(No Model.) 4 Sheets—Sheet 1.

G. L. RILEY.

DISINTEGRATING MACHINE.

No. 557,886. Patented Apr. 7, 1896.

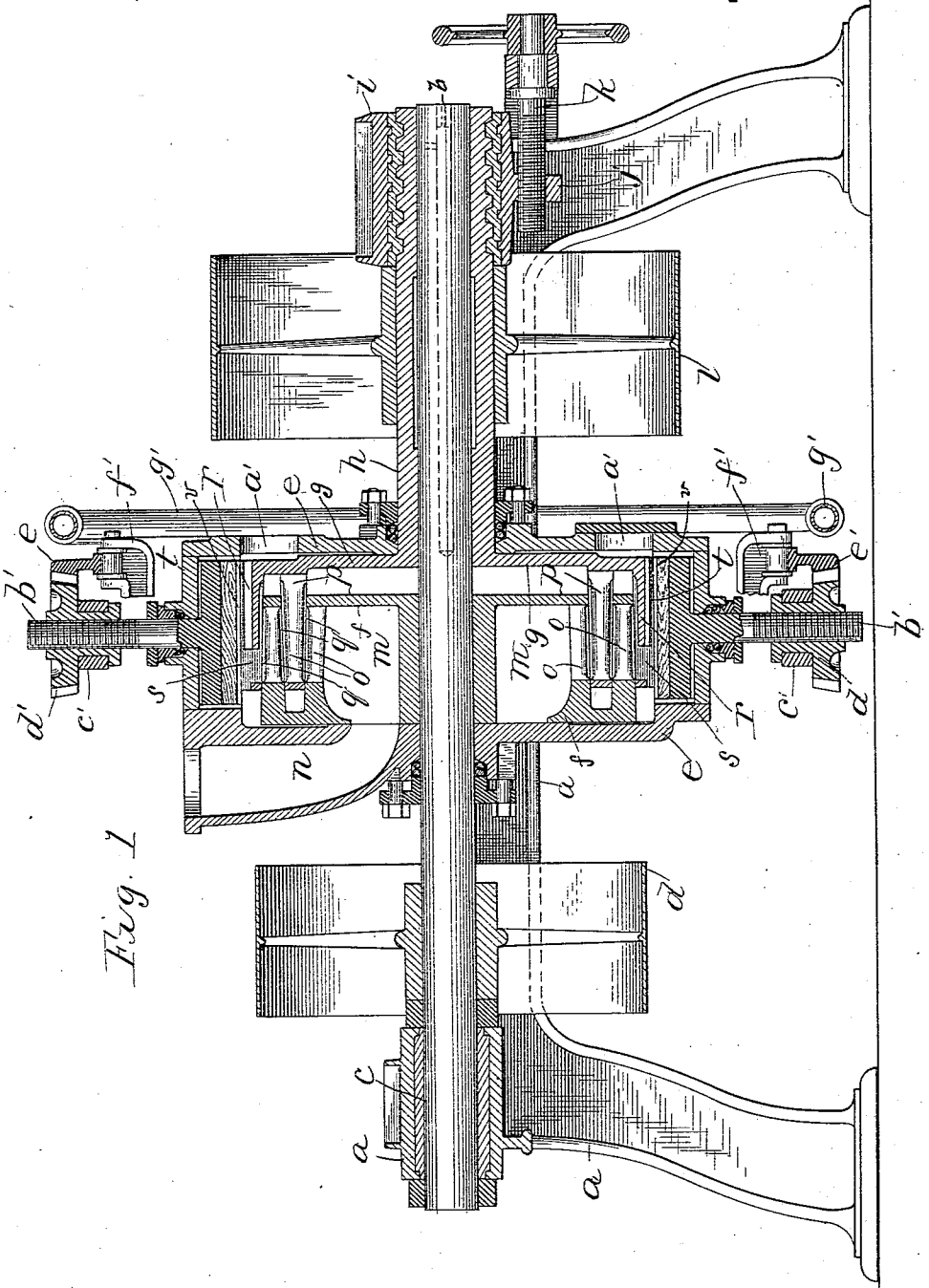

Fig. 1

Witnesses
Chester Bundell
Hubert E Beck

Inventor
George L. Riley
by D. E. Duff
Attorney

(No Model.) 4 Sheets—Sheet 2.

