

No. 620,884.

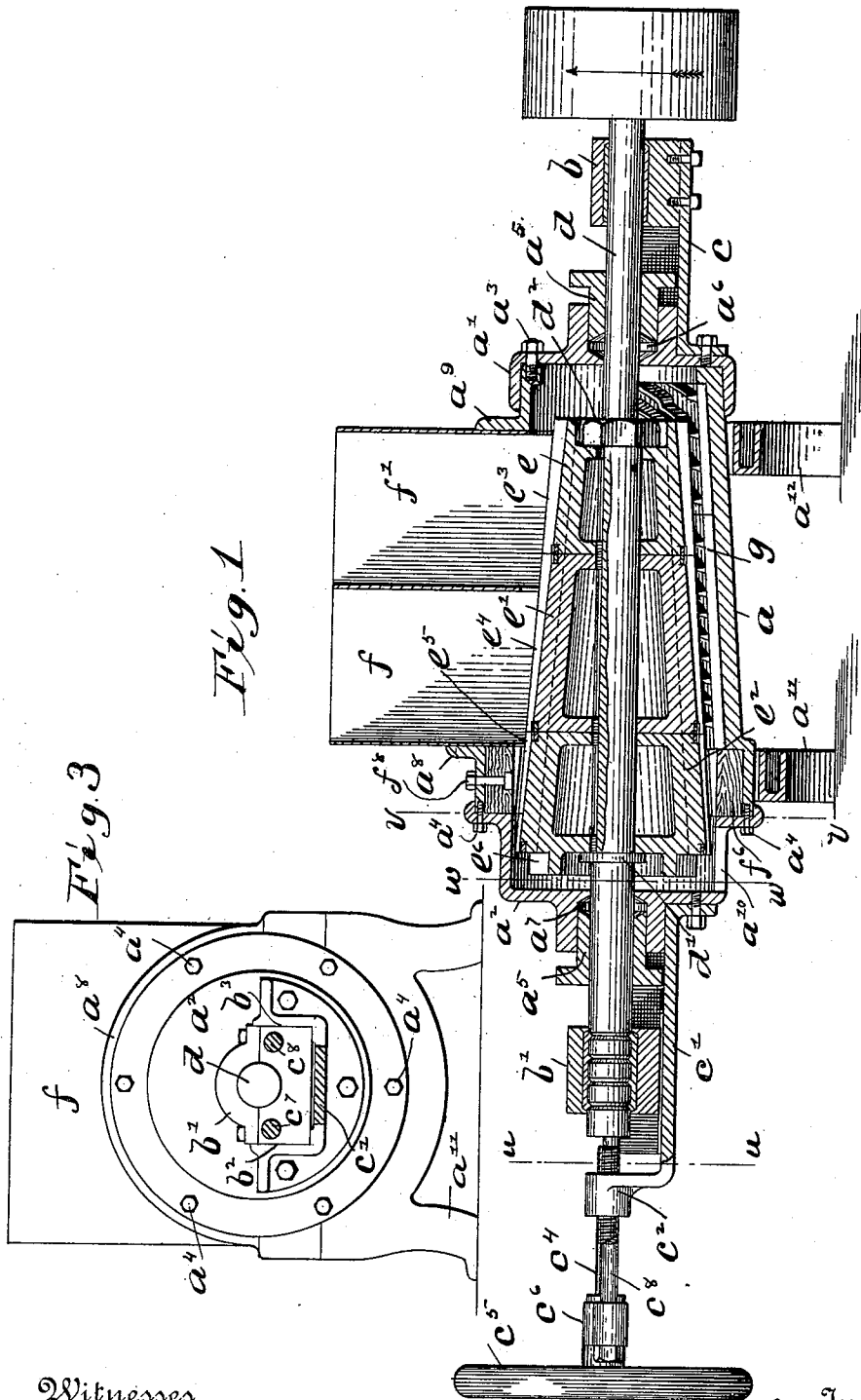
Patented Mar. 14, 1899.

