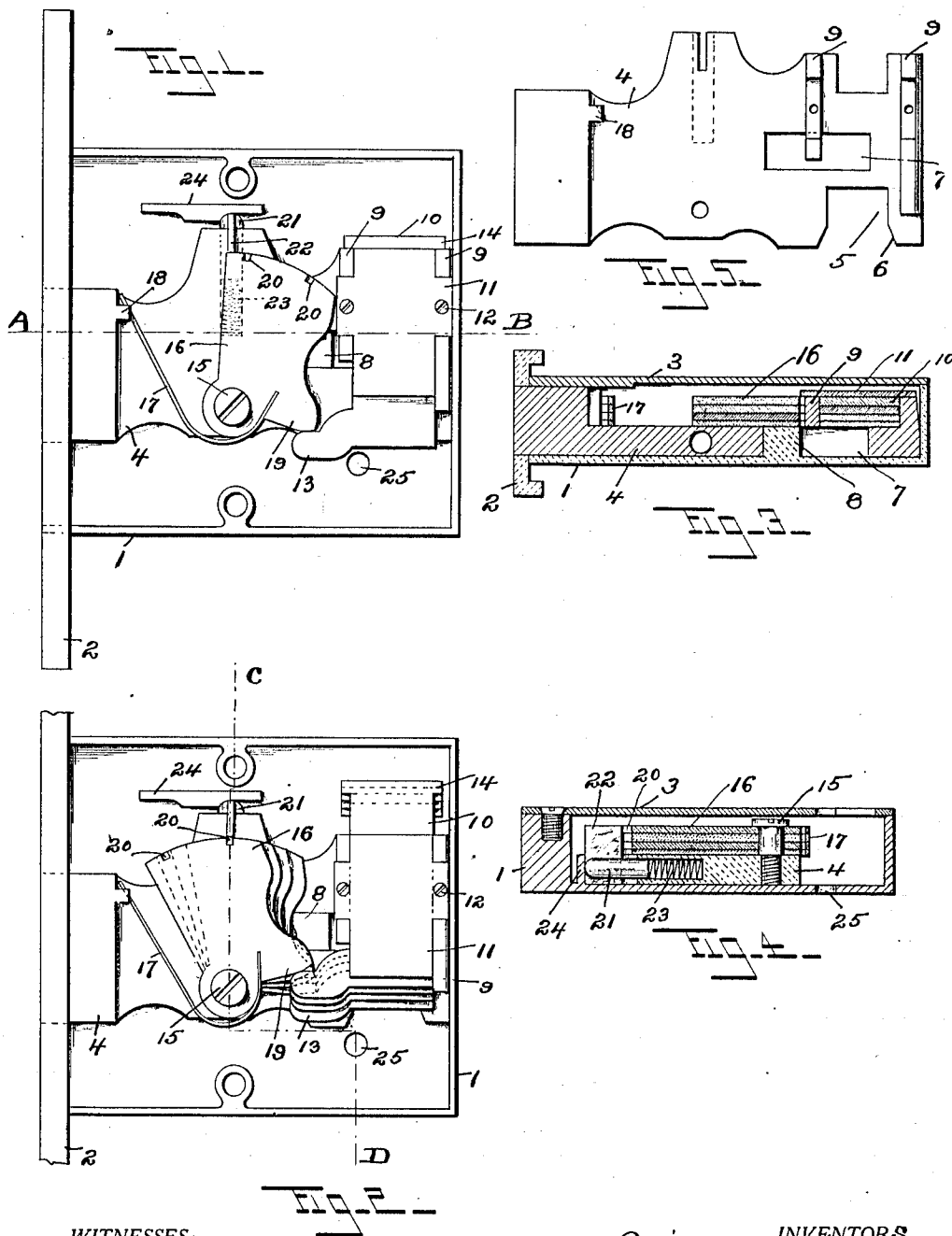


W. E. & O. F. SPARKS.
LOCK.
APPLICATION FILED APR. 30, 1909.

1,040,245.

Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.



