

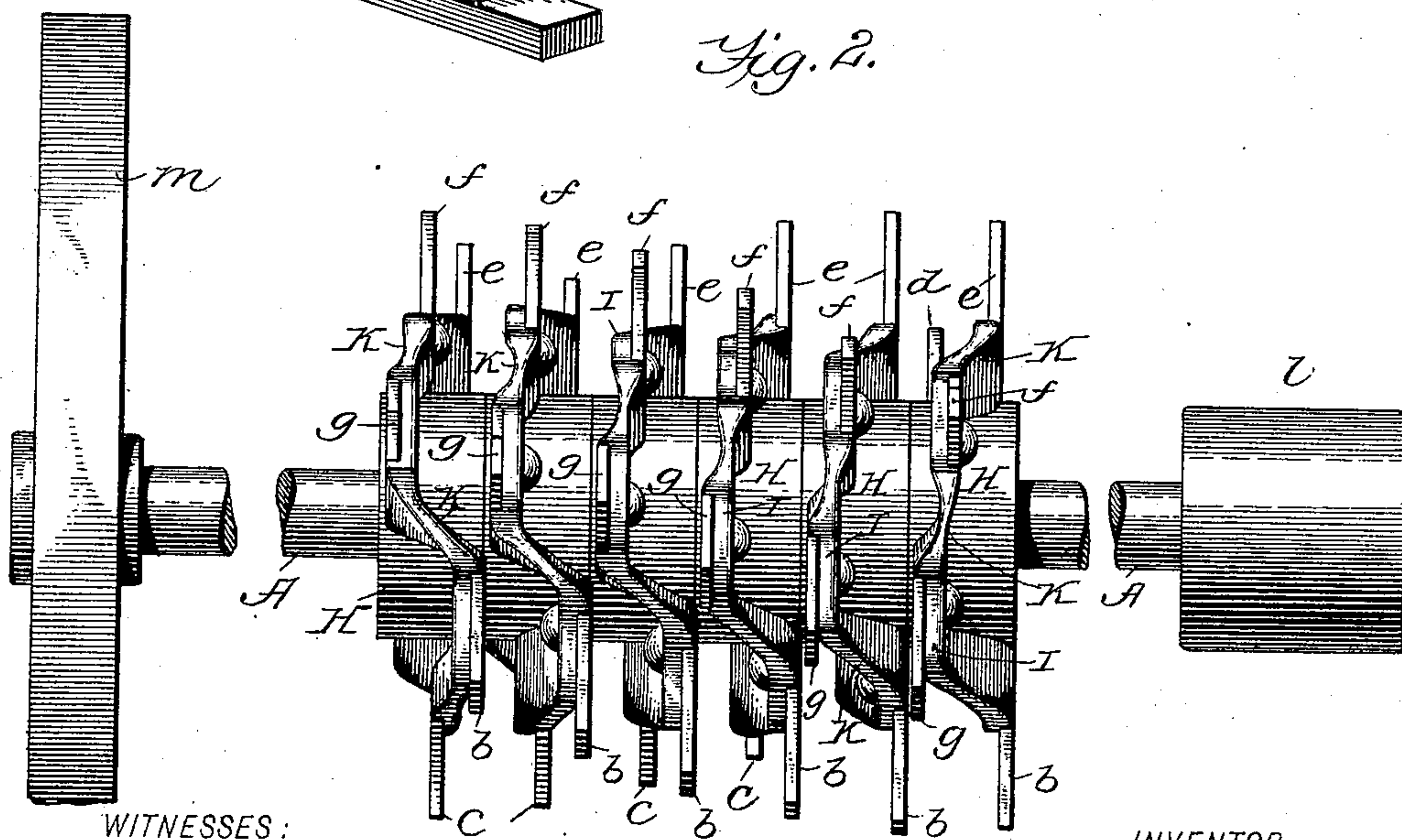
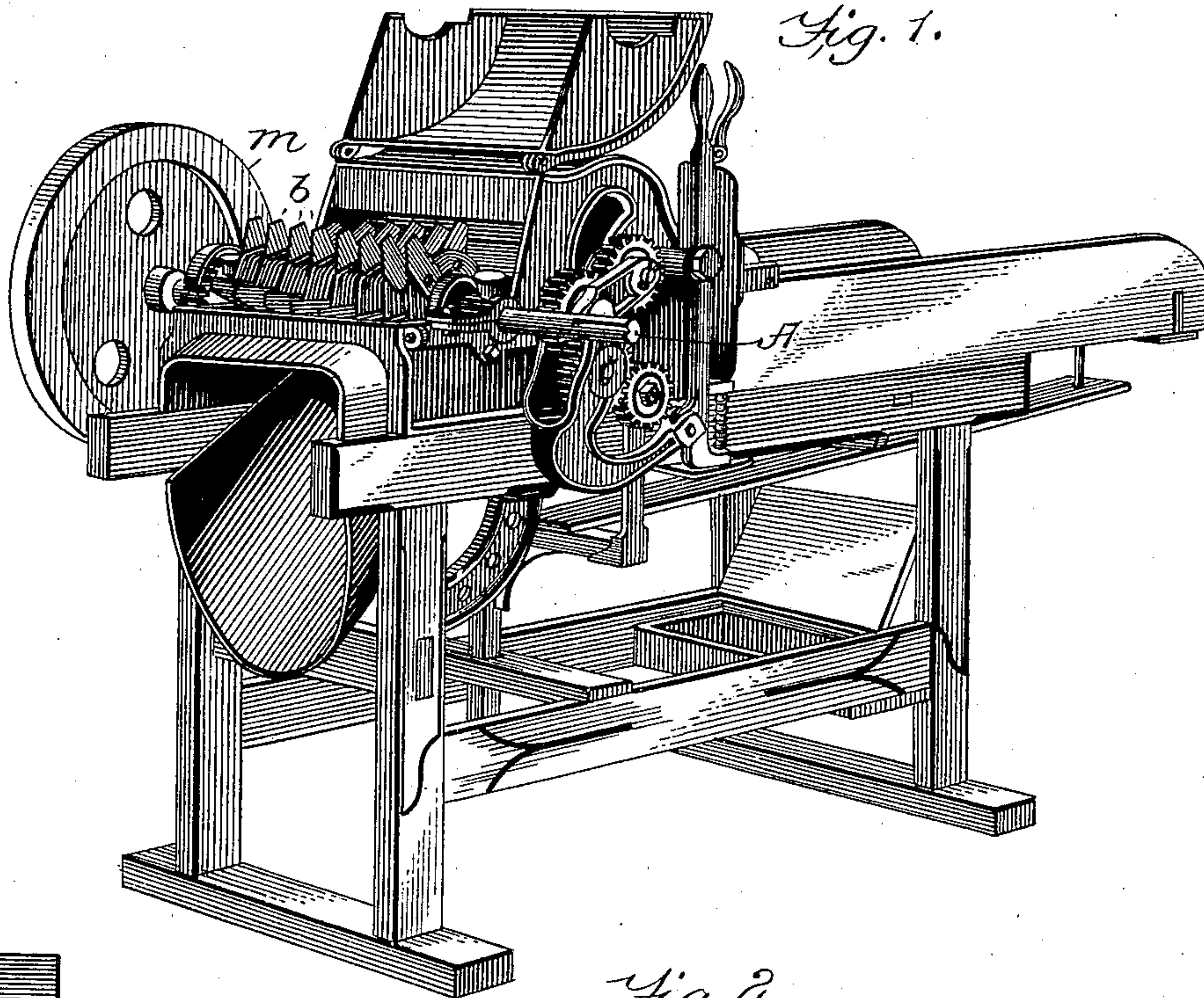
(No Model.)