T. C. CADWGAN.
MACHINE FOR REDUCING PAPER STOCK.

(Application filed Feb. 18, 1898.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
G. M. Bradley
Chas. J. Welch

Inventor
Thomas C. Cadogan
By his Attorney
Paul H. Hays

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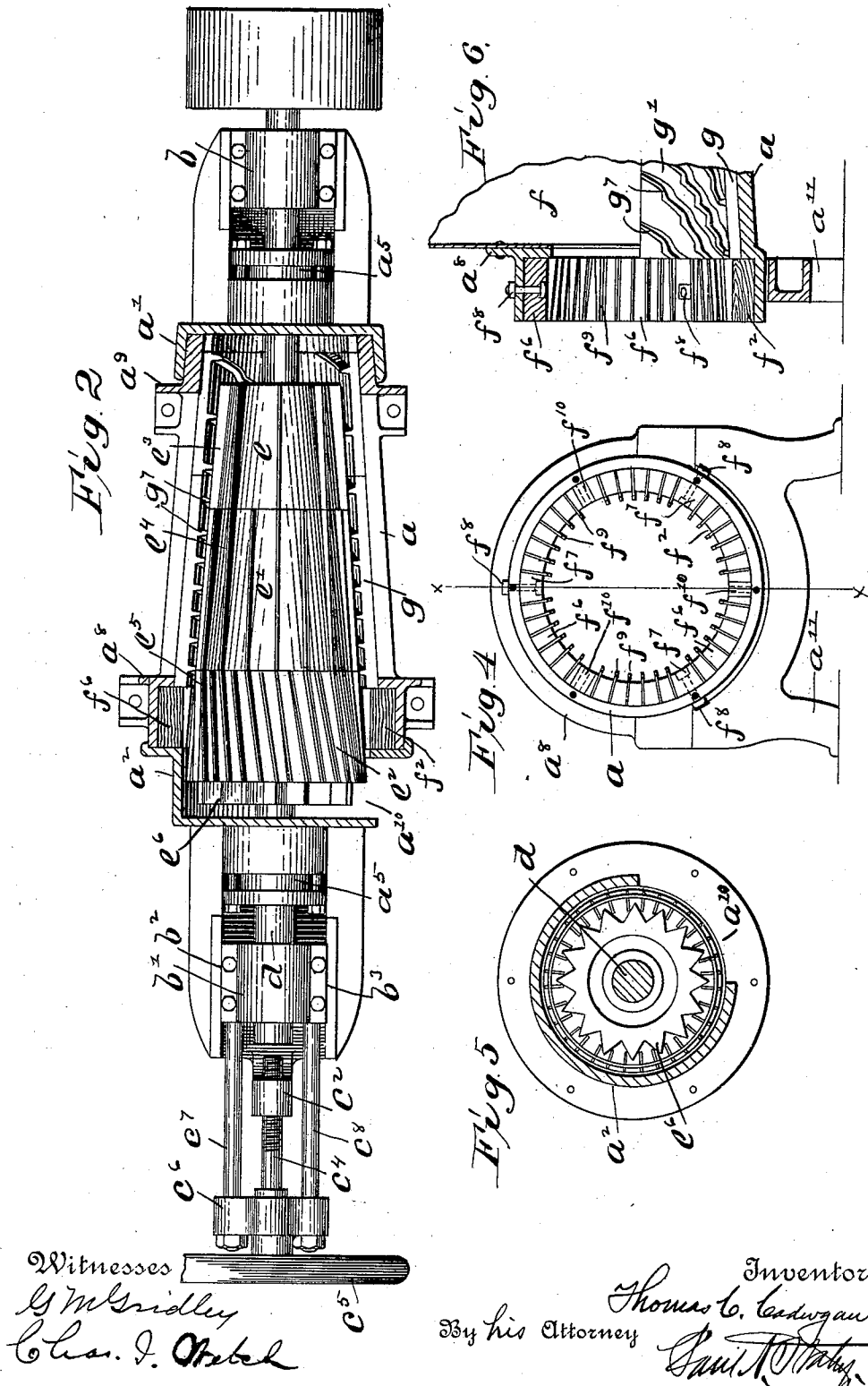