G. L. RILEY.

DISINTEGRATING MACHINE.

No. 557,886. Patented Apr. 7, 1896.

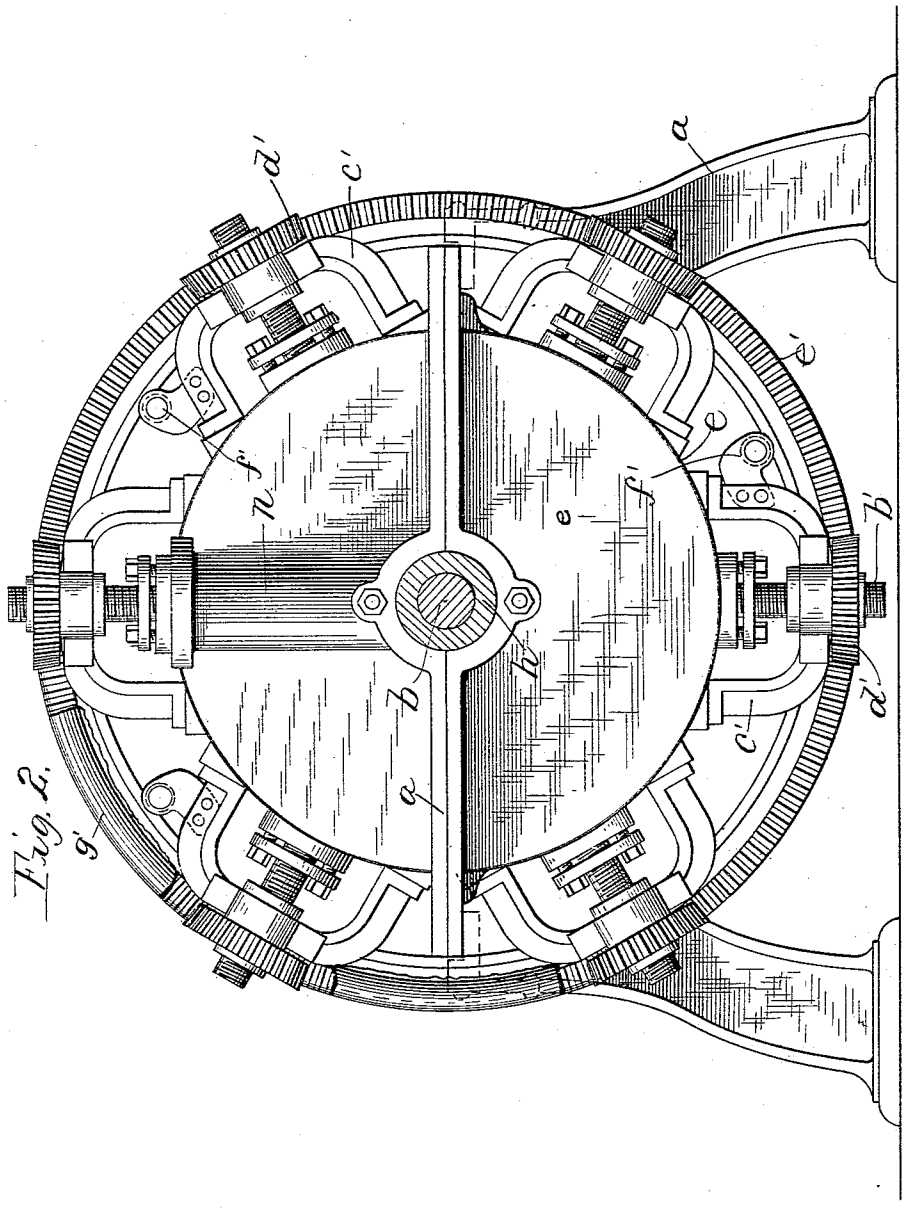

Fig. 2.

