

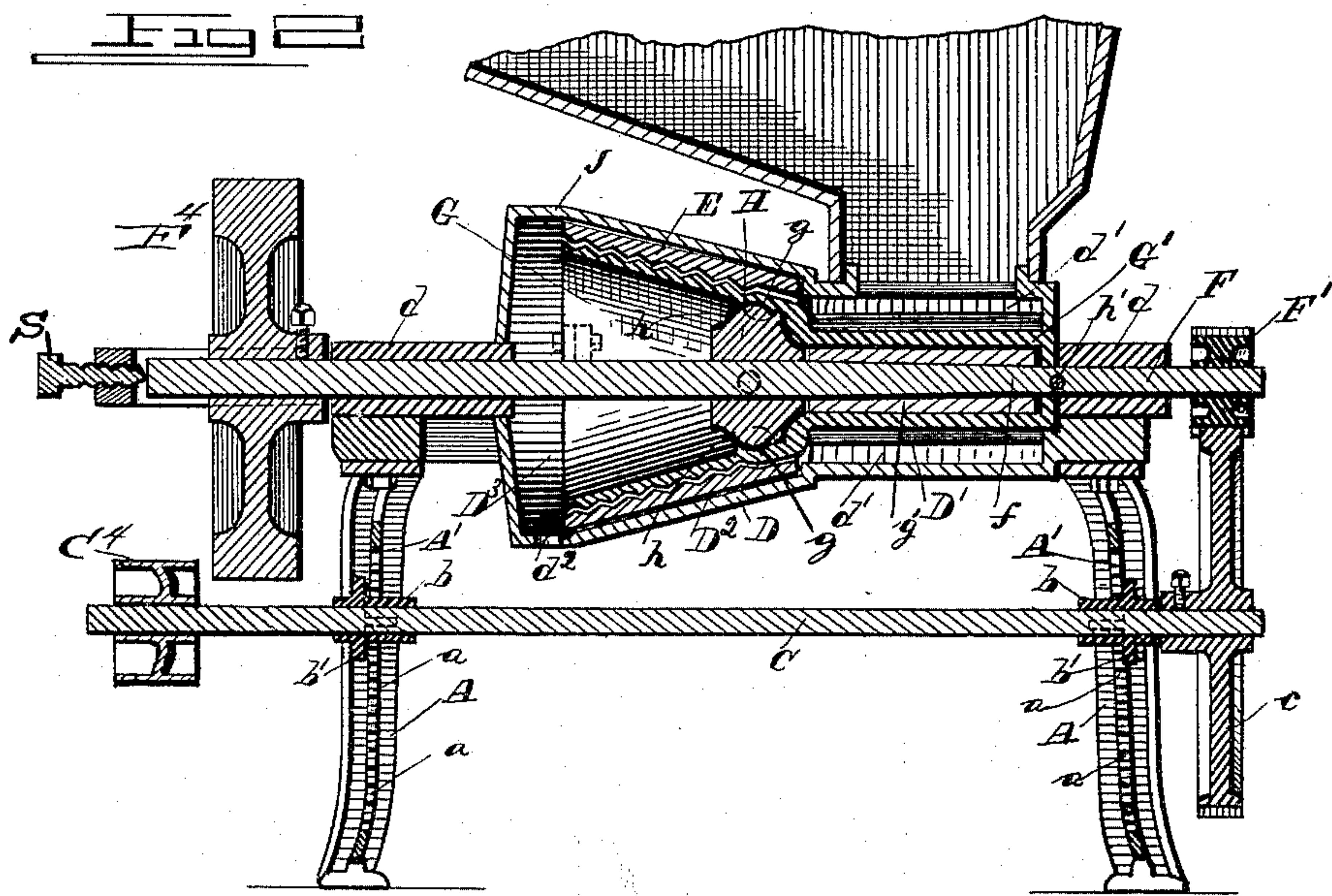
