(No Model.) 3 Sheets—Sheet 1.

W. G. BOORMAN & E. J. DONOHUE.

MACHINE FOR SEPARATING FLOUR.

No. 440,301. Patented Nov. 11, 1890.

Fig. 1.

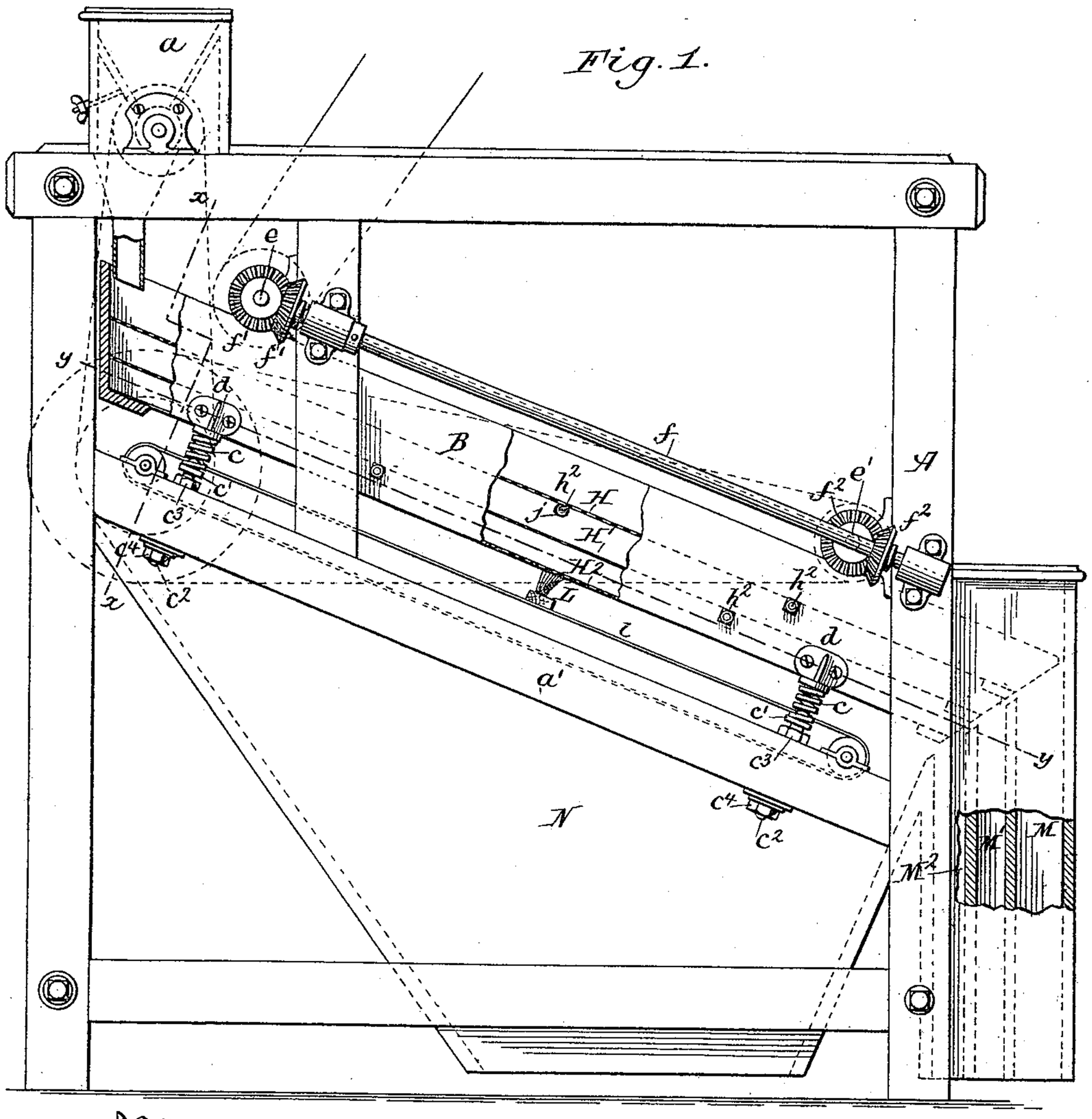
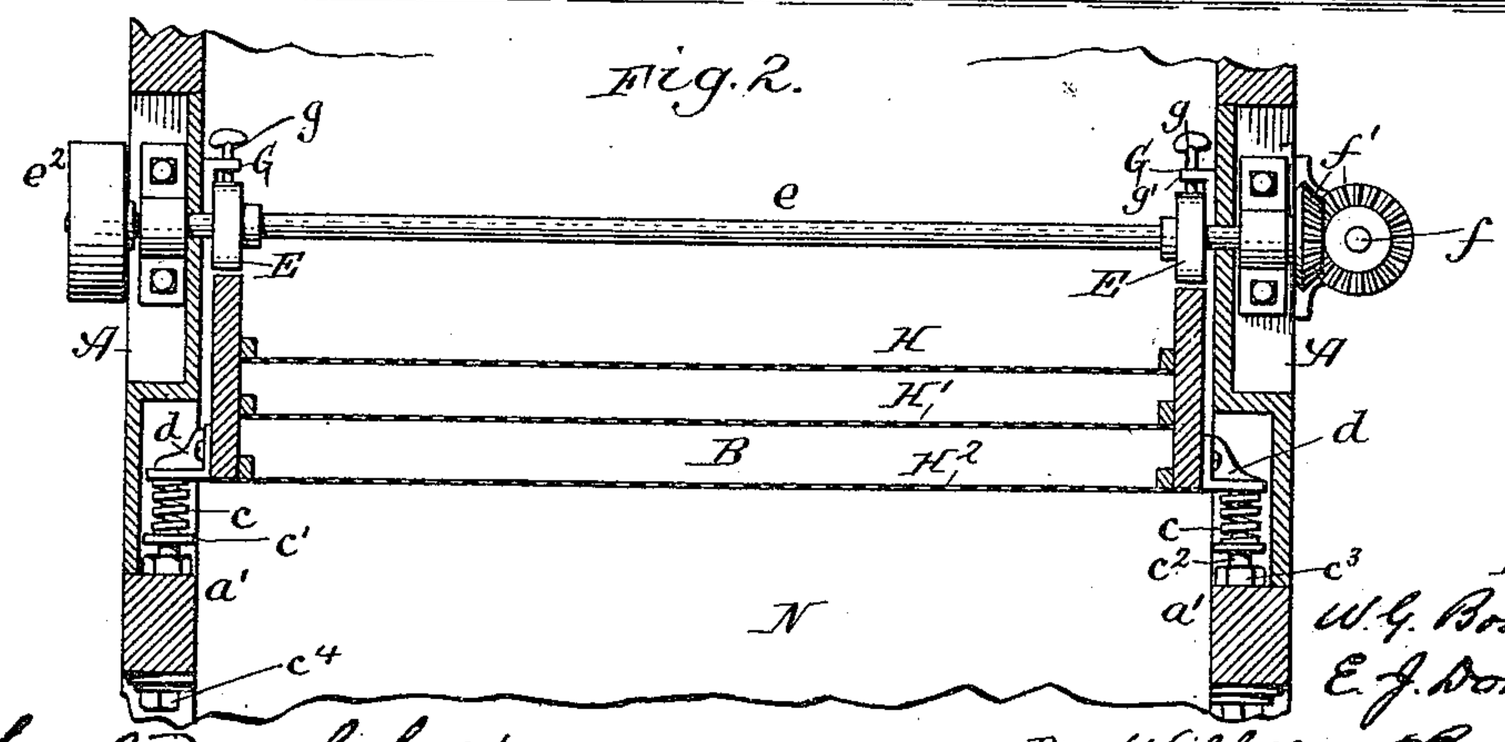