Witnesses
Chester Budlong
Hubert A. Beck

Inventor
George L. Riley
by O. E. Duffy
Attorney

(No Model.) 4 Sheets—Sheet 3.

G. L. RILEY.

DISINTEGRATING MACHINE.

No. 557,886. Patented Apr. 7, 1896.

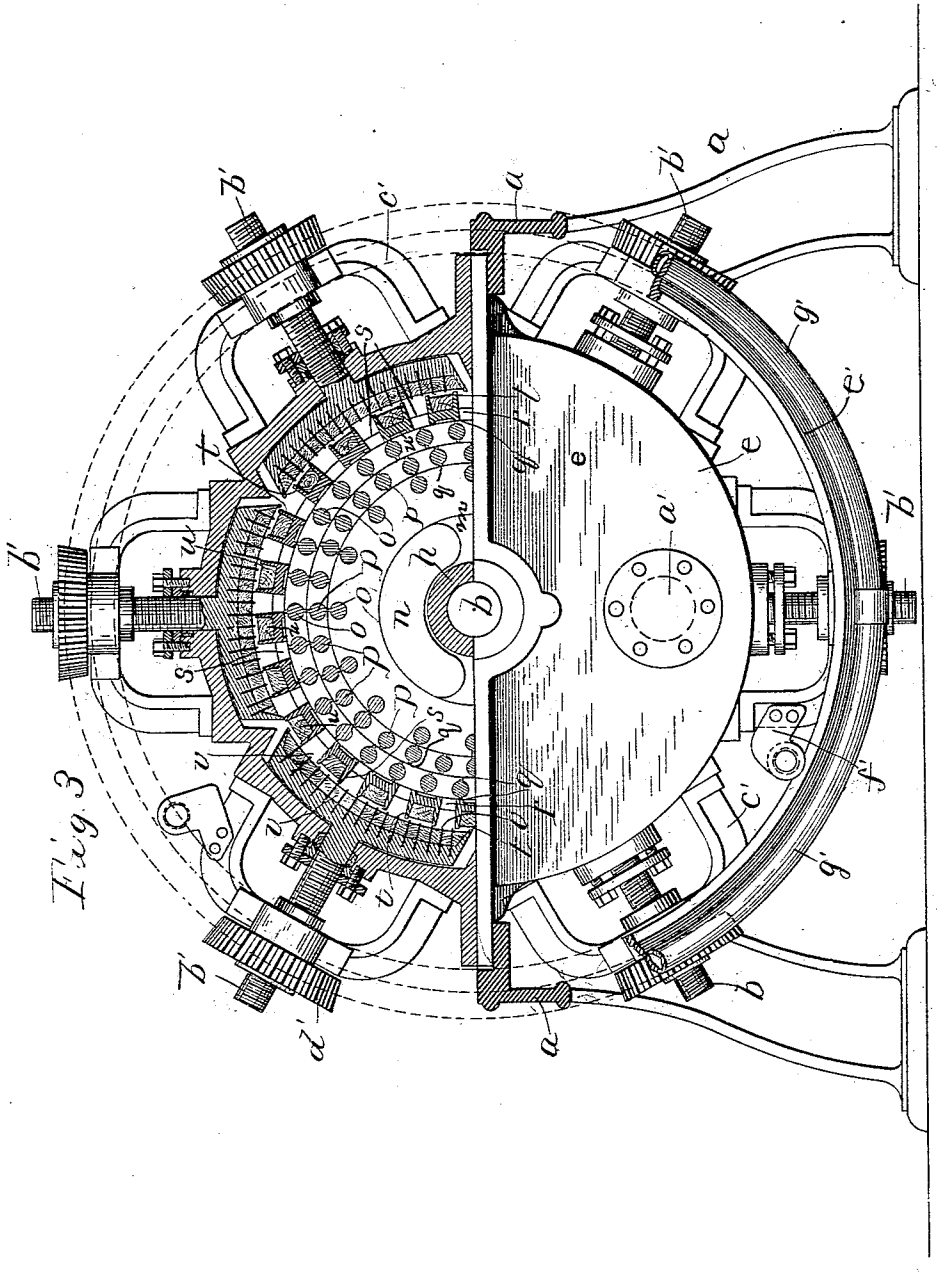

Fig 3

Witnesses
Chester Bradford
Hubert Peak

Inventor
George L. Riley
by O. E. Duffy
Attorney

(No Model.) 4 Sheets—Sheet 4.

G. L. RILEY.

DISINTEGRATING MACHINE.

No. 557,886. Patented Apr. 7, 1896.

Fig. 5

Fig. 6.

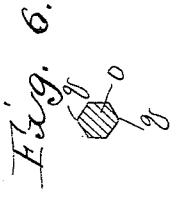

Fig. 4

Witnesses
Chester Burdine
C. Mathias Werle

Inventor
George L. Riley
by O. E. Duffy
Attorney

UNITED STATES PATENT OFFICE.

GEORGE L. RILEY, OF WILMINGTON, DELAWARE.

DISINTEGRATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 557,886, dated April 7, 1896.

Application filed January 5, 1894. Serial No. 495,832. (No model.)

To all whom it may concern:

Be it known that I, GEORGE L. RILEY, of Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Disintegrating-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention relates to certain improvements in disintegrating-machines for use in connection with the reduction of pulp or fiber for paper-stock.

The object of the invention is to provide an improved machine for thoroughly disintegrating fibrous pulp, so that it can be used in the manufacture of paper or the like, which shall be exceedingly sure and effective in action and which shall be comparatively simple and durable in construction.

The invention consists in certain novel features of construction and in combinations of parts more fully and particularly described hereinafter.

Referring to the accompanying drawings, Figure 1 is a central vertical longitudinal sectional view of the machine. Fig. 2 is an end view thereof, partially in section. Fig. 3 is a partial vertical cross-sectional view. Fig. 4 is a detail view of the two rotary disks. Figs. 5 and 6 are detail cross-sectional views showing different shapes of fingers.