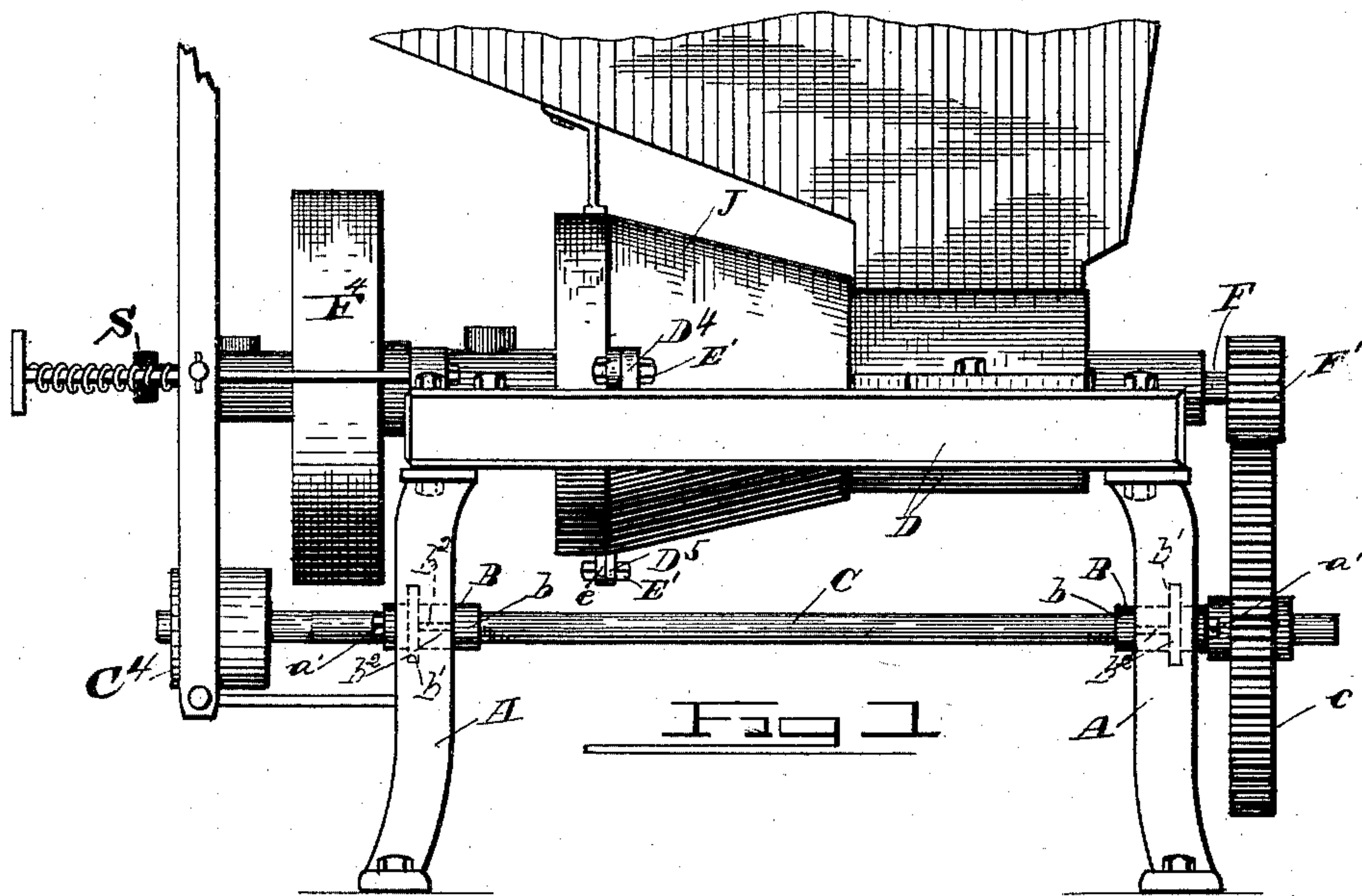
(No Model.)