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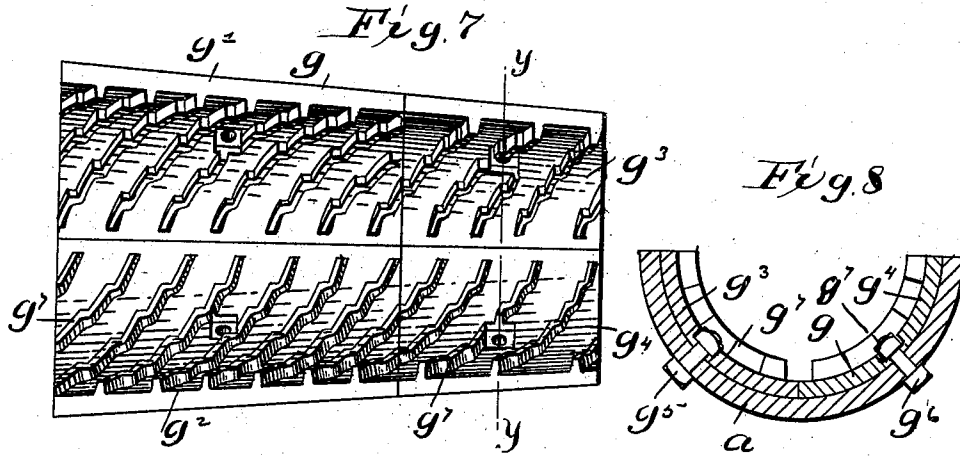
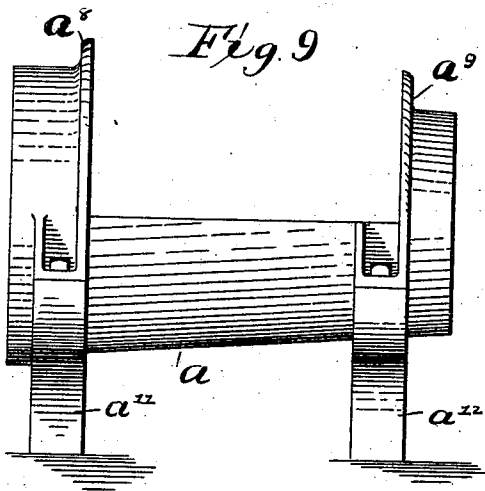
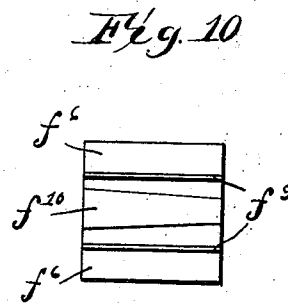
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(No Model.)