In the drawings, the reference-letter *a* indicates a suitable supporting-frame provided with standards or the like to hold the frame at the desired elevation.

b indicates the main shaft of the machine, horizontally arranged longitudinally of the frame and at one end journaled in a fixed journal-box *c*. This shaft is provided with a driving-pulley *d*, rigid therewith. The shaft passes centrally through the vertical approximately stationary cylindrical casing *e*, mounted in the frame on the sides thereof. Within said casing the shaft is provided with a disk *f*, rigidly attached to the shaft to revolve therewith.

g indicates a disk located within the said casing and arranged parallel with and opposite the said disk *f* and rigid with the sleeve *h*, loosely surrounding one end of the main shaft and in which the main shaft revolves. This sleeve is mounted to revolve in a thrust-bearing *i*, adjustably supported at one end of the frame. This thrust-bearing is provided with the downwardly-extending threaded extension *j*. A threaded adjusting rotary shaft *k* is mounted in the main frame against longitudinal movement and passes through said extension *j*. This threaded adjusting-shaft *k* is provided with a hand-wheel, as shown, so that by turning said shaft *k* the bearing *i*, and consequently the sleeve *h* and the disk *g*, can be adjusted longitudinally and independently of the main shaft.

The sleeve *h* is provided with the driving-pulley *l*, rigid therewith, so that the sleeve and its disk can be driven in an opposite direction to that of the main shaft and its disk *f*. It should be noted that the sleeve *h* revolves freely on and can be adjusted longitudinally of the main shaft.

The casing can be provided with suitable packing, if desired, where the main shaft and the sleeve *h* enter the same.