2 Sheets—Sheet 1.

C. F. HALDEMAN & E. W. SILVER.
SHREDDER CYLINDER FOR FODDER MILLS.

No. 594,250.

Patented Nov. 23, 1897.



WITNESSES:

Harry S. Cohen,
L. R. Ritter, Jr.

INVENTOR

C. F. Haldeман & E. W. Silver,

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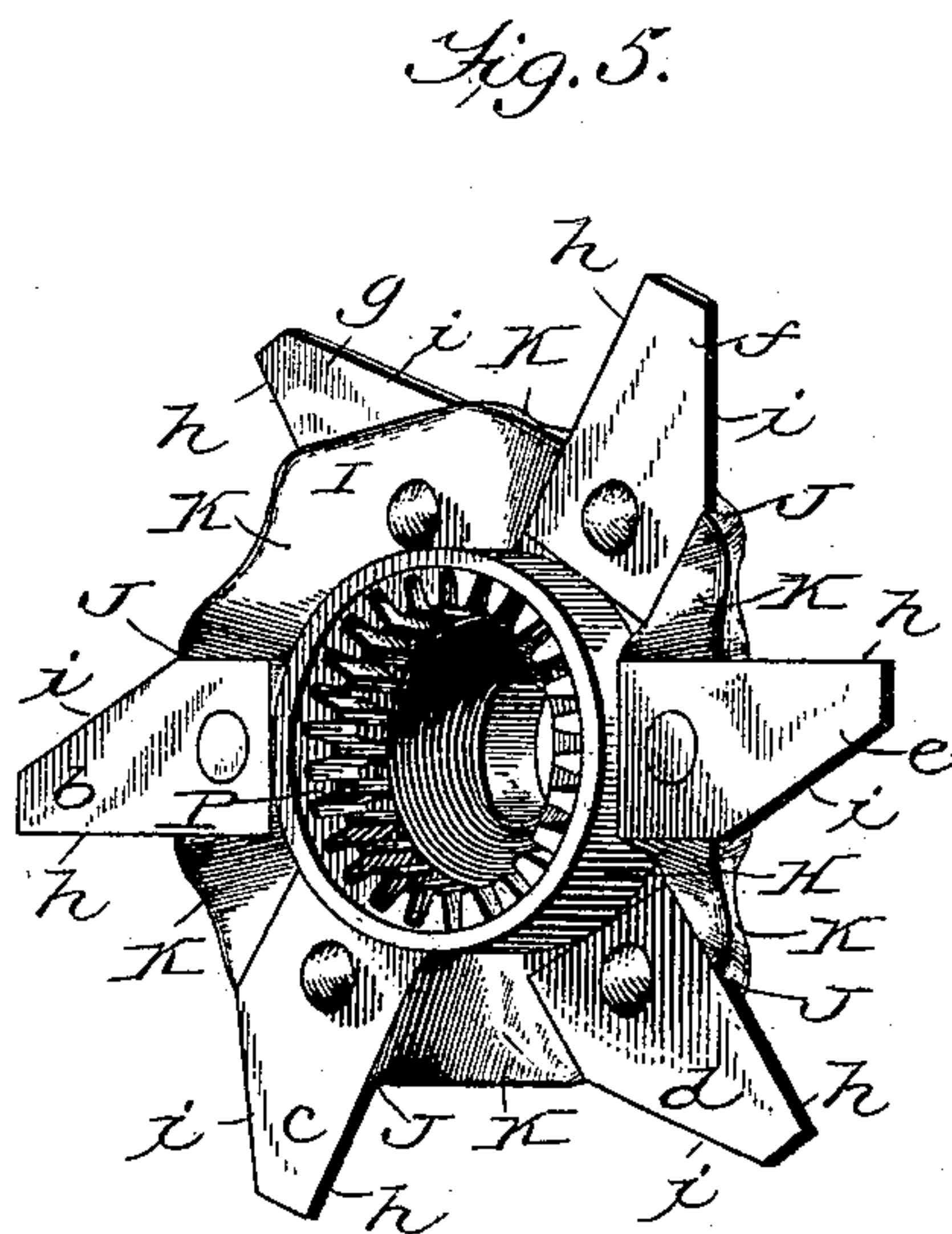
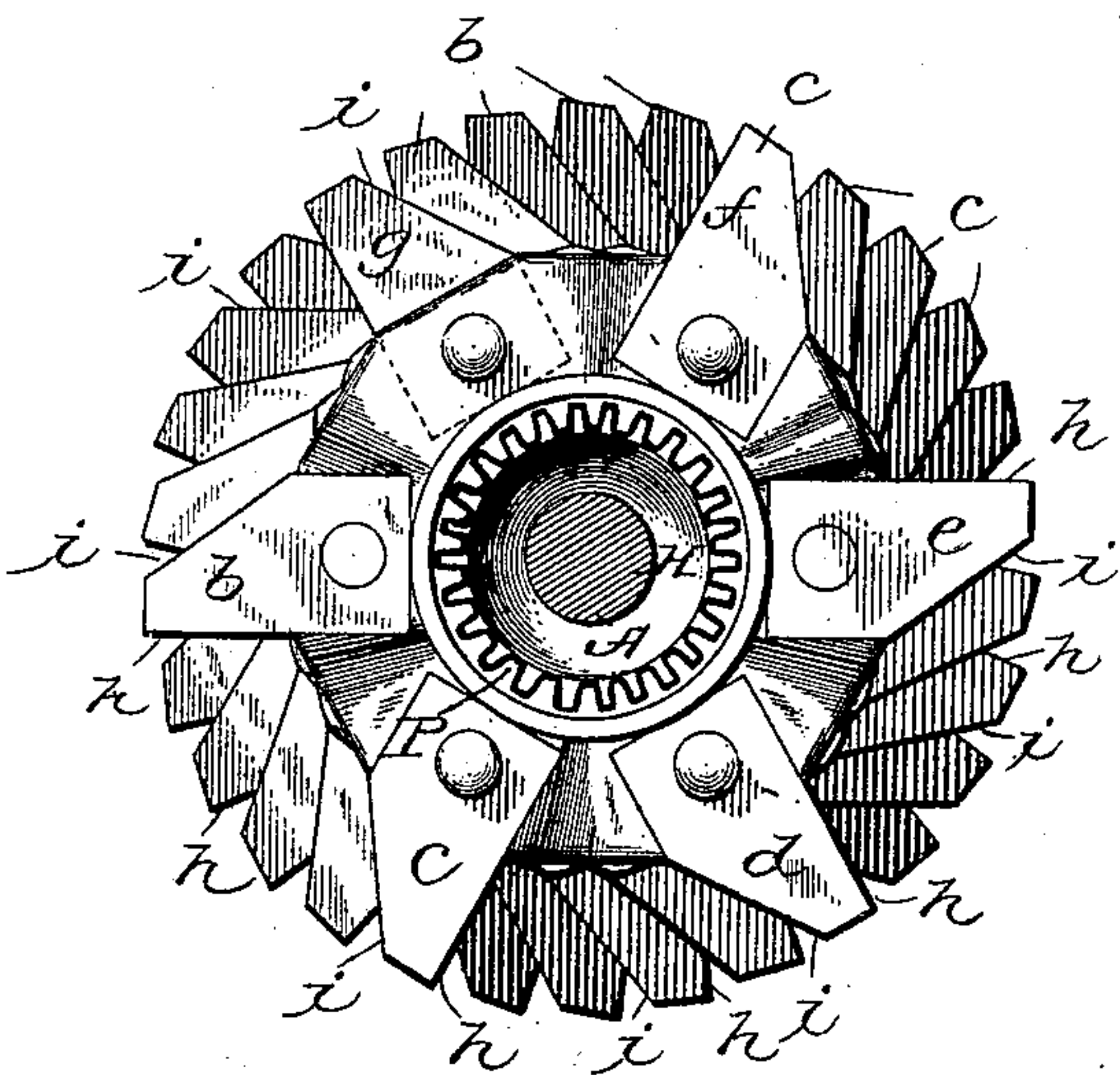
