

(No Model.)

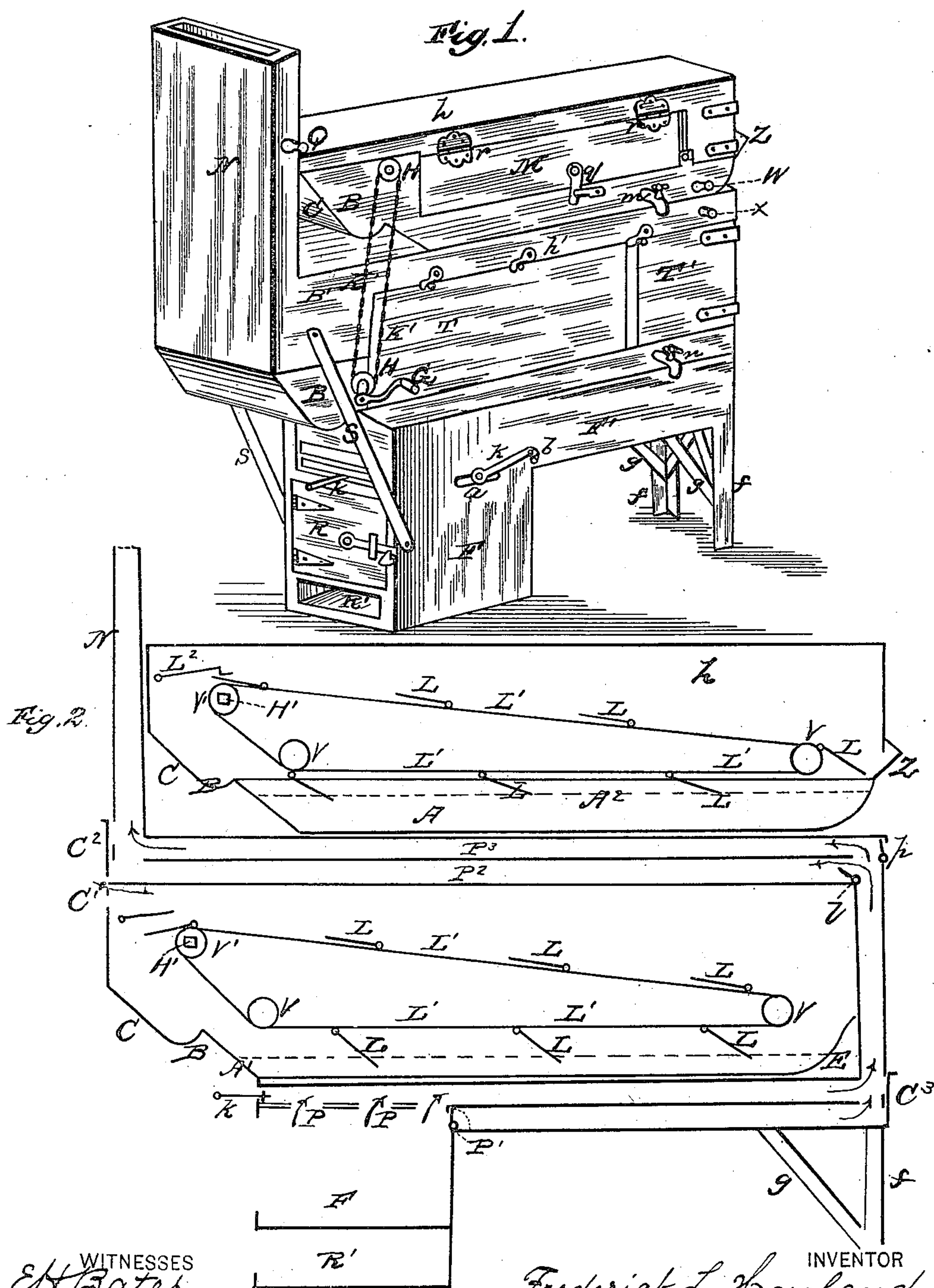
2 Sheets—Sheet 1.

F. L. HOWLAND.

SORGHUM EVAPORATOR AND ROTARY SKIMMER.

No. 270,545.

Patented Jan. 9, 1883.