WITNESSES:

Florence H. Monk.
Gertrude Brethauer

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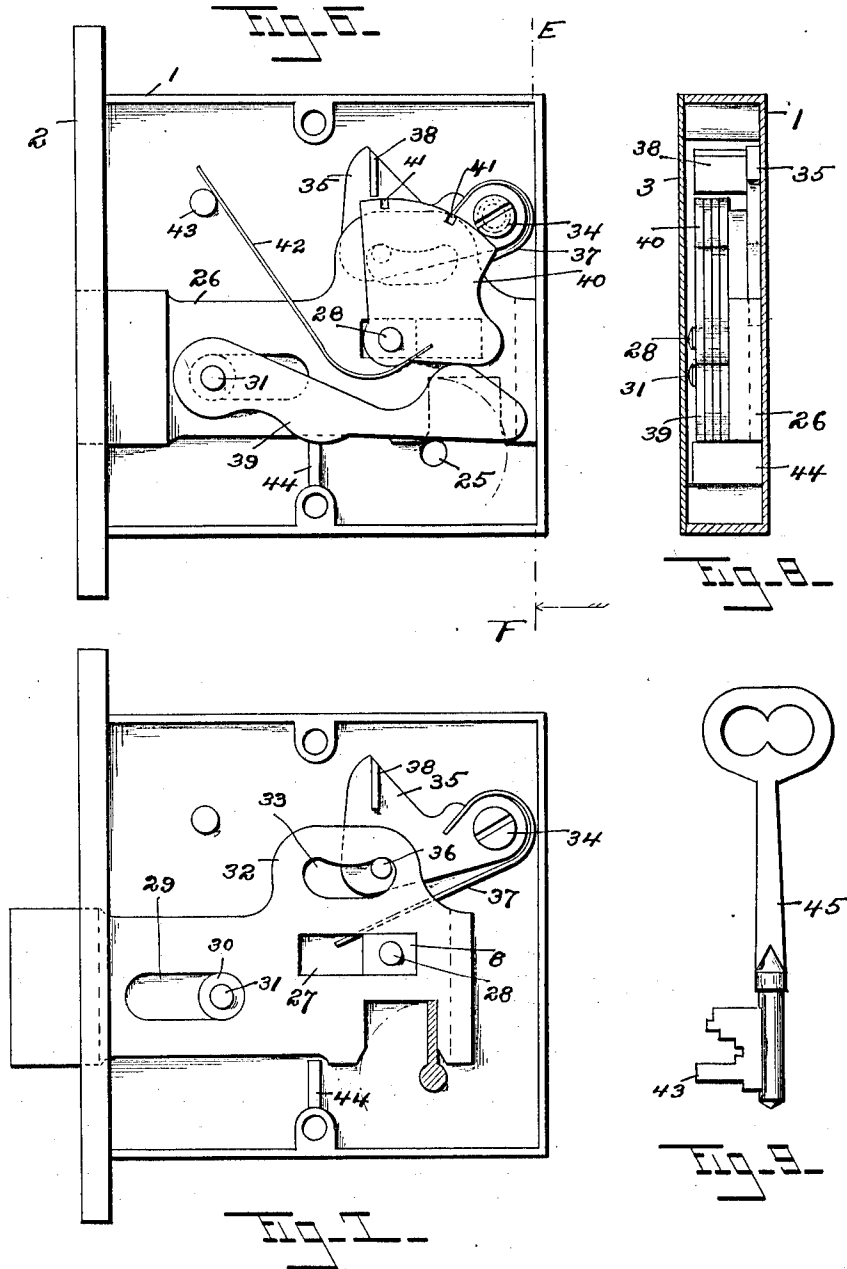
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UNITED STATES PATENT OFFICE.

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LOCK.

1,040,245.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed April 30, 1909. Serial No. 493,213.

To all whom it may concern:

Be it known that we, WILLIAM E. SPARKS and OLIVER F. SPARKS, citizens of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Locks, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to new and useful improvements in locks, and has for its object, among other things, to provide a lock with such an arrangement of tumblers and operative parts as to eliminate all chances of the same being picked or unlawfully opened, and that will permit a practically endless number of locks to be placed in one series and each lock in the series require a separate key, but yet all capable of being operated by a single master key, and to produce these results with a lock of few parts of such simple design as to be economically constructed and readily assembled.