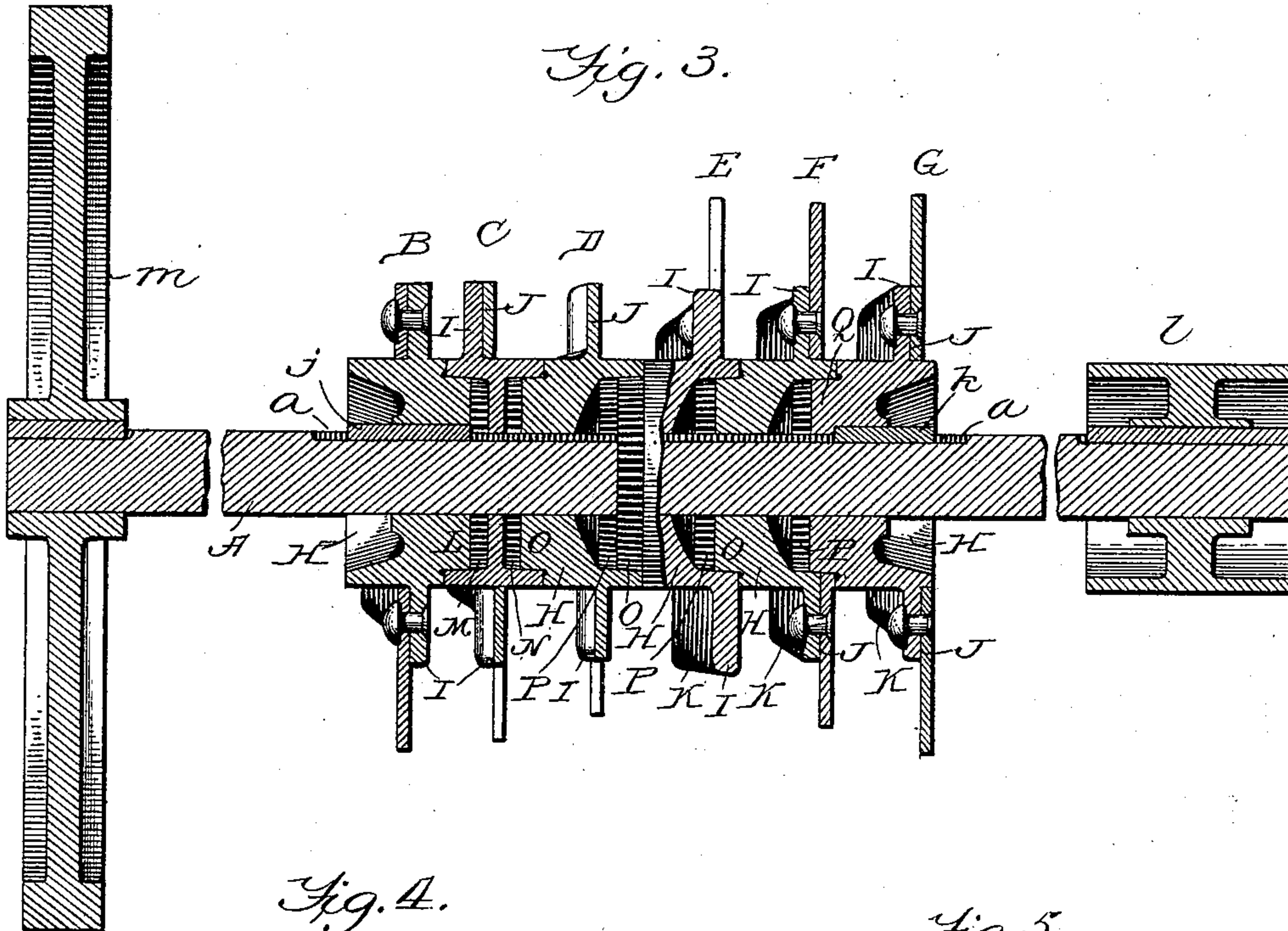
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C. F. HALDEMAN & E. W. SILVER.
SHREDDER CYLINDER FOR FODDER MILLS.