2 Sheets—Sheet 1.

N. P. BOWSHER.
GRINDING MILL.

No. 477,498.

Patented June 21, 1892.



Witnesses

C. W. Seville.

Arthur E. Sowell

Inventor

N. P. Bowsher

By his Attorney

T. H. Alexander

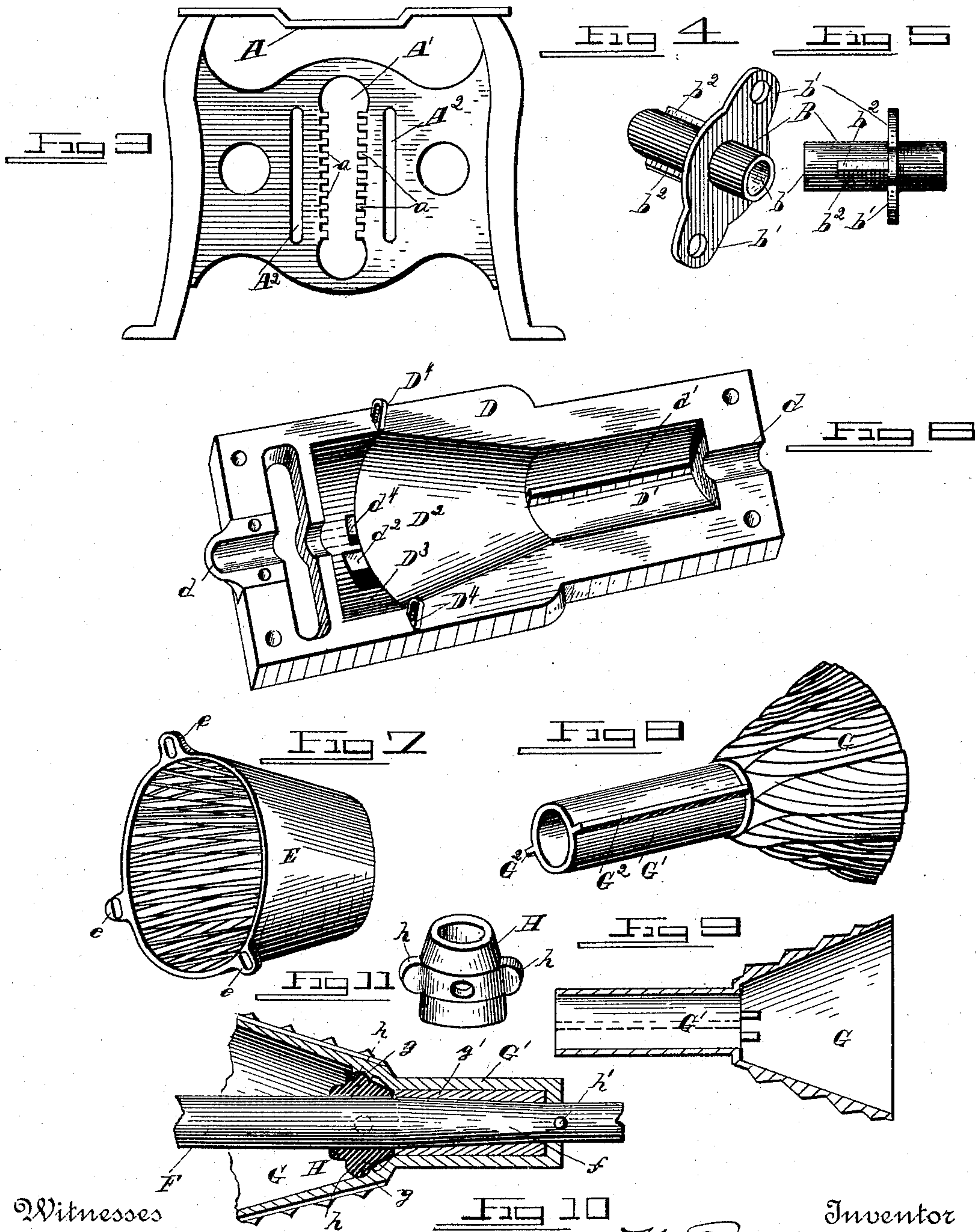
(No Model.)