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

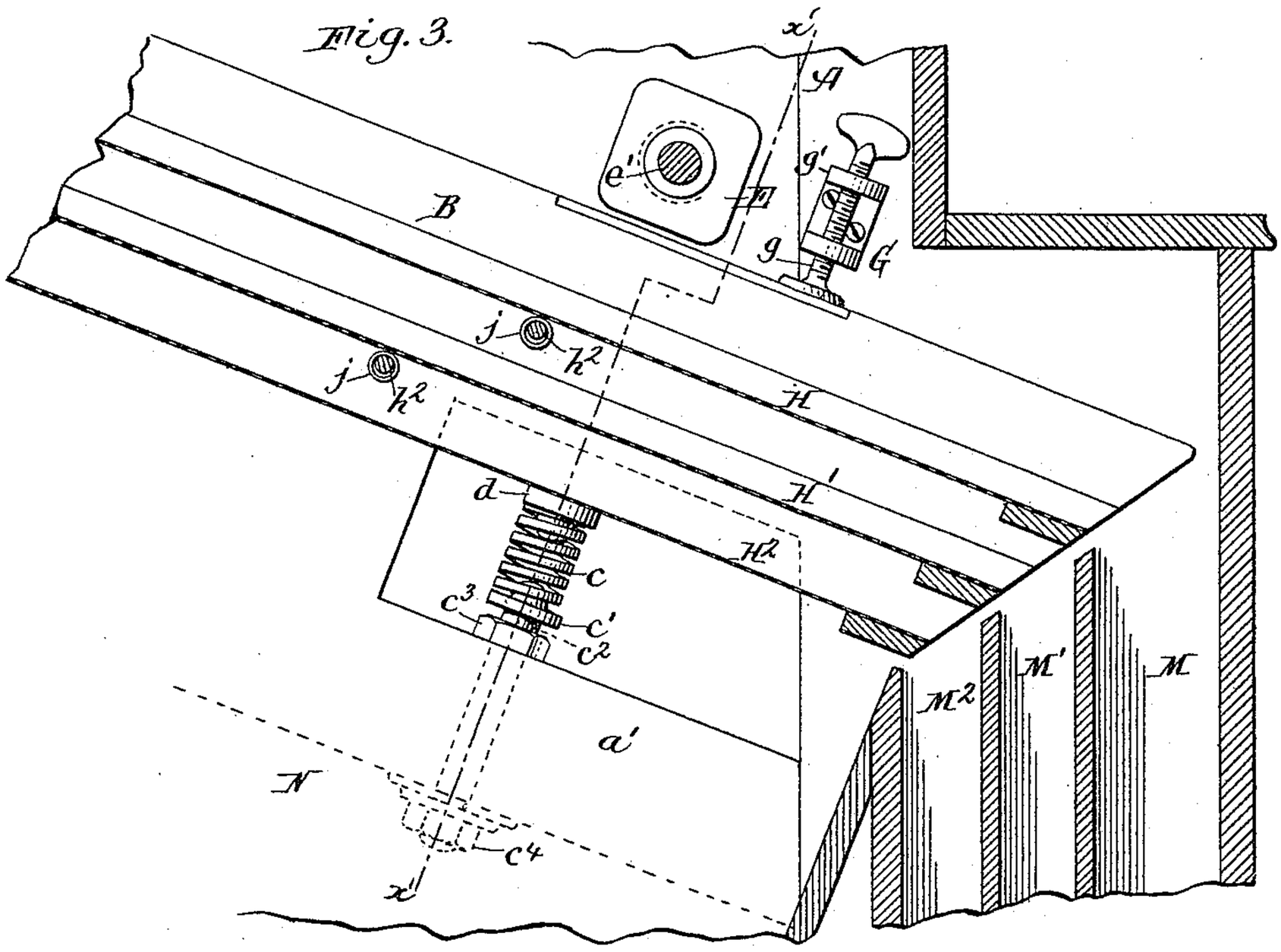
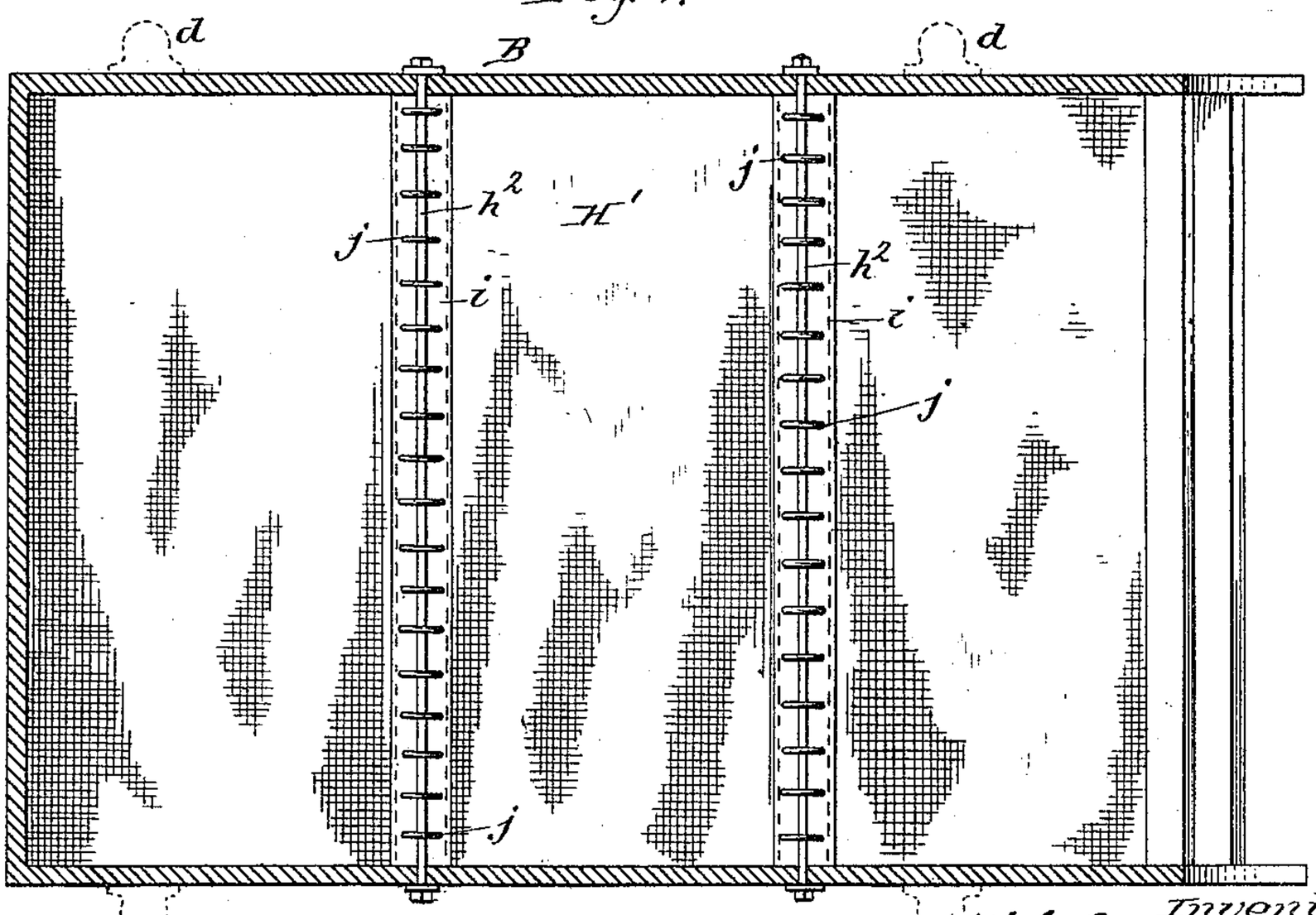