3 Sheets—Sheet 3.



Witnesses
Wm. G. Bridley
Chas. J. Mele

Inventor
Thomas C. Cadwgan
By his Attorney
Amos T. Hays

UNITED STATES PATENT OFFICE.

THOMAS C. CADWGAN, OF SPRINGFIELD, OHIO, ASSIGNOR OF ONE-HALF
TO THE O. S. KELLY COMPANY, OF SAME PLACE.

MACHINE FOR REDUCING PAPER-STOCK.

SPECIFICATION forming part of Letters Patent No. 620,884, dated March 14, 1899.

Application filed February 18, 1898. Serial No. 670,799. (No model.)

To all whom it may concern:

Be it known that I, THOMAS C. CADWGAN, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Machines for Reducing Paper-Stock, of which the following is a specification.

My invention relates to devices for reducing and preparing paper-stock, and it especially relates to improvements in machines or reducers in which paper-stock is reduced in a continuous manner, the stock being continuously fed to the machine and completed by passing through the same.

The object of my invention is to produce a machine or paper-stock reducer which will be simple in construction and capable of adjustment to vary the quality or the fineness of the stock which comes from the machine, the construction of the machine being such that it is to a large extent self-regulating and adapted to handle stock fed to it in varying quantities and in the varying conditions which may result from its previous treatment. I attain this object by the constructions shown in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a reducer embodying my invention. Fig. 2 is a plan view of the same with some of the parts removed. Fig. 3 is an end view of the same, partly in cross-section, taken on line *uu* in Fig. 1. Fig. 4 is a detail view of some of the parts, taken in cross-section on line *vv*, in Fig. 1. Fig. 5 is a detail view in cross-section of some of the parts, taken on line *ww* in Fig. 1. Fig. 6 is a detail view taken in cross-section on line *xx* in Fig. 4. Fig. 7 is a detail view of the lining *g*, hereinafter referred to. Fig. 8 is a cross-section taken on line *yy* in Fig. 7. Fig. 9 is a side view of the main casing, hereinafter referred to as *a*. Fig. 10 is a detail view of the part shown at *f*¹⁰ in Fig. 4.

Like parts are represented by similar letters of reference in the several views.

In the said drawings, *a* represents a main outer casing which is preferably formed like hollow sections or grinders, having the top portion cut away at the middle for the greater part of its length, as shown in Fig. 9. Over

the respective ends of said casing are fitted caps or end pieces *a'* and *a''*, which are fastened to the casing by means of bolts *a'''* and *a''''* or in any other suitable manner. The casing is supported on legs or standards *a¹¹* *a¹²*, suitably secured to it near its ends, as shown in Fig. 9. Passing through said main casing *a* and the respective ends *a'* and *a''* is a shaft *d*, which is journaled in suitable bearings *b b'*, supported on brackets *c* and *c'*, secured to the respective end pieces *a'* *a''*.

Threaded onto the shaft *d* and situated within the main casing *a* is a series of conical shells or hollow sections *e e' e''*, preferably three in number. The respective sections are so constructed that when they are placed on the shaft *d* in position they form substantially one continuous grinder, the outer periphery of which conforms substantially to the inner periphery of the main casing, but which tapers slightly more from its largest diameter to its smallest, thereby allowing an increasingly-greater distance between the outer surface of the inner sections or grinders and the inner surface of the main casing from the larger to the smaller end, as shown in Fig. 1. To the outer surfaces of the respective sections are attached in series reducing fins or blades *e³* *e⁴* *e⁵*. The fins on the sections *e* and *e'* are parallel to the shaft *d*, while those on the section *e''* are at an angle to the shaft or are placed spirally, as shown in Fig. 2. The number of fins *e⁴* on the section *e'* is greater than those *e³* on the section *e*, the number being preferably doubled. (See Fig. 2.) So, also, the number of fins *e⁵* on the section *e''* is preferably double the number *e⁴* on the cylinder *e'*. The fins are fastened on the section in any well-known manner, but preferably as shown in the patent issued to me on May 21, 1895, and numbered 539,414. The sections are threaded onto the shaft from the small end before the shaft is placed in the casing and are held in place between the collar *d'* and the nut *d''*, which is screw-threaded onto the shaft *d*. The sections are splined onto the shaft, and thereby made to turn with it.

The nut *d''* is adapted to be sunk into the small end of the grinder *e*, so that the end of the grinder may stand in close proximity to the end piece *a'*.

The end pieces or caps of the main casing are formed with recesses or pockets, which, together with the followers a^5 a^5 , form glands or stuffing-boxes a^6 and a^7 , which are adapted
5 to keep the water or other fluid with which the stock is mixed from leaking out around the shaft.

As before stated, the shaft d is journaled in bearings b and b' , supported on brackets
10 which are secured to the respective end pieces. The bearing b , on account of its construction, permits the shaft to move longitudinally therein, as well as revolve.

The shaft or that part of it which is adapted to lie within the journal-box of the bearing b' is grooved, as shown in Fig. 1, said grooves being adapted to engage with corresponding projections in the metal lining of the journal-box. By this construction the
20 shaft is kept from moving longitudinally in the bearing b' .

