

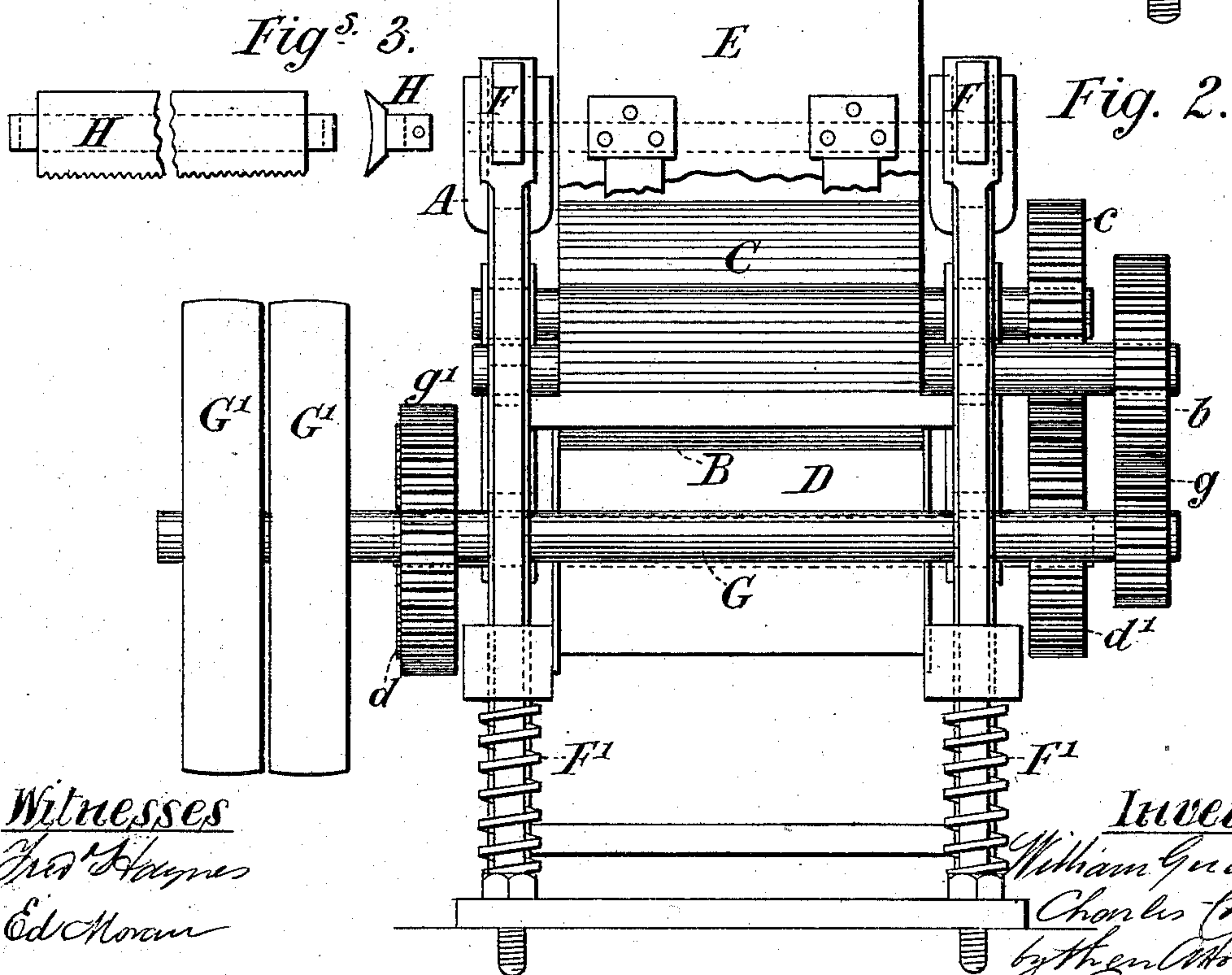