2 Sheets—Sheet 2.

N. P. BOWSHER.
GRINDING MILL.

No. 477,498.

Patented June 21, 1892.



Witnesses

C. W. Seville.

Arthur E. Sowell.

Inventor

N. P. Bowsher

By his Attorney

T. H. Alexander

UNITED STATES PATENT OFFICE.

NELSON P. BOWSHER, OF SOUTH BEND, INDIANA.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 477,498, dated June 21, 1892.

Application filed December 22, 1891. Serial No. 415,842. (No model.)

To all whom it may concern:

Be it known that I, NELSON P. BOWSHER, of South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Grinding-Mills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a side view of my improved grinding-mill. Fig. 2 is a central longitudinal vertical section through the same. Fig. 3 is a face view of one of the leg-frames. Figs. 4 and 5 are detail views of the adjustable journal-bearings of the driving-shaft. Fig. 6 is a detail perspective view of the lower half of the casing. Fig. 7 is a detail view of the grinding-shell detached. Fig. 8 is a detail perspective view of the grinding-cone and crushing-cylinder, and Fig. 9 is a longitudinal sectional view thereof. Fig. 10 is a detail view of the cone-securing nut. Fig. 11 is an enlarged sectional view illustrating the manner of centering and securing the cone on the main shaft.

This invention appertains to mills for crushing and grinding corn, &c., and is an improvement upon the machine for which I was granted Letters Patent No. 370,310 on the 20th day of September, 1887; and my present objects are to provide means for easily varying or regulating the speed of the grinding-cone and to improve the construction of the grinding cone and shell and the mounting and centering of the same.

To this end the invention consists in the novel construction of the leg-frames and journal-boxes, the lower half of casing, the grinding-cone and crushing-cylinder, the grinding-shell, the devices for securing the cone on the driving-shaft, and certain other novel details of construction and combination of parts, as will be hereinafter specifically defined.

Referring to the drawings by letters, A A designate the leg-frames or the machine, and D the lower half of the casing, rigidly bolted to the tops of leg-frames and uniting the same. In use the legs should be fastened to the floor. Each leg-frame has a transverse vertical web, in the center of which is a vertical slot A'

and at each side thereof vertical slits A² A². The side edges of slots A' are notched, as at a a.

B B are the journal-boxes, each consisting of a tube b, having opposite lateral extensions b' b' and lugs or webs b² at the junction of the extensions with the tube. These tubes are passed through slots A' of the leg-frames until lugs b² engage a pair of opposite notches a a, thereby suspending the box on the leg-frame, and by means of bolts a', which pass through slits A² and openings in the extensions b', the box is firmly bound to the leg-frame. It is evident that the boxes can be adjusted vertically on the leg-frames by shifting lugs b² into engagement with other notches a. The ends of the counter-shaft C are journaled in tubes b, as shown, and on one end of said shaft is a gear c, meshing with a pinion on the main shaft. Shaft C may be connected to any suitable driving-power. C⁴ is a driving-pulley on the counter-shaft, and F⁴ is a fly-wheel on the main-shaft.

The lower half D of the casing-shell has half-bearings d d for the main shaft and has a semi-cylindrical recess D' at one end, on the inner face of which are formed or secured ribs d', thus forming the lower half of the crushing-concave, and also has about center a semi-cylindro-conical recess D², the smaller end of which communicates with recess D', and its larger ends communicates with an enlarged but shorter semi-cylindrical recess D³, as shown in Fig. 6. An opening d² is left in the casing D at the lowest part thereof, where recesses D² and D³ unite, and through this opening the ground material escapes into the delivery-spout.