To these, and other ends, our invention consists in the lock having certain details of construction, and combinations of parts, as will be hereinafter described and more particularly pointed out in the claims.

Referring to the drawings, in which like numerals of reference designate like parts in the several figures; Figure 1 is a view of the interior of our improved lock with the bolt in its retracted position; Fig. 2 is a similar view illustrating the position of the tumblers when set to permit the movement of the bolt; Fig. 3 is a transverse sectional view upon line A—B of Fig. 1; Fig. 4 is a sectional view upon line C—D of Fig. 2; Fig. 5 is a detail view of the bolt; Fig. 6 is a view of the interior of our improved lock showing a modified construction and with the bolt thereof in its retracted position; Fig. 7 is a view of the lock shown in Fig. 6 with the tumblers removed and the bolt in its forward position; Fig. 8 is a sectional view upon line E—F of Fig. 6; and Fig. 9 is a view of one form of day key that can be used with our invention.

In locks of the type known as hotel locks, it is desirable that a very large number of locks be provided in a series, each of which may be operated by a so-called day key that will not open any other lock in the series and at the same time provide means where-

by a single key, called the master key, may

open every lock in the series. We have accomplished this result by using two sets of tumblers, one set being pivotally mounted and having notches in the edge thereof, and the other set, corresponding in number to those in the first set, actuated by the key and by their contact with the tumblers in the first set, move the same upon their pivot mountings so as to bring the notches therein into register with each other, at which time the bolt can be moved. Each tumbler in the first set has two notches, one for the day key and the other for the master key.

In the practice of our invention, we provide the usual lock case 1, having a front plate 2 and cap 3, and within which is movable the bolt 4 having the race 5, talons 6 and a slot 7, into which projects the post 8 to limit the movement of the bolt. On the bolt, near the rear end thereof, are the guide rails 9, between which a set of reciprocating tumblers 10, four in number, are movably mounted, and secured therein by a cap 11, fastened by the screws 12. Each of the tumblers 10 have a radially projecting arm 13 at one end and laterally projecting stop lugs 14 at the other end, which engage the guide rails 9 to limit the movement of the tumblers in one direction. Pivotally connected with the bolt 4 by a screw 15 are the rotary tumblers 16, also four in number, having two radial notches 20 in their outer edges, and the radial arms 19 thereon which are normally held in engagement with the arms 13 by the spring 17 resting at one end against the lug 18. The relative positions of the notches in each of the tumblers is varied so that to bring the notches in all of the tumblers into register with each other the several tumblers have to move through an arc of greater or less length, determined by the steps on the key bit, as hereinafter explained.

Mounted within the bolt 4 is the racking piece 21 having a feather 22 projecting radially therefrom and engaged at its inner end by a spring 23, the tension of which is exerted so as to move the racking piece outwardly against a fixed cam 24 upon the case 1.

In operation the key is inserted in the usual manner with the end thereof supported within the hole 25 in the case, the steps on the key bit during its rotation engaging the tumblers 10 and moving them to the po-

sition shown in Fig. 2, during which time the tumblers 16 are rotated by the engagement of the arms 13 and 19 bringing the notches 20 in each of the tumblers 16 into register with each other. When the tumblers are in position the throw portion 43 of the key bit is in engagement with the side of the race 5 and begins to move the bolt from its retracted to its forward position. Immediately this movement begins the racking piece 21 is moved within the bolt against the tension of the spring 23 by its engagement with the cam 24 and the feather 22 enters the notches 20 and the springs 17 return all of the tumblers in both sets to their original positions, as shown in Fig. 1, when the key is withdrawn. By this combination of two coöperating sets of compound tumblers the slight movement of the key contacting tumblers is multiplied many times in the movement of the notched edge of the other tumblers through an arc of considerable length and the larger the arc the greater the surface capable of being notched. Each of the tumblers 16 is provided with one set of notches that are brought into register by the day key and no other lock in the series has the same relative location of notches, and also a second notch in each tumbler that occupy the same relative positions in the tumblers of every lock in the series and which are consequently brought into register with each other by the same key known as the master key.

