and flow of the material. These elastic, pliant, or springy screen bars, wires, or needles, which will be hereinafter called "needles" for the sake of brevity, are made of angle or elbow form and have their upper portions *e* extending from the cross-head F, to which they are secured downwardly and preferably obliquely to the bends *e'* of the needles and have their lower portions *e²* extending from the bends downwardly to the lower free ends of the needles at the proper angle for effecting the desired separation and flow of the material. The grain or other material is delivered upon the lower portions of the needles between the bends and the lower free ends thereof, so as to cause the needles to vibrate or tremble by the impact and flow of the material, thereby producing a vibratory action of the needles which tends to prevent grains or other particles from lodging between the needles and which also enhances the separating action. As the material is delivered only against the lower portions of the needles below their bends, the upper portions of the needles above their bends are not liable to become obstructed by lodged particles. The upper portions of the needles increase considerably the length of the needles, and consequently the

vibrations thereof, without increasing the length of the screen itself, and as the point at which the material is delivered against the needles is located at a considerable distance from the fixed ends of the needles the vibratory action at that point is correspondingly lively.

Each screen-frame has two side plates G, of angle or elbow form, corresponding to the form of the separating-needles. The upper portions of these side plates are connected by the cross-head F of the screen, which is arranged between them and secured at its ends thereto. This cross-head consists of a doubled strip of tin, which straddles the upper ends of the needles and to which the needles are secured by soldering. The cross-head is secured at its ends to the side plates by soldering, the side plates being also preferably constructed of tin. In rear of the cross-head and of the upper portions *e* of the needles there is secured a chute-stop or gather-plate H, which protects the screen against the material which has passed through the next upper screen and which directs such material as strikes the plate to the rear of the screen below such plate. The latter is arranged at such a distance from the needles as not to interfere with the vibratory action of the same. This plate is preferably also made of tin and doubled at its upper end to stiffen that end and support the plate at a sufficient distance from the needles. This stop-plate is soldered at its upper end to the cross-head of the screen and at its sides to the side plates of the screen-frame. In the separator represented in Fig. 1 the first and second screens D D' are also provided with these stop-plates, although such plates are not required for these upper screens, as no material can fall on the backs of these screens from above. In these screens the plates operate only as stiffening connections for the upper portions of the side plates, and the presence of these plates in all the screens renders the latter interchangeable.

I represents a cross-bar which connects the lower portions of the side plates of the screen-frames and which is arranged above the lower portions of the needles at such a height that it permits of the unrestricted flow of the material over the screen, but intercepts any grains or other particles which bound up from the screen. This bar is secured to the side plates by soldering or otherwise and serves both as a transverse connection and as a deflector or stop for particles which rebound too high from the screen-surface.

Each side plate of the screen-frame is provided on its inner side with a rib or flange *g*, preferably of about the same thickness of the needles or less. This flange projects inwardly from the side plate and follows the surface of the screen, being of angular or elbow form, like the needles, and arranged in line therewith. This flange forms a guard which prevents particles from wedging between the end needle of the screen and the

flat inner side of the screen-frame or other side wall which confines the screen, where such particles would be difficult to dislodge, as the flat surface of the side wall would form a large contact-surface for lodged particles to rest against. If a particle lodges between the end needle and the guard-flange, it finds no support except against the narrow inner edge of the flange, which does not afford sufficient bearing-surface to hold such particles against the vibrating action of the needles.

The upper edges of the side walls of the screen-frame are provided with outwardly-projecting flanges *j*, by which the screen is supported in inclined grooves *j'*, formed in the inner faces of the side walls A' of the casing. The outer ends of these grooves are closed by the removable panels or doors of the casing. Upon removing these panels or doors the screens can be withdrawn from the casing for cleaning or making repairs.

In the separator shown in Fig. 1 four screens are arranged one above the other; but the number and arrangement of the screens and of the inlet and outlet passages may be varied as the particular kind of work which the separator is designed to perform may require. In the arrangement shown in Fig. 1 the grain is directed by the long front plate of the feed-hopper against the lower portions of the needles of the upper screen D. The grain which does not pass through this screen is directed by this screen against the lower portions of the needles of the next lower screen D'. This screen delivers the grain in like manner to the next lower screen D² and the latter to the lowermost screen D³. The material which passes through the first and third screens D D², which are arranged on the rear side of the separator, falls upon the inclined gather-board K and escapes through the opening *k* in the rear wall of the casing. In like manner the material which passes through the second and fourth screens D' D³, which are arranged on the front side of the separator, falls upon the gather-board K' and escapes through the opening *k'* in the front wall of the casing. The material which tails off from the lowermost screen falls upon the inclined board L and escapes through the opening *l* in the rear wall of the casing.

I claim as my invention—

1. A stationary separator-screen having springy, vibratory needles which are fixed at their upper ends and free from their fixed ends to their lower ends and which are of angular or elbow form, having their upper portions, above their bends, arranged in such a position that the material is prevented from coming in contact with the same, and having their lower portions, below their bends, arranged at the proper inclination to cause the flow of the material by gravity, substantially as set forth.

2. The combination with a stationary separating-screen having springy, vibratory needles which are fixed at their upper ends and

free from their fixed ends to their lower ends and which are of angular or elbow form, having their lower portions, below their bends, arranged at the proper inclination to cause the flow of the material by gravity, of a directing-surface whereby the material is directed against the lower portions of the needles below the bends thereof, substantially as set forth.

10 3. The combination with a stationary separating-screen having springy, vibratory needles which are fixed at their upper ends and free from their fixed ends to their lower ends and which are of angular or elbow form, having their lower portions, below their bends, 15 arranged at the proper inclination to cause the flow of the material by gravity, of a stop-plate arranged behind the upper portions of the needles, above the bends thereof, to protect the same against material falling from above, substantially as set forth.

25 4. A stationary separating-screen composed of side plates, a cross-head connecting said plates, springy, vibratory needles of angular or elbow form secured at their upper ends to said cross-head and free from their fixed ends to their lower ends, their lower portions, be-

low their bends, having the proper inclination to cause the flow of the material by gravity, and a stop-plate arranged between 30 the side plates and extending from said cross-head downwardly behind the upper portions of the needles to their bends, substantially as set forth.

5. The combination with a stationary separating-screen having springy, vibratory needles which are fixed at their upper ends and free from their fixed ends to their lower ends and which are of angular or elbow form, having their lower portions, below their bends, 40 arranged at the proper inclination to cause the flow of the material by gravity, of upright side walls between which said needles are arranged, and rigid guard-flanges projecting from said walls inwardly and arranged 45 in the plane of the lower portions of the needles, substantially as set forth.

Witness my hand this 23d day of November, 1898.

AUGUST HEINE.

Witnesses:

S. NEWTON,
J. D. NAGLE.