D⁴ D⁴ are upstanding ears on casing D in line with the line of union of recesses D² D³, and D⁵ is a similar depending ear in line with ears D⁴, but on the bottom of the casing, and d⁴ is an opening in the casing beside ears D⁵.

E designates the cylindro-conical grinding-shell, adapted to rest in recesses D² and having laterally-projecting ears e e at its largest end, which coincide with the lugs D⁴ D⁵ of the casing D. When the shell is placed in the recess, the lowest ear e passes through openings d⁴ and lies thus beside ear D⁵.

E' are nutted bolts transfixing ears D⁴, D⁵, and e, thereby securing the shell E in posi-

tion rigidly within the casing. The bolt-openings in ears D^4 D^5 are vertically elongated, and those in ears e are horizontally elongated, so as to allow the shell E to be perfectly centered within the casing. The shell E is made of chilled iron; but its interior surface is serrated or ridged to form the grinding-surfaces.

F designates the main shaft, journaled in the bearings in casing E and driven by a pinion F' on one end, meshing with gear c .

G is the grinding-cone, and G' the crushing-cylinder, both hollow and preferably formed integral, the smaller end of the cone uniting with one end of the cylinder. When properly mounted on the shaft F , cylinder G' occupies recess D' and cone G lies within shell E . Cylinder G' is provided with external ribs G^2 , which coact with ribs d' to crush the material before it is subjected to the action of the grinding cone and shell, and the exterior of cone G is roughened to coact with shell E , as usual. The cone is supported on the shaft and centered by means of the cylinder, and it has on its inner surface, near the cylinder, pairs of lugs g g .

H represents a collar secured on shaft F by a set-screw or in other suitable manner within cone G , and having its inner end conical, so as to fit in the smaller end of the cone, and provided with projecting ears h , that interlock with lugs g g , and thus cause the cone and cylinder to revolve with the shaft and collar. A pin h' in the shaft at the other end of the cylinder prevents lateral movement of the cone and cylinder on the shaft. The shaft is tapered, as at f , within the cylinder G' , and the end of shaft adjoining said cylinder is smaller in diameter than the end adjoining the cone G . The shell is centered on the shaft by means of a filling of soft metal g' , which surrounds the tapered portion of the shaft. This connection enables the cone and cylinder to be primarily accurately centered on the shaft and to be subsequently easily removed and replaced without destroying its centering.

The manner of centering the cone and cylinder on the shaft is as follows: The shaft is first aligned, then the cone and cylinder slipped thereon until cylinder G' overlies taper f , then the cone and cylinder are exactly centered in relation to the shaft and fixed in such position while unconnected thereto. Soft metal—such as babbitt—is then introduced into the space between the cylinder and taper f , and this when cooled firmly supports the cylinder and cone upon the shaft, preserving the proper relative alignment thereof. The cone and cylinder, however, are revolved by means of the interlocking-ears in the cone and on collar H , as described, and the soft-metal filling is simply employed to insure the centering of the cone and cylinder on the shaft, and the cone-cylinder and soft-metal filling may be removed from the shaft for repairs and replaced thereon by inexperienced

workmen without impairing the working of the mill, as the fine adjustment of the cone is always maintained by the soft-metal filling and the wear is evenly distributed and can be readily taken up, whereas in the usual method of mounting the cone on spiders the parts wear unequally and the cone has to be frequently centered by experienced workmen or it will wear uneven and work imperfectly.

In order to align and center shell E after the cone is fixed and centered on the shaft, as described, and before the shaft is secured in its bearings, the shell is slipped on the shaft and upon the cone. The shaft is then placed in its journals, the tempering-screw S (or devices for adjusting the shaft F longitudinally, such as set forth in my aforesaid patent) is then turned, moving shaft F longitudinally until the cone is forced into the shell, which will then find its own center, as the lugs on the shell are pressed against the lugs on the casing, insuring an equal bearing against each of said lugs, and at the same time the shell is held in a perfectly central position with reference to the grinding-cone, and by bolting the lugs together it is securely held in such position. The tempering-screw is then turned back, so as to slightly separate the opposed surfaces of cone and shell according to the degree of fineness of ground material desired.