WITNESSES
E. H. Bates

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INVENTOR
Frederick L. Howland
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His ATTORNEY

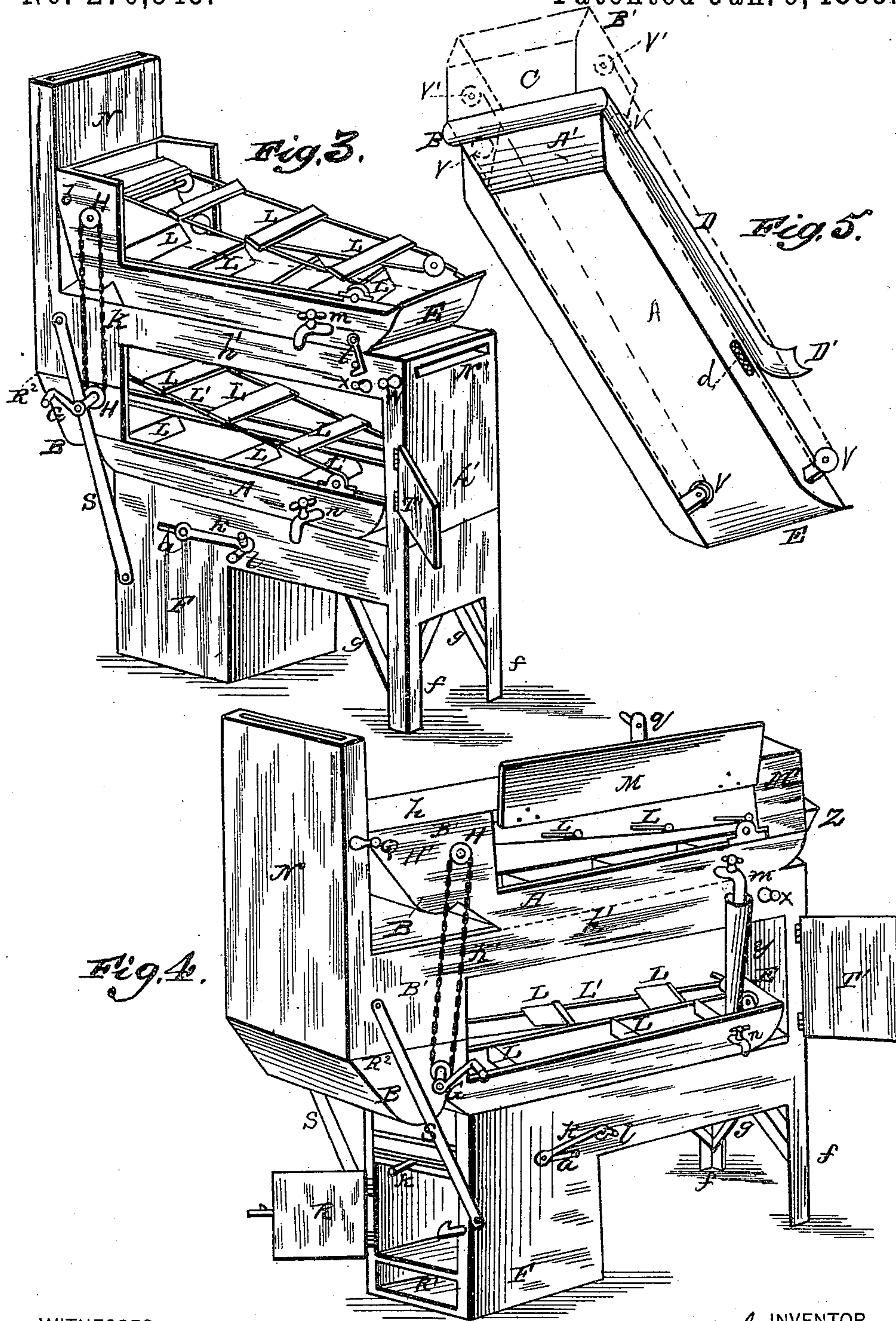
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UNITED STATES PATENT OFFICE.

FREDERICK L. HOWLAND, OF BLUE EARTH CITY, MINNESOTA, ASSIGNOR
OF ONE-HALF TO JAMES H. ABBOTT, OF SAME PLACE.