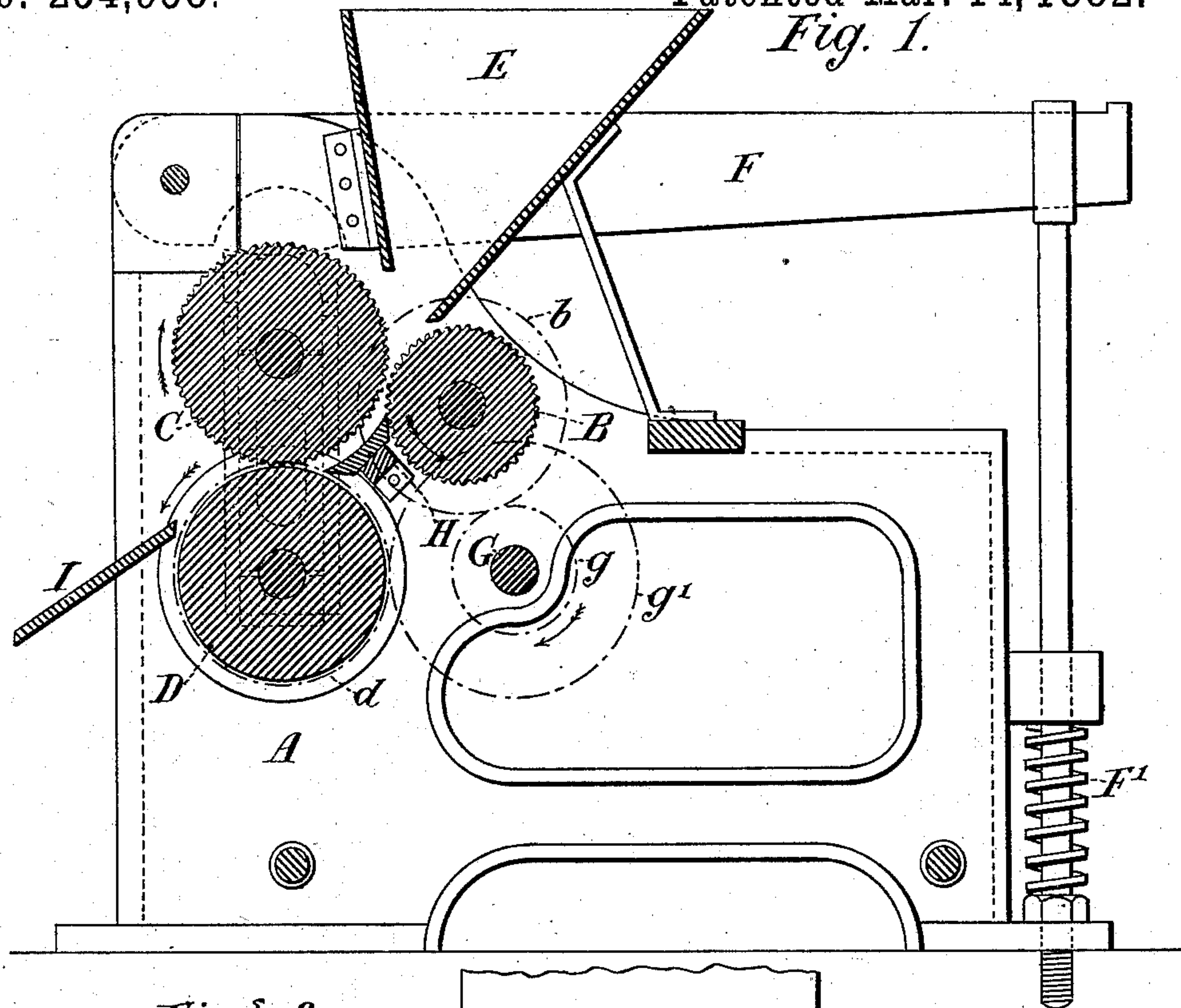
(No Model.)