The disk *f*, rigid with the main axle, is located close to one side of the casing and is provided with the central annular space or opening *m* around the hub of the disk. This space *m* is closed at one end by the slide of the casing, so that the vertical hopper *n* always registers with said central opening *m*. This vertical feed-hopper *n* is formed by an outward and upward bulge, preferably in one side of the casing, and at its inner lower end opens into the annular space *m* in said disk, as described, and is open at its upper end to receive the material to be reduced in the machine.

Series of fingers *o* project laterally from one face of disk *f* around the space *m*, and these fingers are arranged parallel or approximately parallel to the axis of the disk. Two concentric series of fingers *o* are here shown. There is a space of suitable width between the two series of fingers *o* to receive a series of fingers *p*, carried by the opposite disk *g* of the sleeve *h*. These fingers, rods, or bars *o* are preferably, although not necessarily, rounded in cross-section, and the fingers of each se-

ries are located a suitable distance apart to permit the pulp placed in the space m to fly outwardly between the fingers. The fingers are rigidly connected at their ends and are preferably formed integral with the disks.

I do not wish to limit myself to round fingers, as in some cases square, hexagonal, or like-shaped fingers might be required with certain fibers. (See Figs. 5 and 6.)

The oppositely-rotating disk g is provided with a series of similar corresponding fingers, rods, or bars p, projecting into the space between the two series of fingers o. The fingers p are also separated a suitable distance to permit passage of the pulp between them, and these fingers p are also connected at their ends and are usually formed integral with their disk.

The fingers p are preferably, although not necessarily, rounded and are tapered toward the disk f, and the fingers o are tapered toward disk g. Fingers p enter the tapering or flaring annular space between the two series of fingers o. The adjoining longitudinal portions or sides of the fingers o and p are provided with longitudinal cutting or knife ribs q. Thus the fingers of the inner series of fingers o have the knife-ribs longitudinally on their outer sides, while the fingers p each have two knife-ribs located longitudinally on diametrically opposite sides to respectively engage the corresponding knives of the inner and outer series of fingers o. These knife ribs or edges are arranged to pass each other with a shearing action on the pulp thrown outwardly between the fingers from the space m by centrifugal action.

The casing of the machine is formed of sufficient width to permit adjustment of the disk g toward or from the disk f. Thus if it is not desired that the knives q should have a cutting or shearing action on the pulp it is only necessary to adjust the sleeve h outwardly by the means hereinbefore described, thereby moving the disk g and the fingers p away from the disk f, so that by reason of the increased space between the fingers p and o the said knife edges q will be separated such distance as to prevent the shearing action. It will thus be seen that the rounded bars or fingers o p can be employed to rub the fiber apart without cutting the same by thus adjusting the fingers so that the space between them is increased. However, in order to provide for all cases and conditions of material the revolving disks have been made relatively adjustable toward each other, and the bars or fingers have been formed tapering with the side knives, so that the knives can be employed, if desired, to cut or shear the stock, and by reason of the adjustment all the lost motion can be taken up as the parts are worn and the distance between the cutting edges varied.

The outer rim r of the disk g extends around the outer series of fingers or bars o and is inclined or tapered on its inner surface and is provided with the ribs q' to coact with the ribs on the outer longitudinal sides of the fingers o of the outer series. This outer rim r is provided with openings s between the knives q' to permit the outward passage of the pulp.

The outer side of the rim r of the disk g is provided with a series of outwardly-projecting shearing-knives t. These knives are preferably arranged in pairs with a space between the knives of each pair, each space being preferably partially filled by a block of wood u, as shown. The portion of the casing surrounding the rim or periphery of said disk g is provided with the inwardly-projecting shearing-knives v, arranged to coact with said knives t with a shearing action to cut the fibers. These knives v are preferably separated by blocks of wood or the like. The fingers o and p, rapidly moving in opposite directions, serve to rub or cut apart (as the case may be) the fibers. The mass of pulp constantly moving outwardly by centrifugal action passes through the openings s and into the space between the stationary knives of the casing and the revolving knives on the outer face of the rim r and is thoroughly disintegrated and refined by the shearing action between said revolving and stationary knives.