The journal-box of the bearing b' is adapted to be moved longitudinally in suitable ways b^2 b^3 on the supporting-bracket c' .

On the end of the supporting-bracket c' and substantially in line with the shaft d is an upwardly - projecting portion c^2 , through which and in line with said shaft is a movable screw-threaded rod c^4 , having secured to its
30 outer end a hand-wheel c^3 . Loosely journaled on this screw, between the hand-wheel and the end of the bracket c' , is a cross-bar c^6 , formed in the nature of a collar, having two horizontal arms. The screw c^4 can be turned
35 in the collar, but the collar is held from play along the length of the shaft by engaging collars.

Connecting the collar c^6 with the journal-box of the bearing b' are two rods c^7 and c^8 , one lying on each side of the screw c^4 . These rods are rigidly secured at one end to the journal-box in any well-known manner, and at the other end they are adjustably secured
45 in the collar c^6 and securely held by means of nuts screw-threaded onto the ends of the rods, as shown in Fig. 2. By this arrangement it will be seen that the shaft while it is free to revolve in its bearings can also be moved to any desired position longitudinally
50 within certain limits.

Between the collars a^8 a^9 of the main casing a and resting on the edges of the said cut-away portion of the said casing is the relief-compartment or expansion-chamber f . This relief-compartment is immediately above the revolving shell or grinder. Between the relief-compartment and the small end of the casing and having one of its walls formed by a wall of the relief-compartment is a feeding-chamber f' . The walls of these several chambers and the wall common to both the relief-compartment and the feeding-chamber are cut away to substantially conform to that part of the periphery of the revolving section or
60 grinder which is adjacent thereto, having, however, a slight clearance-space when said section or grinder is moved in toward the

small end of the main casing as far as possible. The relief-compartment is preferably left open at the top, thus permitting the paper-stock to back up into it without unnecessary resistance. In the drawings I have shown but one of these relief-compartments. It is obvious that there may be any number, according to the size of the reducer and the number of sections in the reducing-grinder.
75

Located within the lower portion of the main casing and extending from its small end to about opposite the inner end of the collar a^8 is a lining g , extending up with the said casing to the line where said casing is cut away. (See Fig. 8.) This lining g is preferably made in four sections g^1 , g^2 , g^3 , and g^4 , as shown in Fig. 7, and when placed in position within the casing it conforms to the inner periphery of
85 the main casing. The inner surface of this lining, or that surface lying nearest to the reducing section or grinder, has formed upon it spirally-extending projections or ridges g^1 . Each of these ridges is in the nature of a step, one side of said steps being adapted to lie adjacent to the inner periphery of the lining. The inner part of these steps on the side lying nearest the small end of the lining is smoothed off somewhat, while the other side is left sharp,
95 so that the edge of each step acts as a reducer. The respective sections of this lining are secured to the main casing by means of bolts g^5 g^6 , the nuts being countersunk into the face of the lining.
100

Within the main casing and lying between the lining g and the large end of the casing and conforming to the inner periphery of the said casing is a lining-ring f^2 , preferably made of wood. Arranged at intervals around the inner periphery of this ring f^2 are reducing fins or blades f^3 , (see Fig. 4,) which are adapted to conform to that portion of the outer periphery of the reducing-grinder which is adjacent thereto.
110

The wooden lining-ring f^2 is preferably constructed in three sections, each of which is formed of the wooden blocks f^6 , which lie between the blades. In the center of each section is the block f^7 , which is bolted to the outer casing, as shown at f^8 . Between the ends of the sections thus formed wedge-shaped blocks f^{10} are driven, as shown in Fig. 10, the smaller side of the block lying toward the inner periphery of the lining-ring. From this construction it will be seen that the blades will be held in place and the lining-ring will be kept from turning in the casing by means of the bolted blocks f^7 .
115

The end piece a^2 is formed with an opening a^{10} in its side, extending part way around its periphery. The large end of the reducing-grinder is cut away on its surface and for a short distance back from the end, so as to form a many-pointed star e^6 , whose greatest diameter is slightly less than the greatest diameter of the grinder.
125 130

The stock mixed with a sufficient quantity of water or other liquid which may be used

is admitted into the feeding-chamber f' , which is over the small end of the reducing-grinder.

