Jan. 16, 1951 F. B. ENGEL 2,538,675

CHAIN TENSION ADJUSTING DEVICE

Filed July 16, 1946 2 Sheets-Sheet 1

Fig. 1

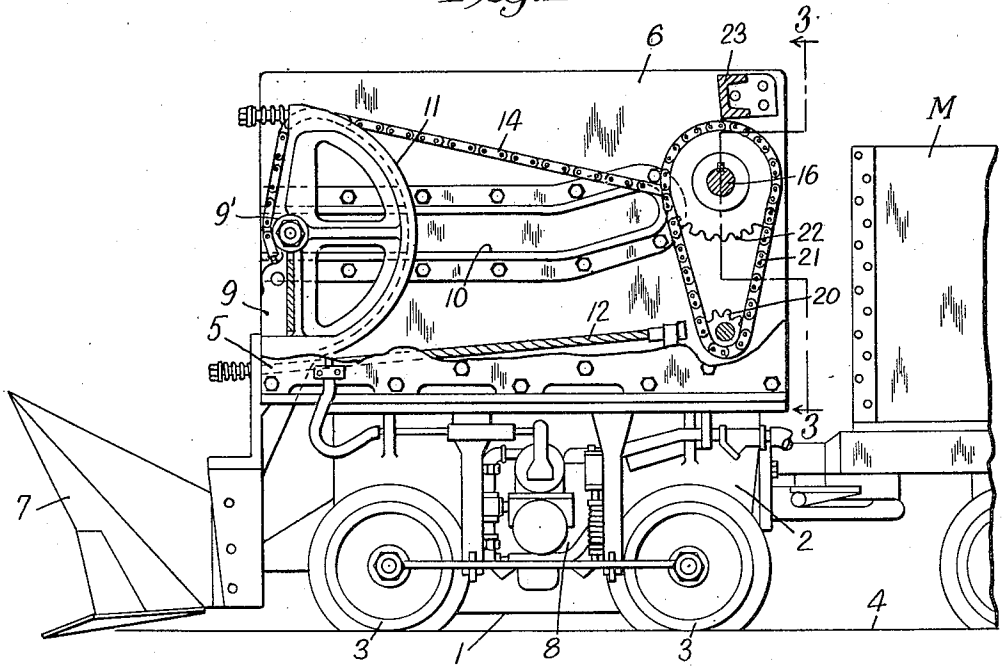
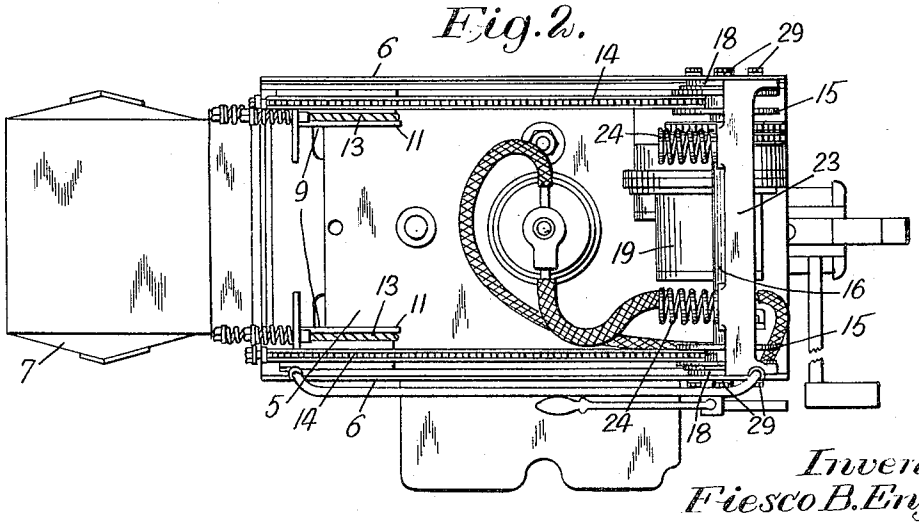


Fig. 2.



Inventor:
Fiesco B. Engel.
by Charles F. Osgood,
Atty.

Jan. 16, 1951 F. B. ENGEL 2,538,675

CHAIN TENSION ADJUSTING DEVICE

Filed July 16, 1946 2 Sheets-Sheet 2

Fig. 3.

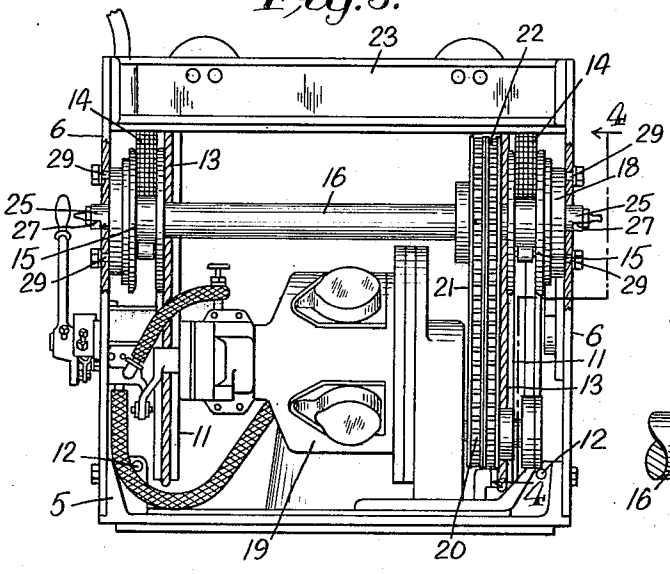


Fig. 5.