In the lock heretofore described both sets of tumblers are mounted on, and move with, the bolt, and the first of said sets having a reciprocating movement thereon, but the tumblers and bolt operate equally as well with the tumblers fixed to stationary parts with the first of said set of tumblers pivotally mounted instead of reciprocating. Such a modified construction is shown in Figs. 6 to 8 inclusive, wherein the bolt, designated by the numeral 26, has a slot 27 therein, and into which projects the post 8 having a tumbler pin 28 therein, and a second slot 29 into which projects a post 30 having the tumbler pin 31 therein. Pivotally secured to the case by the screw 34 is the racking piece 35 having a feather 38 integral therewith and a cam pin 36 thereon which enters the cam slot 33 in the lug 32 projecting radially from one side of the bolt, and held against one side thereof by the tension of the spring 37. The tumblers 39, four in number, are mounted upon the pin 31 and contact with the tumblers 40, also four in number, that are mounted upon the pin 28 and having notches 41 in their outer edges corresponding with the notches 20 in the tumblers 16. The springs 42 are fixed at one end to the tumblers 40 and at the other end lie against the integral post 43 and hold all of the tumblers in the posi-

tion shown in Fig. 6, wherein the tumblers 39 rest against the post 44. The operation of this modified construction is substantially the same as that of the lock above described, the notches upon the key bit engaging the tumblers 39 moving them upon their pivot mountings, and through which the tumblers 40 are actuated, and when brought into their proper position wherein the notches in each of the tumblers register with each other, the key engages the side of the race, at which time the feather 38 moves into said notches by the engagement of the pin 36 with the cam slot 33 and the bolt is moved forward. When the key is removed the spring 37 shifts the position of the racking piece 35 so that the feather 38 therein is disengaged from the notches 41 and all of the tumblers resume their original positions, as shown in Fig. 6.

It will be observed that in both forms of the invention shown in the drawings, the notched edge of the tumblers 16 or 40, respectively, is located a considerable distance farther away from the tumbler pivot than is the point where the actuating tumbler 10 or 39, respectively, contacts with the first mentioned tumbler. By this arrangement, the notched edge of the intermediate or secondary tumbler will have considerably greater movement as compared to the actuating or primary tumbler.

It will be practically impossible to pick this lock or to open it unlawfully owing to the two sets of tumblers and their coöperative engagement with each other. The key bit, both as to size and relative arrangement of the steps thereon must be exactly right to actuate the tumbler and bolt. In Fig. 7 we have shown a section of the key in the bolt race as it is about to move the bolt to its retracted position, which position it cannot assume until all of the tumblers are in their proper relative positions so as to permit the feather 38 to enter the notches. If any one of the tumblers has not been moved to its proper position the feather will not enter the notches and allow the key to rotate or the bit thereof to engage the side of the race. The reverse is also true, that if the bit is too short it will not move the tumblers a sufficient distance to permit of the engagement or disengagement of the feather with the notches therein. The talons 6 upon the bolt are so spaced that the bit of the proper key will just pass and a key with a longer bit will not enter the bolt race.

In the drawings we have shown four tumblers in each set but a greater or less number may be used equally as well, the addition to the number of tumblers increasing greatly the number of key changes, all of which is accomplished without resorting to the common expediency of using key wards within the lock case and on the cap.

There are minor changes and alterations that can be made within our invention, aside from those herein suggested, and we would therefore have it understood that we do not

5 limit ourselves to the exact construction herein shown and described, but claim all that falls fairly within the spirit and scope of our invention.