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

W. G. BOORMAN & E. J. DONOHUE.

MACHINE FOR SEPARATING FLOUR.

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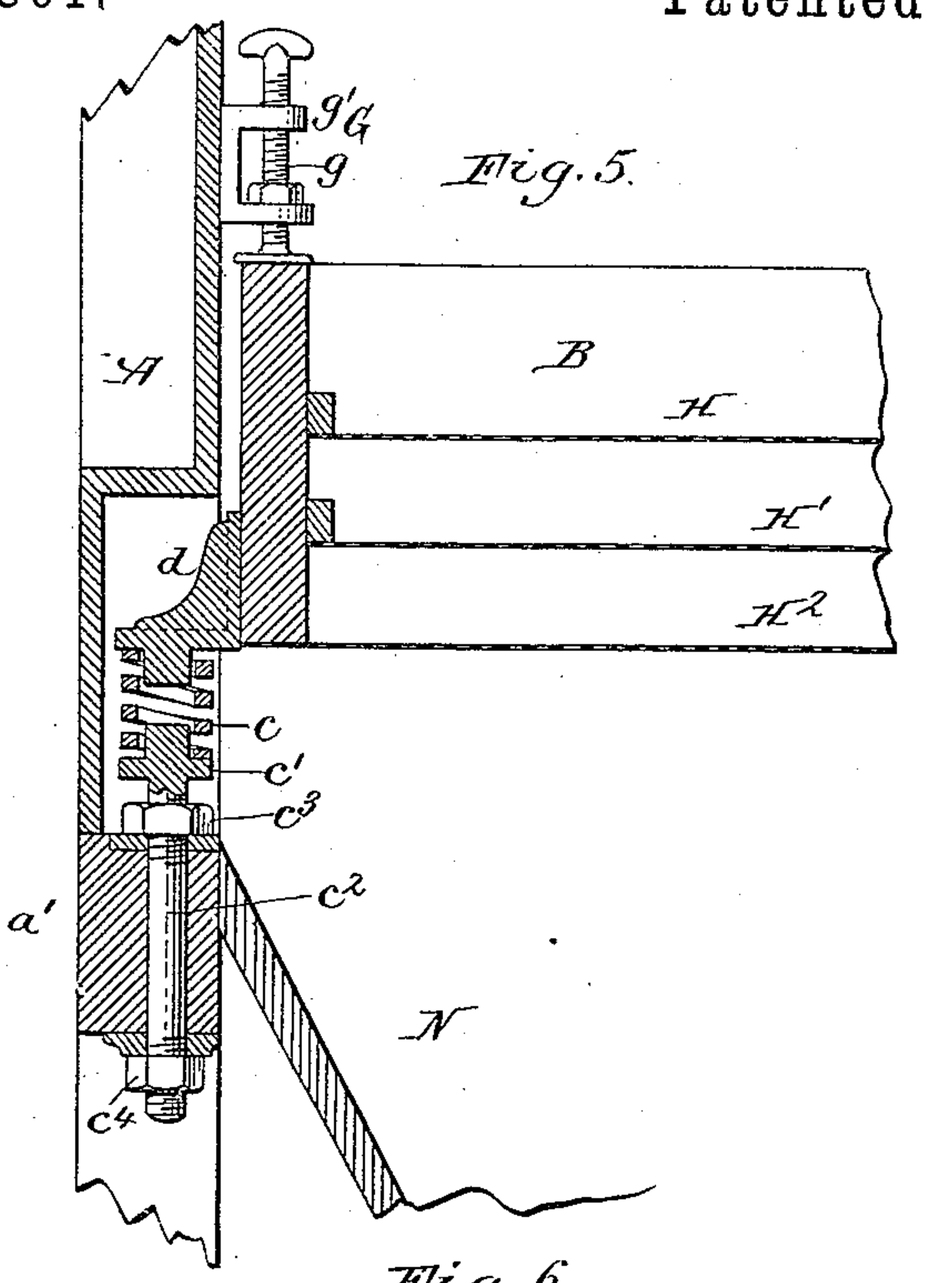

Fig. 5.

Fig. 10.