By substituting different-sized gears on shaft C the relative speed of the main shaft may be regulated, though shaft C be always driven at a uniform speed. The upper part J of the casing is a metallic shell similar in general contour to casing D , but having a feed-opening above the cylinder and a hopper. These last-mentioned parts and other details may be substantially as shown and described in my aforementioned patent, and are not herein claimed.

In this machine the nuts and devices for adjusting the parts are exterior to the casing, and are thus readily accessible.

Having described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination of the leg-frames having vertical slots in their webs, with the journal-boxes lying in said slots and having lateral extensions adjustably connected to the legs, substantially as described.

2. The combination of the leg-frame having a central vertical slot and vertical slits beside the same in its web, with the journal-box having a tubular portion projecting through the slot, and lateral extensions projecting over the slits, and bolts transfixing said ears and slits, substantially as specified.

3. The combination of the leg-frames having vertical slots notched at their edges and vertical slits beside said slots in their webs, with the journal-boxes having tubular shaft-receiving portions, lateral extensions overlying said slits, and lugs adapted to engage the notches in the edges of the slots, and the securing-bolts, substantially as set forth.

4. The combination of the casing-shell having a recess for the grinding-shell and up-
standing and depending perforated ears at one
end of said recess, with the grinding-shell
5 adapted to rest in the recess of the shell and
having radial ears on one end arranged to co-
incide with the ears of the casing, and the bolts
transfixing the ears of the shell and casing,
substantially as and for the purpose described.

10 5. For a grinding-mill of the character de-
scribed, the half-casing D, having a semi-cy-
lindrical recess for the reception of the crush-
ing-cylinder, a semi-cylindro-conical recess for
the reception of the grinding-shell, externally-
15 projecting perforated ears at the end of the
latter recess for attachment of said shell, main-
shaft journal-bearings in its ends, and an
opening at the bottom and larger end of the
conical recess for escape of material, substan-
20 tially as specified.

6. The combination of a main shaft and a
removable grinding-cone and cylinder rigidly
connected together and loosely mounted on
said shaft, with a conical collar adjustably
25 mounted on the shaft within the cone and
transmitting motion from the shaft to the lat-
ter through interlocking lugs and ears, all con-
structed and arranged to operate substan-
tially as and for the purpose described.

30 7. The combination of the main shaft hav-
ing a tapered portion, with the grinding or
crushing shell having an interior bore larger
than the tapered portion of the shaft and
slipped thereon, and a soft-metal bushing, sub-

stantially as described, whereby said shell is 35
centered and fitted on said tapered portion of
the shaft and may be removed therefrom
with the bushing, substantially in the manner
and for the purpose specified.

8. The combination of the main tapered 40
shaft, the crushing-cylinder and grinding-
cone formed integral and removably fitted on
the shaft, the conical-faced collar fixed remov-
ably to the shaft within the cone, and the in-
terlocking lugs between said collar and cone, 45
and the bushing between the shaft and cylin-
der, substantially as and for the purpose de-
scribed.

9. The combination of the leg-frames, the
lower half of casing having recesses D' D^2 D^3 50
and ears D^4 D^5 , connecting said frames, the
counter-shaft journaled therein, the main
shaft journaled on the lower half of the cas-
ing, the gearing between said main and
counter shafts, the crushing-cylinder and 55
grinding-cone on said main shaft, respectively
resting in recesses D' and D^2 , and the grind-
ing-shell E, having ears e e , coinciding with
ears D^4 D^5 of the casing and bolted thereto,
all constructed substantially as and for the 60
purpose set forth.

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

NELSON P. BOWSHER.

Witnesses:

JAMES DUSHANE,
H. H. HUMPHREY.