4 Sheets—Sheet 1.

W. GUEST & C. COURT.
TREATING TAN BARK, &c., TO RENDER THE SAME SUITABLE FOR USE
IN MANUFACTURING PAPER.

No. 254,958.

Patented Mar. 14, 1882.



Witnesses
Jas. H. Hayes
Ed. H. H. H.

Inventor
William Guest
Charles Court
by their Attorneys
Brown & Brown

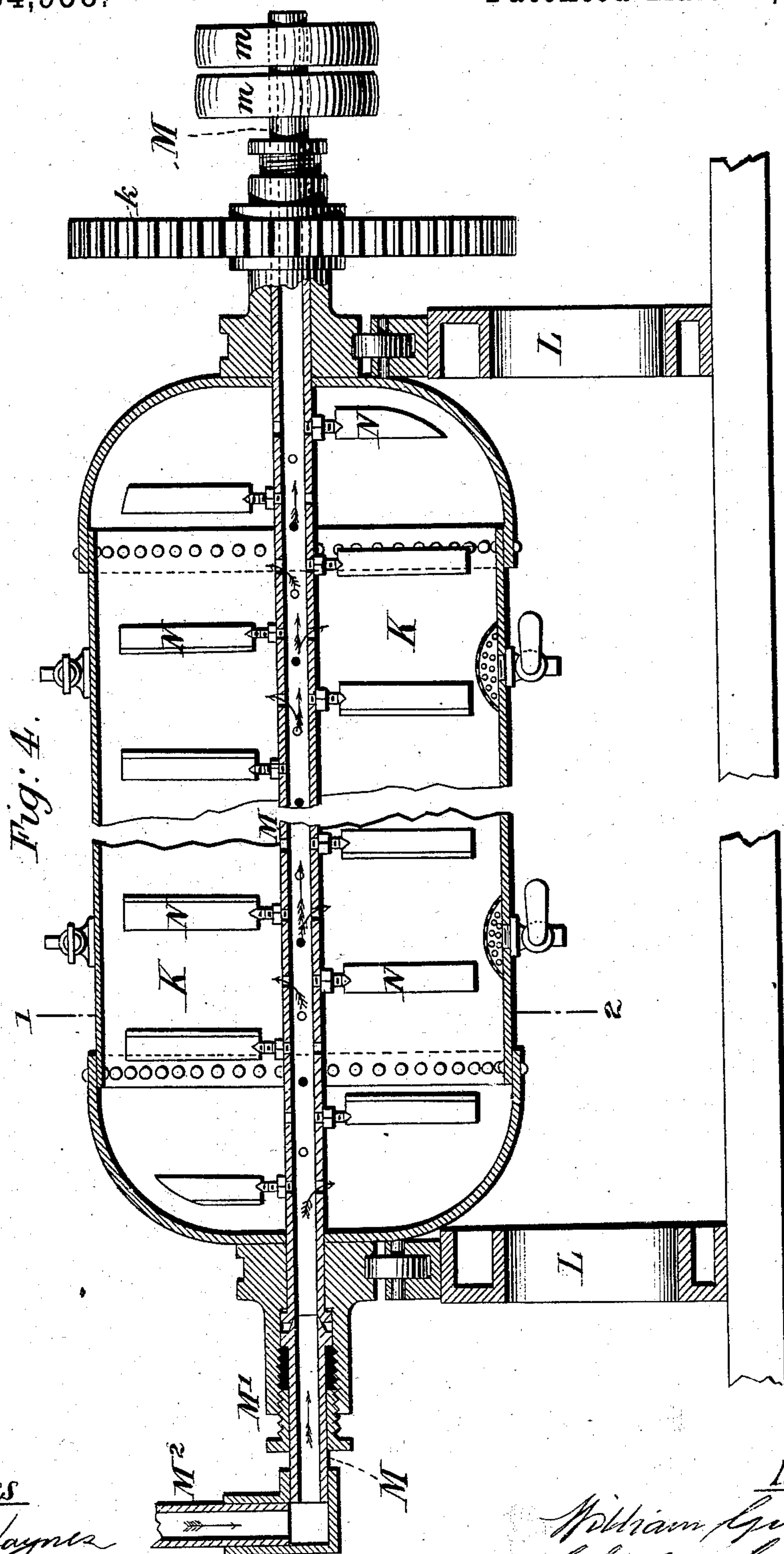
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4 Sheets—Sheet 2.