SORGHUM EVAPORATOR AND ROTARY SKIMMER.

SPECIFICATION forming part of Letters Patent No. 270,545, dated January 9, 1883.

Application filed September 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK L. HOWLAND, a citizen of the United States, residing at Blue Earth City, in the county of Faribault and State of Minnesota, have invented a new and useful Sorghum Evaporator and Rotary Skimmer, of which the following is a specification.

My invention relates to improvements in oven-heated evaporators for sorghum or other saccharine liquids in which the scum is mechanically ousted from the evaporating-pans.

The main features of novelty in my improvement are: a peculiar two-way discharge for the scum; a portable sheet-metal casing divided into superimposed sections; a special arrangement of two lines of flues provided with check-dampers midway therein, and deflecting inlet-dampers to admit and control the currents of hot and cold air where and as desired to carry on properly the process of gradual higher-heated concentration in the lower of the two co-operative evaporating-pans; a connection between the two evaporating-pans by direct tube and cock, by which the lower pan may be refilled by tapping from the upper pan from time to time, and a combination of certain coacting parts.

To more clearly show the construction and arrangement of the parts, my apparatus is illustrated in the accompanying drawings, in which—

Figure 1 represents a perspective view of my apparatus, with doors closed, as at work. Fig. 2 represents a vertical longitudinal section made through rotary skimmer belts, rollers, scrapers, pans, &c., near the wall. Fig. 3 represents a perspective view of my apparatus with jacket or cover removed and doors open to show the interior. Fig. 4 is a perspective view of my apparatus with doors open and tunnel applied to transfer liquid. Fig. 5 represents a perspective view of one of my improved evaporator-pans.

Similar letters refer to similar parts throughout all the views.

Letter A denotes my evaporator-pan proper, having the slant end A', and outside of the latter the trough or eaves B, communicating with the scum-conductor D, which terminates at the discharge-spout D'.

Letter C denotes a shedding-shield to catch the dropping from the scrapers L' on the reversal of the skimmers L, as will be hereinafter more fully explained.

Letter d denotes an aperture provided with strainer, in the pan's side, near the discharge-spout, to permit drippings or condensations from the scum to return into the pan A. The end E of said pan is curved concentric with the roller V, that the skimmers when being reversed may transversely fill that end of the pan. An inlet or chute, Z, in the casing is employed to fill the upper pan thereat, over said end E, without opening the upper doors, M M'.

I employ two pans of the foregoing description, placed in a kind of two-story sheet-metal structure; one above the other, with hot and cold air flues arranged beneath the pans and in the ends of said structure, all communicating with an oven in the base of the apparatus.

Letter F denotes said oven; R', the ash-pan beneath the oven; R, the door of the oven; S, braces connecting the base or oven with the superstructure above the lower evaporating-pan; g f, the supports of the rear end of the base; P, registers for admitting heat into the flue P³; K, a damper for closing said register-openings, which damper is coupled through a slot, a, by bar or rod k, with the handle b of the damper P', by which latter the flue P² is opened as a passage for hot air. Said dampers are so arranged that when one flue is shut the other is automatically opened. When flue P² is opened to let hot air into it, then the front end of flue P³ at damper K will be open to let cold air into it. The mingled hot and cold air ascends and may be conducted to the stack N, either through the flue P² or the flue P³, underneath the upper evaporating-pan, the dampers l p opening or closing either of said flues at the will of the operator. When damper p closes the upward passage into flue P³ cold air is let into said flue at the opening N'. (Shown in Fig. 3.) The doors M M' and T T' may also be opened to cool the apparatus when desired. In the stack N is also a damper, Q, to regulate the draft.

The above-mentioned devices to direct the hot and cold currents and to modify them or arrest them in the flues are important precau-

tionary improvements, not only to utilize the heat to best advantage, but also to avoid overflow of the pans by too rapid evaporation and too large a percentage of scum, as now occurs in apparatuses not so improved when an intense heat is not under control.