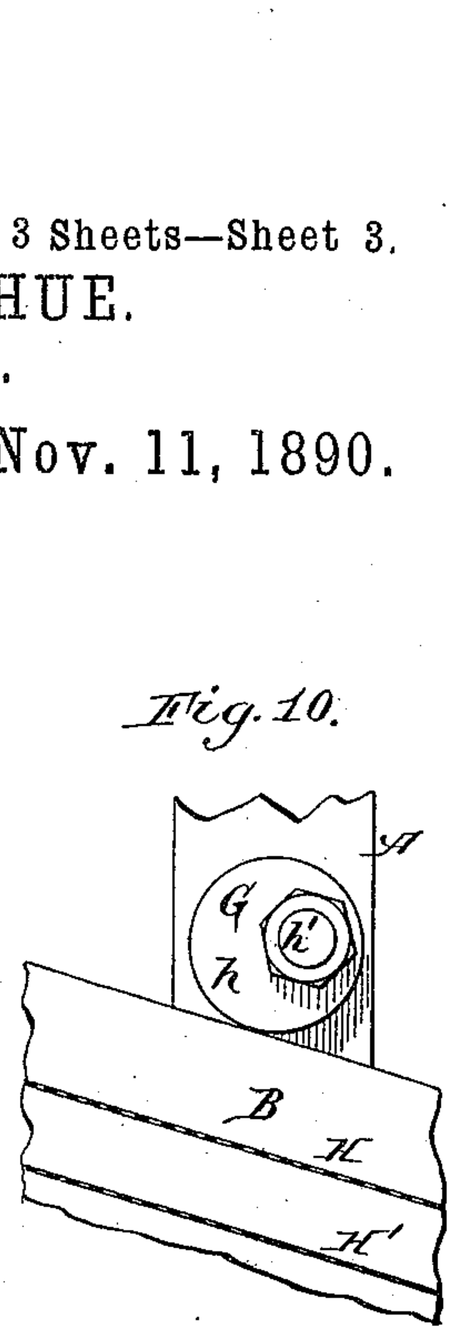

Fig. 6.

Fig. 7.

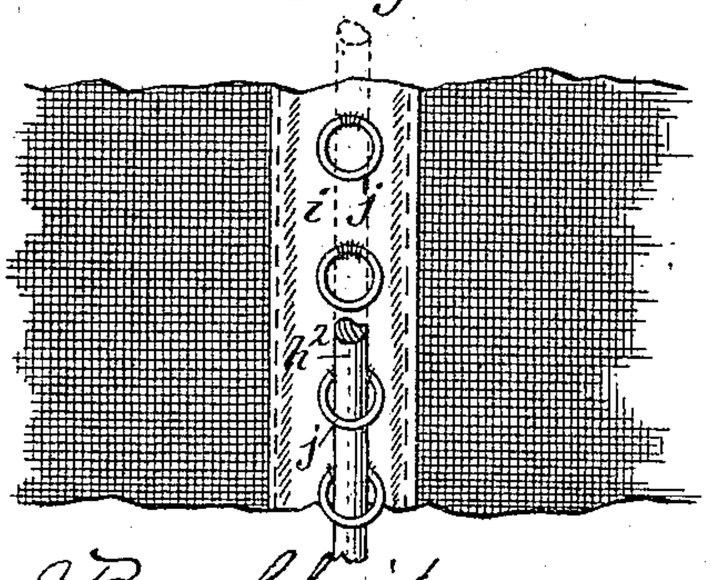

Fig. 8.

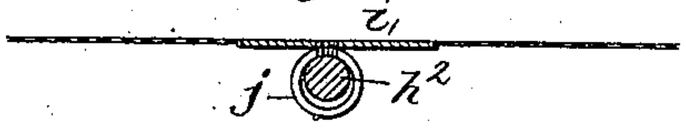

Fig. 9.

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UNITED STATES PATENT OFFICE.

WILLIAM G. BOORMAN AND EDWARD J. DONOHUE, OF MAUSTON, WISCONSIN.

MACHINE FOR SEPARATING FLOUR.

SPECIFICATION forming part of Letters Patent No. 440,301, dated November 11, 1890.

Application filed October 3, 1889. Serial No. 325,872. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM G. BOORMAN and EDWARD J. DONOHUE, citizens of the United States, residing at Mauston, in the county of Juneau and State of Wisconsin, have invented new and useful Improvements in Machines for Separating Flour, &c., of which the following is a specification.

This invention relates to that class of separating-machines which are provided with shaking screens. Our invention is more particularly designed to produce an efficient separating-machine for separating the "breaks" from roller-mills, which operation is commonly known as "scalping," although machines containing my present improvements may be employed for separating other products or substances in the manufacture of flour and in other industrial operations.

The object of our invention is to provide means for shaking or vibrating the separating-screen in a peculiar manner, so that a thorough separation is effected, and to provide the screen with efficient means for keeping the meshes of the cloth clean.