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Witnesses

Frederic Haynes
Ed. Moran

Inventor

William Guest
Charles Court
by their Attorneys
Brown & Brown

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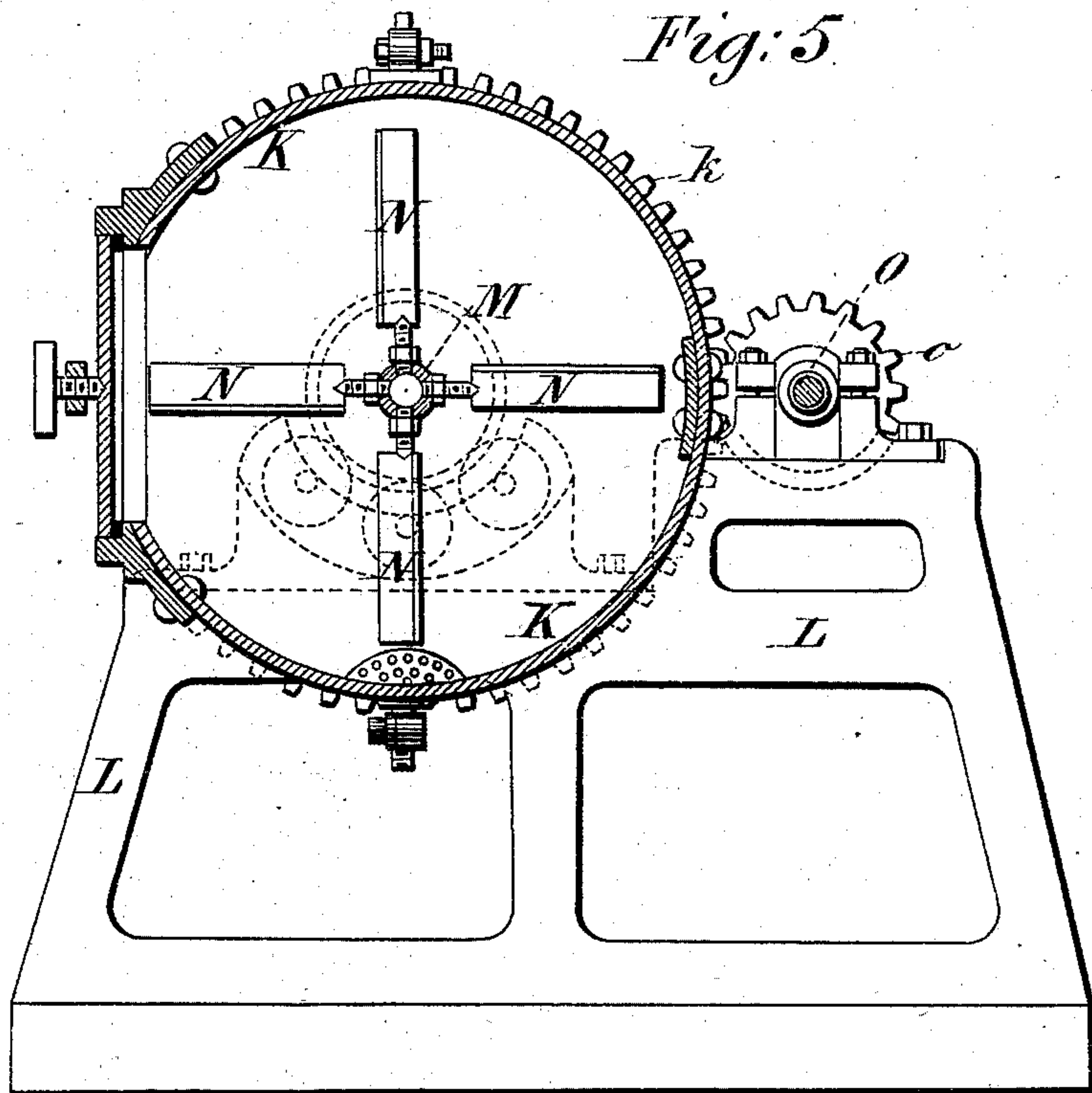
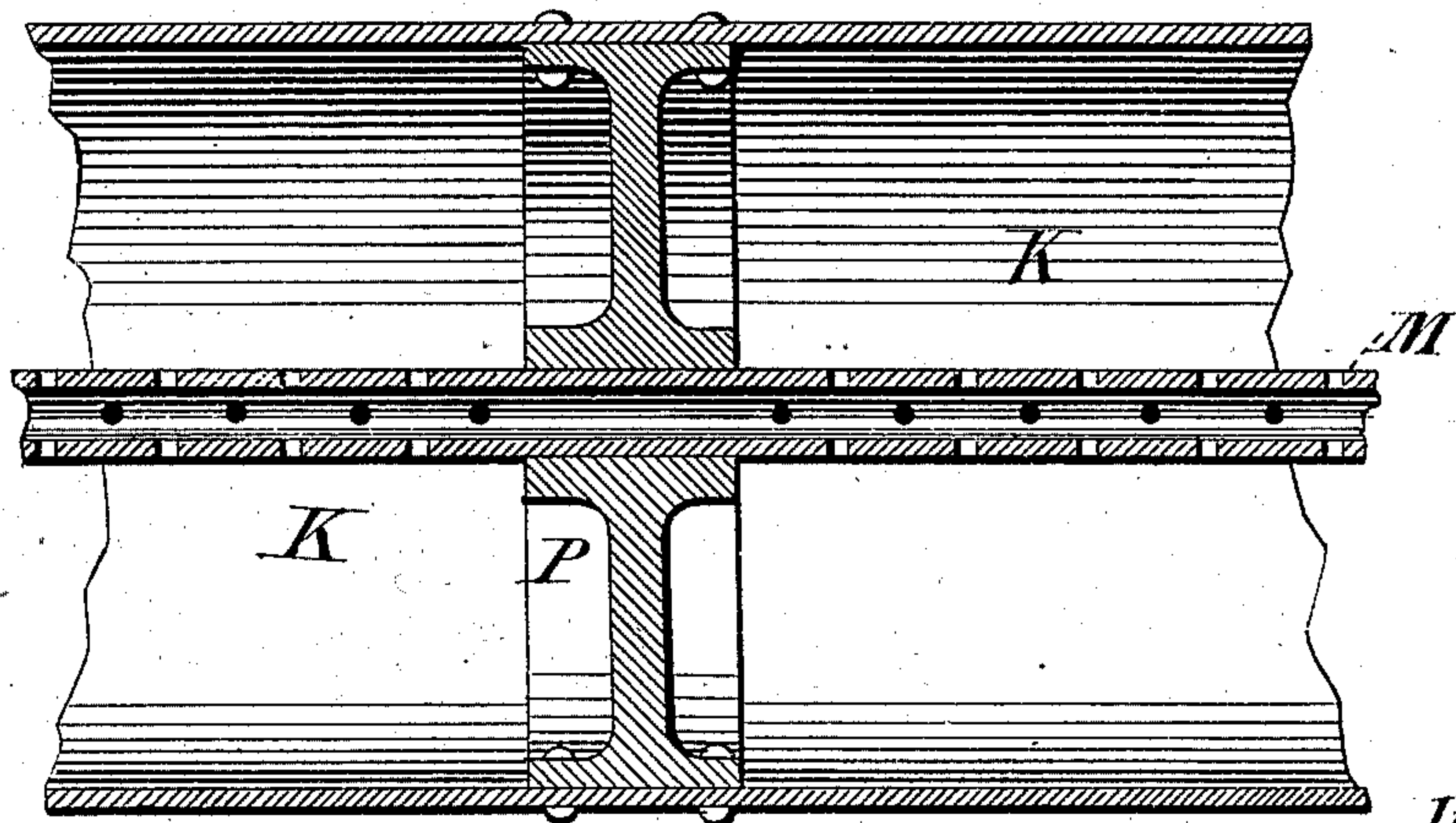