No. 594,250.

Patented Nov. 23, 1897.



WITNESSES:

Harry S. Rohrer,
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INVENTOR

C. F. Haldeман & E. W. Silver,
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UNITED STATES PATENT OFFICE.

CHARLES F. HALDEMAN AND EMMOR W. SILVER, OF SALEM, OHIO, ASSIGNORS
TO THE SILVER MANUFACTURING COMPANY, OF SAME PLACE.

SHREDDER-CYLINDER FOR FODDER-MILLS.

SPECIFICATION forming part of Letters Patent No. 594,250, dated November 23, 1897.

Application filed February 3, 1897; Serial No. 621,818. (No model.)

To all whom it may concern:

Be it known that we, CHARLES F. HALDEMAN and EMMOR W. SILVER, citizens of the United States, residing at Salem, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Shredder-Cylinders for Fodder-Mills; and we 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.

Our invention relates to that class of machines or mills used in shredding, cutting, or otherwise comminuting fodder and ensilage for the purpose of reducing it to a convenient and satisfactory form for feeding cattle.

More particularly stated, the invention resides in a shredder-cylinder, as distinguished from a cutting-cylinder, for operating in the machines or mills aforesaid upon dry corn-fodder. This shredder-cylinder in its structural arrangement contemplates and includes a central drive-shaft, a series of adjustable heads mounted thereon, interposed and intermeshing gears combining to relatively interlock said heads and shaft, together with suitable shredder-teeth secured to and carried by the heads, being spaced and arranged to describe spiral forms upon the surface of said cylinder.

The object of our invention, therefore, is the production of a sectional shredder-cylinder in which are combined the qualities of greater general efficiency, a positive but relatively adjustable interlocking of parts, ready interchangeability of such parts in the event of breakage, and consequent economy in the matter of repairs.

For purposes of the present application the improved shredder-cylinder will be hereinafter described irrespective of any particular machine, but in order to better illustrate its operative position it is shown as applied to a mill constructed in substantial accord with United States Letters Patent No. 424,434, granted March 25, 1890, to E. W. Silver, one of the present applicants.