The feeding-chamber acts as a reservoir, and the paper-stock may be fed into it in any quantities, where it will be retained and delivered to the reducer as fast as it can be taken care of. By this means the reducer will regulate itself and will always work to its full capacity.

10 The stock upon being taken up by the reducing-grinder will by the revolutions of said grinder be carried on toward the larger end of the casing. From the construction hereinbefore described the paper-stock as it moves
15 toward the larger end of the casing will be retarded, thus causing a congestion of the stock within said reducer. This congestion is cared for and completely overcome by means of the relief-compartment. As the stock becomes congested it will back up and will escape
20 into the relief-compartment, where it will be retained to be taken up again by the reducing-grinder as the congestion subsides. When the paper-stock reaches the large end of the
25 reducing-grinder, it is caught by the star e^6 and is expelled from the reducer through the outlet-opening in the end piece a^2 .

By having the grinder, as well as the lining, sectional the parts may be renewed as they
30 become worn. The casing being cut away at the top for the greater portion of its length, the sectional lining of the casing, with the feeding and relief chambers, may be removed without removing the grinder. This is accomplished by removing the bolts g^5 and g^6 ,
35 which screw in from the outside. The larger sections g' and g are then moved upwardly, following the curvature of the casing, until they may be removed at the top. The small sections g^3 and g^4 are then slipped longitudinally in the casing until their small ends are free from the end piece or ring a^3 , after which they may be moved upwardly, following the
40 periphery of the outer casing, until they can be removed at the cut-away portion of the
45 sections or grinders.

Having thus described my invention, I claim—

1. In a reducer for paper-stock, the combination with an outer casing, of an inner reducing sectional grinder, said grinder having reducing-fins attached to its periphery, of a relief-compartment above said outer casing and connecting with the inside thereof,
55 substantially as specified.

2. In a reducer for paper-stock, the combination

with a reducing-grinder having fins on its outer periphery, of a main casing surrounding said grinder, a relief-compartment above same and connecting with the interior
60 of said casing, and a sectional lining in said casing, substantially as specified.

3. The combination, in a paper-stock reducer having an outer casing, and an inner grinder, of a relief-compartment connecting
65 with the interior of said casing, a feeding-chamber connecting with the interior of said casing, said relief-compartment and said feeding-chamber forming means for controlling the action of said reducer, substantially as
70 specified.

4. The combination in a paper-stock reducer having an outer casing, formed as described with an opening for a relief-compartment, of a removable step-ridged lining for
75 said casing, adapted to be removed through said opening, substantially as specified.

5. The combination in a reducer for paper-stock having an outer casing with a lining thereon consisting of laterally-extending
80 reducer-blades arranged at intervals around its inner periphery, of a feeding-chamber arranged above said outer casing and connecting with the interior thereof, of a relief-compartment adjacent to said feeding-chamber,
85 said feeding-chamber and said relief-compartment being adapted to govern the action of said reducer, substantially as specified.

6. In a paper-stock reducer the combination with an outer casing, of a relief-compartment adjacent to said casing and connecting
90 with the interior thereof, of a reducing-grinder within said casing, and means outside of said casing for changing the position of said grinder with relation to said relief-compartment, substantially as specified.

7. In a paper-stock reducer the combination with an outer casing, of a removable lining for said casing such as described, of a reducing-grinder within said casing, said
100 grinder having fins on its periphery extending parallel with its length for a portion of its length and spirally for a portion of its length, of an ejector formed on the large end of said reducing-grinder, substantially as specified.
105

In testimony whereof I have hereunto set my hand this 1st day of February, A. D. 1898.

THOMAS C. CADWGAN.

Witnesses:

THOMAS J. WANNER,
L. G. BULL.