Fig: 7.



Witnesses

Thos. Haynes

Ed. Moran

Inventor

William Guest
Charles Court
by their Attorneys
Rowntree & Brown

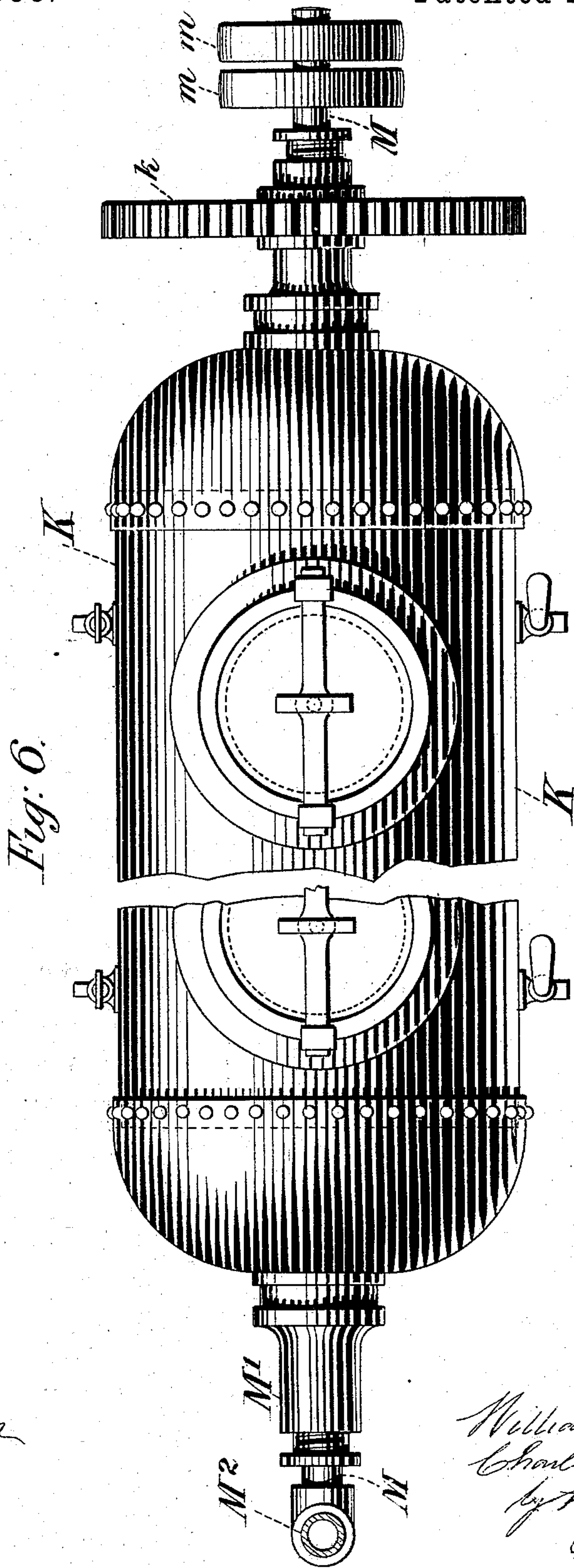
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4 Sheets—Sheet 4.

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TREATING TAN BARK, &c., TO RENDER THE SAME SUITABLE FOR USE
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Patented Mar. 14, 1882.



Witnesses
Fred Wagner
Ed. Harned

Inventor
William Guest
Charles Court
by their Attorneys
Brown & Brown

UNITED STATES PATENT OFFICE.

WILLIAM GUEST, OF DEPTFORD, COUNTY OF KENT, AND CHARLES COURT,
OF ROTHERHITHE, COUNTY OF SURREY, ENGLAND.

TREATING TAN-BARK, &c., TO RENDER THE SAME SUITABLE FOR USE IN MANUFACTURING PAPER.

SPECIFICATION forming part of Letters Patent No. 254,958, dated March 14, 1882.

Application filed January 14, 1882. (No model.) Patented in England June 18, 1881.

To all whom it may concern:

Be it known that we, WILLIAM GUEST, of Deptford, in the county of Kent, and CHARLES COURT, of Rotherhithe, in the county of Surrey, England, engineers, have invented new and useful Improvements in Treating Tan or Spent Bark to Render the same Suitable for Use in the Manufacture of Paper, of which the following is a specification.