The invention will be hereinafter more definitely described, and pointed out in the claims following.

In the accompanying drawings, which form

part of this specification, and whereon the same reference-letters indicate corresponding parts in the several illustrations, Figure 1 is a perspective view of a fodder-mill, showing our improved shredder-cylinder in operative position. Fig. 2 is a plan view of shredder-cylinder, its driving-pulley, and fly-wheel, the supporting-shaft being broken away at either end. Fig. 3 is a horizontal central section throughout the length of shredder-cylinder, showing also an ordinary driving-pulley, a fly-wheel, and supporting-shaft, the latter being broken to economize space. Fig. 4 is an end view of cylinder with its first cast head removed, and Fig. 5 is a detail perspective view of one shredder-head detached.

Reference being had to the drawings and letters thereon, A indicates a central drive-shaft, made of any suitable material, preferably rolled or cold-drawn steel, bearing in its surface a spline *a*, coextensive in length with that of the shredder-cylinder. Surrounding the shaft A is a series of shredder-heads B C D E F G, which collectively constitute a shredder-cylinder and to outward appearances are counterparts one of the other, each having a cylindrical body or hub H encircled by an integral flange, as best shown by Fig. 5. This flange, while continuous, viewed as a whole, may be said to substantially describe two corresponding spirals starting and ending at points diametrically opposite each other and each crossing the hub obliquely from side to side—that is to say, each of the said spirals is composed of plain surfaces I, in step-like arrangement, socketed, as at J, and connected by angular webs K, as shown, thus constituting a corrugated flange for the purpose of receiving suitable shredder-blades and supporting them in adjacent vertical planes, as will later appear. In place of said flange, however, the heads B, C, D, E, F, and G may themselves be made of greater diameter and corrugated from hub to circumference, if desired; but in either event the corrugations aforesaid support shredder-blades, which are thereby offset each from the other, and consequently revolve in adjacent planes.

Within the sockets J of each head B to G, inclusive, are secured shredder-blades *b c d e f g*, which by preference are made of sheet-

steel, are unsharpened, and have a radial leading edge *h*, with a tangential trailing edge *i*, as shown by Figs. 1, 4, and 5.

As thus far described, the heads B, C, D, E, F, and G are practically the same, though by reference to Fig. 3 it will be observed that they differ somewhat in an arrangement of interposed gear-teeth, serving as a clutch to lock them to each other and to their common supporting-shaft A as follows: The end head B is secured to shaft A by means of an ordinary key *j*, driven into spleen *a*, and upon its inner reduced portion has cast or otherwise formed an external gear-wheel L. Head C differs from the former in that it is loose upon shaft A and is furnished with internal gears M N. Heads D, E, and F are counterparts one of the other, each being provided with a reduced external gear O and also an opposing internal gear P, while the remaining head G is provided with an external gear Q and corresponds with head B, except in the side upon which said external gear is projected, all for purposes which will now appear. The teeth of gears L M N O P Q are all of slightly-tapering form, and in assembling heads B C D E F G to constitute a shredder-cylinder that designated B is first keyed to shaft A, as before stated. The internal gear M on head C is then interlocked with external gear L of head B, the shredder-blades *b c d e f g* upon the latter head being arranged slightly in advance of the corresponding blades upon the first-named head. In like manner the remaining heads D, E, F, and G are affixed, the internal gears of each interlocking with an external gear upon the adjoining head. The several heads are then driven up by a blow upon the end hub or body H, the tapering form of all teeth facilitating such operation and insuring a firm interlocking, after which the end head G is keyed to shaft A, as shown at *k*, a driving-pulley *l* and a fly-wheel *m* of ordinary construction being added. When thus assembled, it will be observed that shredder-blades *b* upon the several heads, collectively considered, extend from end to end of the cylinder and are spirally arranged, the same being true of each series of shredder-blades *c, d, e, f*, and *g*, the pitch of such spiral arrangement being regulated by the relative positions of the several heads B C D E F G. In other words, each of said heads may be rotated more or less one way or the other around the central driving-shaft A, for the purpose of relatively adjusting blades *c, d, e, f*, and *g*, the heads then being again interlocked by engagement of gears L M N O P Q, as described. The extent of this adjustment depends largely upon the number of clutch-teeth formed upon gears L, M, N, O, P, and Q, in the present instance twenty-five being shown; but such adjustment is further effected and materially facilitated by a lack of ratio existing between said teeth and shredder-blades, respectively.