10 Having described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. The combination in a lock of that type wherein the bolt is operated by either a day or a master key, and the bit of the operating
15 key is in contact with the race in said bolt and the tumblers at one and the same time; of a bolt, having a race therein; a movable tumbler projecting into the path of the key bit and in part over the said race; a second
20 tumbler mounted so as not to project into the path of said key bit and actuated from said first tumbler; and means, operated when said second tumbler is in a predetermined position, to release said bolt and permit movement thereof by the key bit, said
25 predetermined position when the said tumblers are operated by the day key being different than when operated by the master key, and said tumblers being so arranged that said bolt cannot be actuated by either
30 the day or master key without movement of both of said tumblers.

2. The combination in a lock of that type wherein the bolt is operated by either a day
35 or a master key, and the bit of the operating key is in contact with the race in said bolt and the tumblers at one and the same time; of a bolt, having a race therein; a movable tumbler projecting into the path of the key
40 bit and in part over the race in said bolt; a second tumbler mounted so as not to project into the path of said key bit, and actuated from said first tumbler; means, operative when said second tumbler is in a pre-
45 determined position, to release said bolt and permit movement thereof, said predetermined position when said tumblers are operated by the day key being different than when operated by the master key, said tum-
50 blers being so arranged that said bolt cannot be actuated by either the day or master key without movement of both of said tumblers; and means for limiting the movement of one of said sets of tumblers in one direction.

3. The combination in a lock of that type wherein the bolt is operated by either a day
55 or a master key, and the bit of the operating key is in contact with the race in said bolt and the tumblers at one and the same time; of a bolt, having a race therein; a plurality of tumblers separately movable in the path of the key bit and in part over the race in
60 said bolt; a second plurality of tumblers mounted so as to be separately actuated by the first mentioned tumblers and out of the

path of said key bit; and a movable part cooperating with one of said plurality of
tumblers, when in a predetermined position, to release and permit the movement of said
bolt, said predetermined position, when the
70 said tumblers are operated by the day key, being different than when operated by the master key, and said tumblers being so arranged that said bolt cannot be actuated by
75 either the day or master key without movement of both of said tumblers.

4. The combination in a lock of that type wherein the bolt is operated by either a day or a master key, and the bit of the operating
80 key is in contact with the race in said bolt and the tumblers at one and the same time; of a bolt, having a race therein; means for holding the same against movement when in its retracted or forward position; two
85 sets of tumblers, one of said sets being in part over the race in said bolt and in the path of the key bit, by which it is engaged and actuated, and the second set of tumblers deriving its movement in one direction from
90 the first set, said tumblers being so arranged that said bolt cannot be actuated by either the day or master key without movement of both of said tumblers and with the
95 key bit in contact with one side of said bolt race; means entering notches in one of said sets of tumblers for releasing said bolt when said tumblers are in a predetermined position, said predetermined position being different when said tumblers are actuated by the day key than when actuated by the mas-
100 ter key.

5. In a lock of that type wherein the bolt is provided with a race and the key bit is in contact with the said race and tumblers
105 at one and the same time; the combination with a bolt; of a set of reciprocating tumblers in the path of the key bit; means for limiting the movement of said tumblers toward the path of said key bit; and a set of
110 pivotally mounted tumblers engaged by the tumblers in the first set when the same are actuated by the key.

6. In a lock of that type wherein the bolt is provided with a race and the key bit is in contact with the said race and tumblers
115 at one and the same time; the combination with a bolt; of a set of reciprocating tumblers in the path of the key bit; and a set of pivotally mounted tumblers engaged by the
120 tumblers in the first set when the same are actuated by the key, all of said tumblers being movable with the said bolt.

7. In a lock of that type wherein the bolt is provided with a race and the key bit is in contact with the said race and tumblers
125 at one and the same time; the combination with a bolt; of a set of reciprocating tumblers mounted upon said bolt in the path of the key bit; a second set of notched tumblers pivotally mounted upon said bolt and
130

actuated from said first set so as to bring all of the notches in said tumblers into register with each other; a racking piece movably mounted in said bolt and having a part thereon which enters the notches in said tumblers when in register with each other; and means, as a fixed cam, for actuating said racking piece.