The object of this invention is to utilize what is known as "tan" or "spent" bark by preparing a fiber therefrom suitable for conversion into paper.

It has been proposed from time to time to reduce all kinds of vegetable fibers to pulp or "half-stuff" for paper-maker's use; but many of the fibrous materials mentioned as suitable for this purpose, and among them spent bark, have offered insuperable obstacles to the paper-maker through the cost of their conversion into half-stuff and the inferior character of paper that could be produced therefrom. The spent bark of the tanner contains knots or hard portions, which, notwithstanding the rough grinding operation to which the bark is subjected before use by the tanner and the subsequent steeping received in the tan-pits, retain all their hardness and consistency and yield up little or none of their tanning property.

By the process of treatment which we will now proceed to describe we first reduce the knots to their constituent fibers and then extract therefrom the tannin or tannic acid, which becomes a valuable marketable product.

In Sheet I of the accompanying drawings, Figure 1 is a sectional elevation of the crushing-mill which we employ in preparing the spent bark for the after treatment, and Fig. 2 is a back elevation of the same.

A A are side frames, braced together by stay-rods, and carrying bearings for three rollers, B C D, the rollers B and C being, by preference, fluted.

E is a hopper carried by the framing, and serving to deliver the spent bark to be operated upon between the rollers B and C. The roller B acts as a feed-roller, and the roller C is a crushing-roller, it being held in contact with the roller D by means of levers F F, pivoted to the main framing and resting on the brasses of the axle of the roller C, which

brasses are free to slide in vertical slots made in the side frames.

F' F' are tension-springs, which connect the levers F with a fixed point on the framing, and thus cause the levers to bear down the crushing-roller C upon the roller D. The pressure put on these levers we propose to regulate by means of adjusting-nuts, (shown in the drawings.)

G is a driving-shaft, having its bearings in the side frames and receiving rotary motion through a band from any prime mover. G' G' are the fast and loose band-pulleys on this shaft, and g is a spur-pinion on the opposite end of the shaft. This pinion g gears into a spur-wheel, b, on the axle of the roller B and serves to impart a slow rotary motion to that roller. On the end of the shaft G, near the band-pulleys, is keyed a spur-wheel, g', which gears with a wheel, d, on the axle of the roller D. Keyed to the opposite end of the axle of the roller D is a spur-wheel, d', of a similar pitch, and gearing into this wheel is a wheel, c, of similar pitch, keyed on the axle of the roller C.

Supposing the hopper E to be charged with the spent tan, preferably in a dry state, on rotary motion being imparted to the mill the roller B will force the tan forward into the bite of the rollers C D, the tan being guided thereto by an adjustable scraper, H, situate between the rollers B and D, and shown detached at Fig. 3. As the material is subjected to the crushing action of these rollers the hard knots will be reduced to a fibrous state, and the crushed bark or tan will be delivered out of the machine onto an inclined board, I, whence it is collected into a suitable receptacle. The scraper H, when properly adjusted, will serve to clear the rollers B and D from any adhering fibers, and thereby maintain the efficiency of the mill. The edge of the scraper next the roller B is by preference serrated, as shown in the detached views; but this is not essential. The spent bark, when reduced by the crushing process just described, is submitted to a steeping process, with agitation, for the purpose of extracting therefrom the tannin still remaining in the bark. For this purpose we use the arrangement of apparatus shown in Sheet II of the drawings, which consists of a rotating steam-

tight boiler, in which is inclosed a series of revolving blades. Fig. 4 is a longitudinal section of this apparatus. Fig. 5 is a transverse section taken in the line 1 2 of Fig. 4, and Fig. 6 is a plan view of the same.

K is a horizontal cylindrical boiler, dome-shaped at its ends, and fitted with hollow trunnions, which work in roller-bearings carried by the end frames, L. Through the trunnions of this boiler passes a hollow axle, M, on which is mounted a series of blades or stirrers, N, arranged helically around the hollow axle. One end of this axle is closed, and the open end fits into the stuffing-box M', communicating with a steam-supply pipe, M². The hollow axle is pierced to allow of steam issuing from it into the boiler K, and it is fitted with band-pulleys *m m* for imparting an axial motion thereto.