As will be seen by reference to Figs. 4 and

5, the number of blades employed by preference upon a single head is six, although the number may of course be varied without departing from the spirit of our invention, though it is desirable that an unequal ratio between the number of shredder-blades and the number of clutch-teeth be preserved, thus further extending the range of adjustment afforded said parts.

A shredder-cylinder constructed and located in a fodder-mill, substantially as shown and described, is so obvious in its use as to require but brief statement of its operation. Dry corn-fodder being fed to the machine is arrested by its cutter-bar, where it is met by the blades *b c d e f g*, revolving at a high rate of speed, and thoroughly torn apart or shredded. These shredder-teeth are so set that they cover the entire length of the cylinder, and at point of passing the cutter-bar there is but one-eighth of an inch between them, thus insuring most thorough action of the blades—that is to say, while the blades *b, c, d, e, f*, and *g* upon each shredder-head pass the cutter-bar in rapid succession and in the order named, they at same time revolve in parallel planes, each of which is removed from the preceding about one-eighth of an inch in the following order: *b e c f d g*.

While the foregoing is a description of our improved fodder-mill in substantially its preferred form of construction, it will be noted that various changes, modifications, and arrangements of parts may be made and substituted for those herein shown and described without in the least departing from the spirit of our invention. For instance, the hub H, constituting part of each shredder-head B, C, D, E, F, and G, may in practice be surrounded by a corrugated blade-bearing flange, which viewed as a whole may be said to lie in a plane that intersects said hub at an acute angle to its axis. In other words, such modified form of flange has its beginning at one side or end of hub H, crosses the latter obliquely to a point directly opposite, and, continuing around the hub, terminates at its point of beginning.

As thus constructed, it is of course understood that the shredder-heads employed in any particular machine may be large or small, many or few, as will best suit the purposes for which intended, and it should be particularly noted that the peculiar arrangement of intermeshing gears L M N O P Q, interposed between the shredder-heads B, C, D, E, F, and G, as shown, effect a most rigid clutch and at same time permit a nicety of adjustment between said heads upon their common supporting-shaft. The peculiar advantages of a clutch composed of intermeshing gears, as aforesaid, will be appreciated when it is considered that the main shaft A and its dependent parts are driven at a speed of twelve hundred revolutions per minute. Under these conditions it becomes a matter of vital importance to the machine and its

operators alike that the clutch mechanism serving to retain the individual shredder-heads in operative relation be most secure and positive in its action, and also that the strain imposed upon each of said heads be uniformly distributed. This can only be accomplished by a continuous series of intermeshing gears, as herein shown and described. A further and no less important function resulting from such arrangement of continuous gears is to be found in the facility with which the shredder-heads with blades attached may be relatively adjusted to meet different requirements and conditions.

As before stated, it is important, in order to operate with the least expenditure of power, that the corresponding blades of each head B, C, D, E, F, and G should reach the cutter-bar of the machine in succession, the rapidity of which depends upon the adjustable relation of interlocking gears aforesaid. Thus it will be observed ample provision is made for large or for small machines, many or few heads, heavy or light fodder, the same head being employed in all cases and with equal advantage.

This being substantially a description of our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a shredder-cylinder the combination with adjustable heads, of gear-teeth interposed between the heads for interlocking same, and a series of shredder-blades between which blades and gear-teeth there is an ab-

sence of an exact ratio, substantially as described. 35

2. In a shredder-cylinder the combination with corrugated adjustable heads, of gear-teeth interposed between said heads for interlocking same, and a series of shredder-blades carried by each head in different planes, substantially as described. 40

3. In a shredder-cylinder the combination with a series of adjustable heads, of suitable shredder-blades carried thereby, and a clutch mechanism comprising external and internal gears for interlocking said heads in operative relation, substantially as described. 45

4. In a shredder-cylinder the combination with a series of adjustable heads, of suitable shredder-blades carried thereby, and a clutch mechanism comprising external and internal gears with tapering teeth for interlocking said heads in operative relation, substantially as described. 50

5. In a shredder-head the combination with a surrounding flange formed of diametrically opposite spirals, and shredder-blades supported upon said flange in adjacent planes, substantially as described. 55

In testimony whereof we subscribe our signatures in presence of two witnesses. 60

CHARLES F. HALDEMAN.
EMMOR W. SILVER.

Witnesses:

WM. C. BOYLE,
WM. SILVER.