8. The combination in a lock of that type wherein the bolt is operated by either a day or a master key, and the bit of the operating key is in contact with the race in said bolt and the tumblers at one and the same time; of a bolt having a race therein; two tumblers, one projecting into the path of the key bit and in part over the race in said bolt, and the other acquiring its movement from the tumbler projecting into the path of the key bit, said tumblers being so arranged that they always maintain an operative contact with each other, and said bolt cannot be actuated by either the day or master key without movement of both of said tumblers; means for releasing said bolt when one of said tumblers is in a predetermined position and the side of the key bit is in engagement with the side of the bolt race, said predetermined position being different when said tumblers are actuated by the day key than when actuated by the master key.

9. In a lock, the combination of a case, having a keyhole; a bolt in said case; a tumbler in the case directly engageable with a day key and a master key inserted in said keyhole; a second tumbler in the case, having permanent operative contact with said first tumbler but out of the path of either key; and means for locking the bolt in position, releasable by said second tumbler when the latter is moved into a predetermined position by the day key and also releasable by said tumbler when the same has been moved into another position by the master key.

10. The combination in a lock of that type wherein the bolt is operated by either a day or a master key, and the bit of the operating key is in contact with the race in said bolt and the tumblers at one and the same time; of a bolt, having a race therein; a tumbler in the path of the key bit and in part over the said race; a second tumbler with a notched outer edge rotarily mounted out of the path of said key bit, with a part thereon in the path of movement of said first tumbler, having a permanent operative connection therewith and through which it is actuated, and the movement of said first tumbler multiplied in the movement of the notched edge of said second tumbler, said tumblers being so arranged that said bolt cannot be actuated by either the day or master key without the movement of both of said tumblers.

11. In a lock of that type wherein the bolt is provided with a race and the key bit is in contact with the said race and tumblers at one and the same time; the combination with a bolt; of a plurality of endwise movable tumblers mounted thereon; means for limiting the movement of said tumblers in one direction; a second set of tumblers mounted upon said bolt and having a part thereon lying in the path of a part upon said first tumblers; and means for locking said second set of tumblers against movement when in a predetermined position.

12. In a lock, the combination of a case, having a key-hole; a bolt in said case; bolt locking and releasing means; a pivoted tumbler, having one edge coöperating directly with said bolt locking means; and a second tumbler engageable with the first at a point considerably nearer the pivot of said first tumbler than is the aforesaid edge of said first tumbler, said second tumbler being located adjacent to said key-hole in the path of the bit.

13. In a lock, the combination with a case, having a key-hole; of a bolt in said case; a tumbler in the case directly engageable with the bit of a key inserted in said key-hole; a second tumbler pivoted in the case and directly engageable at one point with said first tumbler, said second tumbler having a notched edge located at a considerably greater distance from the pivot of said tumbler than the point where said tumbler engages the first tumbler; and locking means for the bolt co-acting with said notched edge.

14. In a lock, the combination of a case, having a key-hole for the insertion of a day key and a master key; a bolt in said case; a tumbler in the case directly engageable with the bit of the day key and the bit of the master key; a second tumbler in the case, having permanent operative contact with said first tumbler, but located out of the path of either key, said second tumbler having one edge so arranged with respect to the first tumbler that the movement of such edge is considerably greater than the movement of said first tumbler; and locking means for the bolt co-acting with said edge of the second tumbler and releasable by the second tumbler when the latter is moved to different predetermined positions by the day key and master key respectively.

15. In a lock, the combination of a case, having a key-hole; a bolt in said case; a tumbler in the case directly engageable with the bit of a day key or the bit of a master key inserted in said key-hole; a second tumbler pivoted in the case and directly engageable with said first tumbler, said second tumbler having an edge with separate notches located at a considerably greater distance from the pivot of the tumbler than is the

point of engagement between said tumblers;
and locking means for the bolt coöperating
with the respective notches of said notched
edge to release the bolt as said second tum-
5 bler is moved to different predetermined po-
sitions by the day key and the master key
respectively.

In testimony whereof we affix our signa-
tures in presence of two witnesses.

WILLIAM E. SPARKS.

OLIVER F. SPARKS.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."