The invention consists of the improvements which will be hereinafter more fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of three sheets, Figure 1 is a side elevation, partly in section, of our improved bolting-machine. Fig. 2 is a fragmentary cross-section of the same in line x x, Fig. 1. Fig. 3 is a longitudinal section, on an enlarged scale, of the tail portion of the separator. Fig. 4 is a horizontal section of the separating-screen, looking upwardly, in line y y, Fig. 1. Fig. 5 is a fragmentary vertical cross-section of the separator, on an enlarged scale, in line x' x', Fig. 3. Fig. 6 is a fragmentary perspective view of the separating-screens. Fig. 7 is a fragmentary bottom plan view of one of the screen-cloths on an enlarged scale. Fig. 8 is fragmentary longitudinal section of one of the screen-cloths on an enlarged scale. Fig. 9 is a similar view showing a modified attachment of the vibrating rod to the screen-cloth. Fig. 10 is a view of a modified construction of the adjustable stop.

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

A represents the stationary main frame of the machine, and a the feed-hopper secured to the upper portion thereof near one end.

B represents the inclined shaking shoe or frame in which the separating-screens are mounted, and which is yieldingly supported in the stationary frame A. As shown in the drawings, the shoe B is supported on the inclined longitudinal pieces a' of the main frame by four springs c, one near each corner of the shoe. These springs rest upon supports c', having studs which enter the cavities of the springs, and downwardly-extending screw-bolts c^2, which pass through holes in the longitudinal pieces a'. The screw-bolts are secured in the longitudinal pieces by jam-nuts c^3, resting on these pieces, and screw-nuts c^4, bearing against the undersides of said pieces, as represented in Fig. 5 of the drawings, whereby the spring-supports can be vertically adjusted. As each spring-support is independently adjustable, the shaking-shoe can be adjusted at each corner, as may be necessary, to cause an even distribution of the material over the screen. The shaking-shoe rests upon these springs by brackets d, which are secured to the sides of the shoe and provided with downwardly-projecting studs, which enter the upper ends of the springs.

E represents rotating cams arranged above the shaking-shoe and operating to depress the same and compress the springs on which the shoe rests. These cams are mounted upon two transverse horizontal shafts e e', which are journaled in the main frame, one shaft e being arranged near the head of the shoe and the other e' near the tail thereof. The head-shaft e is provided with a driving-pulley e^2. These two transverse shafts are geared together so as to rotate exactly in unison by an inclined longitudinal shaft f, which is connected with the shafts by bevel-wheels f' f' and f^2 f^2. This longitudinal shaft and the connecting-gears form a positive connection between the two shafts, whereby one shaft is rotated from the other and both are rotated exactly alike, so that the cams will vibrate the shoe at the four corners at exactly the same time, thereby preventing any uneven or irregular movement and twisting of

the screen. The cams E are represented in the drawings as being four-sided, but may be of any other suitable form.

G represents stops, which are secured to the main frame and project beyond the retreating portions of the cams, so as to limit the upward or return movement of the shoe. When the latter is in its highest position, it bears against these stops, as represented in Fig. 3, and does not touch the cams, but is held at a short distance behind the cams. The cams are thereby caused to strike the shoe with a forcible blow at the beginning of each downward movement of the shoe. The stops also cause the shoe to come to a sudden stop at the end of each upward movement, so that the downward movement is started suddenly or with a forcible blow and the upward movement is arrested in like manner, causing the shoe to receive two sharp blows at each complete movement. These stops prevent the shoe from following the cams from end to end of their movement, whereby a gradual beginning and ending of the movement would be produced, but cause a movement of the shoe which begins and ends with a sudden jar or hammer action, similar to that of a knocker. The jar produced by the stops occurs midway between two successive jars produced by the cams, so that the stops double the jarring action which is imparted to the shoe. These stops may be composed of screw-rods *g*, which are attached to brackets *g'*, secured to the main frame A, and in which they can be adjusted toward and from the shaking-shoe, as represented in Figs. 3 and 5. They may also be formed by eccentrics *h*, which are secured to the main frame by screws *h'*, on which the eccentrics can be turned for adjusting them when the screws are loosened, and which are secured in position by tightening the screws, as represented in Fig. 10. Any other suitable construction of stop may, however, be employed, if desired. By adjusting these stops the throw of the shaking-shoe can be increased or reduced, as may be necessary. The sharp jar produced by the stops aids materially in keeping the meshes of the screen clear.