Keyed to one of the trunnions of the boiler is a spur-wheel, *k*, into which gears a pinion, *o*, keyed on a driving-shaft, O, having its bearings on the end frames. The driving-gear we so arrange as to rotate the hollow axle and the boiler in opposite directions, the boiler making, say, twenty-five revolutions per minute, and the axle, with its beaters, running at some four times that speed.

The boiler is provided with four man-holes for admitting the material to be treated and for discharging the same. These man-holes, which are preferably oval, are arranged longitudinally of the boiler, and are closed by loose covers, which are secured by clamping-screws that work through bars overlying the holes, and held in place by lugs projecting from the cover-seat.

The upper side of the boiler is provided with steam-discharge cocks and the under side of the boiler with cocks for discharging the liquor. These cocks we fit with strainers to prevent the fibers entering and clogging up the passages.

This apparatus is intended to operate upon some half a ton of the crushed spent tan at one time. It is discharged into the boiler through the man-holes, and about forty gallons of water is added thereto. In order to quicken the operation of extracting the tannin, we add to the contents of the boiler a saturated solution of caustic soda in the proportion of five pounds of soda, or thereabout, to each hundred-weight of the spent tan to be operated upon. We then admit steam at about thirty pounds pressure to the boiler through the perforations in the hollow axle and set the boiler and the beaters in motion. This we continue for about two hours, by which time the bark-fibers will be separated and deprived of the tannic acid contained therein. Preparatory to discharging the now prepared fibers we shut off the steam to the hollow axle M, open the steam-discharge cocks, and open also the discharge-cocks for the liquor, which, falling into suitable receivers, is then ready for the use of the tanner. When the liquor has been run off we open the man-holes, turn the boiler to bring the man-holes to the under side, and then by means of

rakes discharge the prepared fiber into barrows.

A modification of this apparatus is shown in the partial longitudinal section, Fig. 7, the object being to provide a central support for the cylindrical boiler-shell when the apparatus is made on a large scale. This support consists of a circular skeleton-frame, P, which is made fast by bolts to the shell of the boiler, and is formed with a hub to fit the hollow axle and rotate smoothly thereon. This central stay or support will prevent the sagging of the boiler, the central axle being of suitable strength to sustain the weight of the boiler and its load.

The next step in the process is to subject the fiber to a rinsing operation, which is carried on in an apparatus similar to that just described, or in a washing-drum having radial dashboards similar to those used in tan-yards and bleach-works. This rinsing operation consists in agitating the fiber for about half an hour in clear water. When removed from this agitator the fiber is passed through a second crushing-mill similar to that described above, but having rollers with flutes of a finer gage. The passage of the fiber between these squeezing-rollers will not only discharge the water contained therein, but will complete the separation of such fibers as may have been partially separated by the first crushing operation.

The fiber thus prepared according to our invention is now fit for conversion into paper. If it is desired to convert it into white paper, the fiber must be bleached in any well-known and approved manner; but for inferior or coarse papers no bleaching of the material will be required.

From the foregoing description it will be understood that the advantages of our improved mode of preparing fibers for paper-making are, first, that the fibers of the ground spent bark retain their normal length and are otherwise uninjured by the process; and, secondly, a valuable product consisting of tannic acid is for the first time obtained from the spent bark.

Having now set forth the nature of our invention, we wish it to be understood that we claim—

The process of treating spent bark as above described, consisting in subjecting the same to the action of crushing-rollers to reduce the knots to a fibrous state, and then submitting the crushed material to agitation in a closed vessel under steam-pressure and in the presence of an alkaline solution, whereby the natural fibers of the bark are separated and converted into half-stuff in an economical manner and the tannic acid contained in the spent bark is extracted in a concentrated form.

WILLIAM GUEST.
CHARLES COURT.

Witnesses:

H. K. WHITE,
GEO. CANTLE,
66 Chancery Lane, London.