When the pulp has been reduced to the proper degree or condition of fineness, it can be discharged through the side of the casing and through one or both of the openings a', communicating with the space between said stationary and moving knives. If desired, the pulp can be continuously discharged.

In order to take up all wear between the knives carried by the frame and those carried by the disk g, the knives v are carried by holders adjustable radially of the disk and fitted in depressions in the outer wall of the frame.

Each holder or socket in the casing carries a suitable number of knives v and forms the segment of a circle, so that all the holders form a complete circle around the revolving shearing-knives t. Each holder is provided with an outwardly-projecting shaft or shank b', extending radially through and beyond the casing. Each shank is screw-threaded at its outer portion and passes through a U-shaped yoke or frame c' at its end secured on the exterior of the casing. A gear-wheel d' is journaled in each yoke and is provided with a threaded bore through which said threaded shank or shaft of the knife-holder passes. A circular rack-bar e' is located at the exterior of the casing, meshing with all of the gear-wheels d'. This circular rack-bar is mounted on rollers engaging the inner periphery or surface of the rack-bar, so that the bar is free to revolve in either direction. The rollers are preferably grooved to receive the rack-bar and hold it thereon. These rollers are carried by the lateral brackets f'. The circular hand

bar or wheel g' is secured to the outer side of the rack-bar, so that the rack-bar can be readily revolved by hand when desired.

It will be observed that when the circular rack-bar is revolved in one direction the gear-wheels will all be revolved in the same direction and the threaded shanks will be moved longitudinally of the gear-wheels to move the knife-holders simultaneously in or out the desired distance. All the knives carried by the casing can thus be simultaneously and quickly adjusted as desired to take up wear or to increase the distance between the rotary knives and the stationary knives.

It is evident that various changes might be made in the forms, arrangements, and constructions of parts described without departing from the spirit and scope of my invention. Hence I do not wish to limit myself to the exact constructions here shown, but consider myself entitled to all such changes as fall within the spirit and scope of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A disintegrating-machine having the opposite disks, each disk being provided with a circular series of tapered fingers or bars, each having a longitudinal knife or shearing rib arranged to pass the corresponding knives or ribs of the fingers of the opposite disk with a shearing action, substantially as described.

2. A pulp-disintegrating machine having the casing, the two oppositely-rotating disks therein having pulp-reducing means, one of said disks having outwardly-projecting knives on its outer periphery, and the rim of the casing having inwardly-projecting shearing-knives to coact with said shearing-knives of the disk, substantially as set forth.

3. A disintegrating-machine comprising the casing, the two oppositely-rotating disks therein, means to support and rotate said disks, said disks provided with fingers traveling close to each other and with space between for the pulp to move outwardly, one of said disks having a rim with openings for the outward passage of the pulp, and with shearing-knives on its outer surface between said openings, the shearing-knives at the inner surface of the casing around said disk and arranged to coact with the knives thereof, and means to adjust said casing-knives radially, substantially as described.

4. In a disintegrating-machine, a casing having the shearing-knives arranged around the interior of its rim, said knives arranged in series, each series being adjustable radially, means substantially as described, for adjusting all of the series of knives simultaneously, a rotary disk in the casing having the shearing-knives on its periphery and arranged to coact with said casing-knives, substantially as described.

5. In a disintegrating-machine, the combination of the cylindrical casing having the shearing-knives arranged around its interior, the rotary disk in said casing having the rim provided with openings, shearing-knives on the outer side of the rim arranged to coact with said casing-knives, depressions between said disk-knives to carry around the pulp, and means to support and revolve said disk, substantially as described.

6. A pulp-reducing machine comprising a rotary disk having a series of lateral reducing fingers or bars, a rim around the same having openings for the passage of pulp, cutting edges on the outer surface of the rim, and the casing around the disk having cutting edges corresponding to said edges of the disk, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

GEORGE L. RILEY.

Witnesses:
WILLIAM H. SAVERY,
FRANK WOOLLEY.