Two other main features of the improvement remain to be explained, both coacting to the end last described—that is, to facilitate the process of evaporation and purifying by aid of high heat with little risk from overflowing. Said features are—

First, the employment of the upper pan to treat the crude saccharine liquid by moderate heating, and, after the greater part of the scum has thus been generated and got rid of by low heat or simmering, the denser part of the liquid, next the bottom of said pan, is transferred by way of the spigot *m* and the tunnel or tube *Y*, in the manner illustrated, to the lower pan, to be therein exposed to a higher degree of heat. The apparatus is therefore built in several stories, and the lower pan may have the full intensity of the heat from the oven *F* admitted to the whole of its bottom, only the sheet-iron of the flue intervening, and the same heat-current may also be made to travel next the confine of the liquid in the said lower pan *en route* to the stack *N*.

Second, the employment of an endless series of rotary skimmers for each of the pans, the same being operated simultaneously by a band or chain, *K'*, coupling the pulleys *H*, and enabling both series to be operated by the winch *G*. Said pulleys are on the shafts *H'*, and actuate the reels *V*, which set in motion the carriers or chains *L'*, which latter are suspended on said reels and the rollers *V'*, and have on them the skimmers *L*, transversely arranged upon said carriers. The skimmers *L* are of proper length to match the cross-section of the pans *A*, and are flexibly attached only at one edge to said carriers, allowing the other edge to dip into the liquid in the pan to be skimmed. The breadth of said skimmers and the exit end *A'* of the pan have such relation and proximity to each other that the scum propelled by a given skimmer *L* may be ousted gently out of the pan *A* into the trough or eaves *B*. The rollers *V'* are so situated as to pass the carriers *L'* on their under side, clear of the liquid in the pans, and the end *E* of the pan is concentric with the roller *V'*, that the skimmers as they reverse about said roller may sweep the scum clean from said end *E*.

The pivoted scrapers *L²* catch the adherent scum on the skimmers *L* at the time the latter are passing over the reels *V*, and thus cleanse them and deposit the scum in the troughs *B*.

This ample and effective skimmer apparatus

promptly removes the scum as it forms, thus enabling a higher degree of heat to be employed for evaporating, with little risk of overflow from foaming.

What I desire to secure by Letters Patent of the United States is—

1. In combination with the rotary skimmer *L L' V V'*, the undivided oblong evaporating-pan *A*, having its front end, *A'*, slanted outward to favor ousting the scum over it mechanically by said skimmer, the shielded scum-receiver *C B*, and the duct *D D'*, arranged on the exterior of the long side of said pan for conveying the scum from said receiver past an inlet, *d*, thus allowing the valuable drippings to return into the pan thereat, and discharging the valueless scum at its open end, substantially as set forth.

2. For mounting the evaporating-pans *A*, the portable sheet-metal casing consisting of the base-section composed of the oven *F*, ash-box *R'*, and supports *f g*, the middle or main section, *h'*, with stack *N* thereon, and having therein the flues *P² P³*, communicating with said stack and said oven, the top section, *h*, the braces *S*, and doors *T T' M M'*, all constructed and arranged substantially as set forth.

3. In combination with a couple of evaporating-pans, *A*, mounted in a casing one above the other, with an intervening clear space between them for admitting the rotary skimmer *L L' V V'* on the lower pan, the collateral flues *P² P³*, arranged one under the other and under the bottoms of the said pans, the dampers *l p*, about midway in the flue-course, and the inlet-dampers *K P'*, coupled by the rod *k*, all adapted to pass the heat through either course of flues or to shut off the same, or to divide the same and diminish it by admission of cold air, as and for the purposes set forth.

4. In combination with the upper one of two co-operative evaporating-pans, *A*, arranged vertically one over the other, and supported in a casing having flues *P² P³*, arranged under said pans, the cock *m*, and the direct tube *Y*, applied to transfer portions of the partially-concentrated liquid from the upper to the lower and more highly-heated finishing-pan, substantially as herein set forth.

5. The combination of the freely-traveling rotary skimmers, supported above the pans *A* on rollers *V'*, and reels *V* thereon, the pivoted scrapers *L²*, the chain or belt *K'*, pulleys *H*, winch *G*, and the sectional casing *h h' F f g*, all coacting in the manner and for the purposes set forth.

FREDERICK L. HOWLAND.

Witnesses:

H. J. NEAL,

J. A. KESTER.