H H' H^2 represent three screens arranged in the shoe B one below the other, the top screen H being the coarsest and the bottom screen H^2 the finest in mesh, as represented in Fig. 3. h^2 represents vibrating rods, which are applied to the under sides of the screen-cloths of the upper screens H and H' for the purpose of transmitting the vibrations from the shoe or frame to the cloth. These rods are thin flexible rods or tubes, preferably of metal, which are secured with their ends to the screen-frame and extend across the screen-cloth on the under side thereof. The cloth is preferably provided with a re-enforcing strip *i* of ticking or other strong material, by which the cloth rests on the rod and which prevents wear of the cloth. The cloth is connected with the rod by rings *j*, which are attached to the re-enforcing strip and through which the rod passes, as represented in Figs. 4, 6, 7, and 8, or by a tubular portion or sleeve *k*, formed on the re-enforcing strip *i*, as represented in Fig. 9, or in any other suitable manner. The vibrations which are imparted to the sieve-frame and communicated by the latter to the cloth diminish in force in the cloth from the frame inwardly, so that the vibrations lose a large portion of their force in the central portion of the cloth, and are extinguished altogether when the cloth has become loose or baggy. For this reason the cloth is kept comparatively clear near the screen-frame, but fills up in the middle of the screen, whereby the separating action is impaired. The flexible rods receive the vibrations from the frame, and these vibrations increase in size, number, and force from both ends of each rod inwardly, as the inner portion of each rod is least supported. These rods transmit the vibrations to the cloth which rests on them and cause a thorough agitation of the middle portion of the cloth, whereby the latter is prevented from filling up, and all portions of the screen-cloth are kept in proper condition for effecting the desired separation, while the material is prevented from accumulating in a thick layer upon the middle of the cloth. The rods lift the cloth during their upward movement and pull it down by means of the rings or sleeves during their downward movement.

The lower screen H^2 may be kept clear by a traveling brush L, operated by an endless belt or chain *l*, or by means of rods and rings similar to the screens H H', as shown in Fig. 6, or in any other suitable manner. The screens H H' H^2 are arranged so closely together in the shoe that the middlings or other substances passing over the second and third screens H' and H^2 are thrown upwardly from each of these screens against the lower surface of the next higher screen, so that the meshes of the upper screens are also kept clear by the impact of the material against their lower sides.

The tailings from the several screens pass into discharge-spouts M M' M^2, while the material which passes through the lower screen passes into one or more hoppers N.

We claim as our invention—

1. The combination, with the inclined separating-screen, of independently-adjustable springs, upon which the screen rests near its four corners, and rotating cams arranged above the screen near its four corners, whereby the screen is depressed against said springs, substantially as set forth.

2. The combination, with the inclined separating-screen, of independently-adjustable springs, on which the screen rests near its four corners, rotating cams arranged above the screen near its four corners, whereby the screen is depressed against said springs, and

stops separate from the cams by which the upward movement of the screen is arrested, substantially as set forth.

3. The combination, with the stationary main frame, of an inclined screen-frame, transverse shafts arranged over the screen-frame, cams mounted on said shafts and moving the screen-frame downwardly, a longitudinal shaft and gear-wheels connecting said transverse shaft, and independently-adjustable springs by which the screen-frame is moved upwardly, substantially as set forth.

4. The combination, with the screen-frame and the screen-cloth secured thereto, of a flexible rod secured to the screen-frame, and fastenings connecting the cloth with the flexible rod, whereby the cloth is compelled to take part in the vibrations of the flexible rod both upwardly and downwardly, substantially as set forth.

5. The combination, with the screen-frame and the cloth secured thereto, of a flexible rod secured with its ends to the screen-frame and extending across the cloth, and rings which are attached to the cloth and through which the flexible rod passes, substantially as set forth.

Witness our hands this 23d day of September, 1889.

WILLIAM G. BOORMAN.
EDWARD J. DONOHUE.

Witnesses:
G. H. WINSOR,
F. WINSOR.