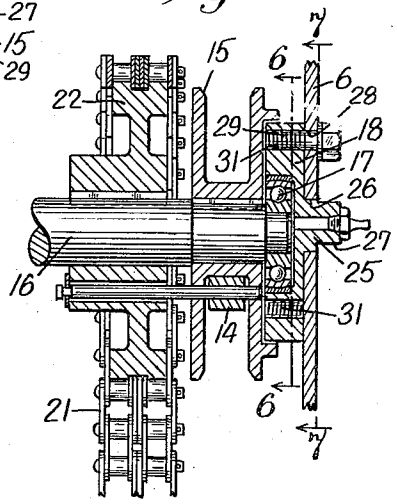


Fig. 4.

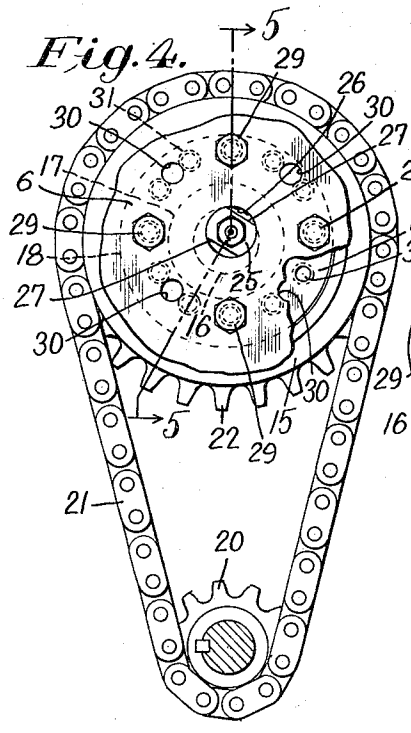


Fig. 6.

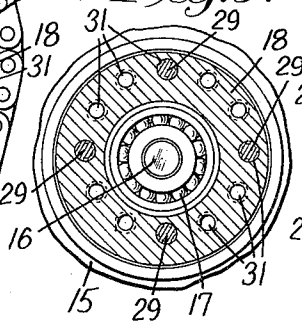
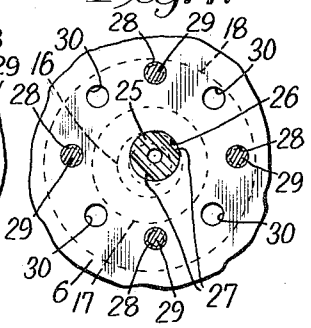


Fig. 7.



Inventor.
Fiesco B. Engel.
by Charles F. Ozzard,
atty.

Patented Jan. 16, 1951 2,538,675

UNITED STATES PATENT OFFICE

2,538,675

CHAIN TENSION ADJUSTING DEVICE

Fiesco B. Engel, Claremont, N. H., assignor to Joy Manufacturing Company, a corporation of Pennsylvania

Application July 16, 1946, Serial No. 683,879

11 Claims. (Cl. 74—242.16)

1

This invention relates to shovel loaders and more particularly to an improved adjusting device for elements of the drive of the bucket lifting mechanism of a shovel loader.

An object of the present invention is to provide an improved adjusting device for elements of the drive of a shovel loader. Another object is to provide an improved eccentric adjusting device for a drive chain of a shovel loader whereby the sprocket centers may be relatively adjusted to vary the tension of the chain. A further object is to provide an improved eccentric adjusting device for the drive chain for the lifting drums of the bucket lifting mechanism of a shovel loader. A still further object is to provide an improved eccentric adjusting device for the bearing brackets of the chain drive shaft of a shovel loader. Still another object is to provide an improved rotary eccentric mounting for the bearing brackets of a sprocket shaft whereby the sprocket centers of a drive chain may be relatively adjusted. A still further object is to provide an improved eccentric adjusting device for the bearing brackets of the sprocket shaft and embodying means for adjusting the bearing bracket into different predetermined positions. These and other objects and advantages of the invention will, however, hereinafter more fully appear in the course of the following description.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Fig. 1 is a side elevational view, with parts in longitudinal vertical section, of a shovel loader in which an illustrative form of the invention is embodied.

Fig. 2 is a top plan view of the shovel loader shown in Fig. 1.

Fig. 3 is an enlarged cross-sectional view taken substantially on lines 3—3 of Fig. 1 and looking toward the rear end of the shovel loader.

Fig. 4 is an enlarged vertical sectional view taken substantially on line 4—4 of Fig. 3, showing the chain drive of the bucket lifting mechanism.

Fig. 5 is a vertical sectional view taken substantially on lines 5—5 of Fig. 4, showing details of the eccentric adjusting device.

Fig. 6 is a detail vertical sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is a detail vertical sectional view taken on line 7—7 of Fig. 5.

In this illustrative embodiment of the invention, the improved eccentric adjusting device is shown embodied in the chain drive of the lifting

2

mechanism for the bucket of a shovel loader. The shovel loader may assume various forms but is herein of the same general character as that disclosed in the R. C. Osgood Patents No. 2,201,671, patented May 21, 1940 and No. 2,268,857, patented January 6, 1942.

The shovel loader generally comprises a portable base 1 having a base frame 2 mounted on wheels 3, 3 adapted to travel along a trackway 4. Carried by the base frame is an upper frame 5 including vertical side plates 6, 6 between which is mounted a vertically swingable shovel or bucket 7. A conventional reversible motor 8 (see Fig. 1) on the base frame is operatively connected to the wheels 3 for propelling the loader back and forth along the trackway, and the traction of the wheels is utilized to effect digging of the shovel, when the latter is in its lowered digging position in Fig. 1, into the material to be loaded. Coupled to the rear end of the loader base is a mine car M having its wheels guided on the trackway and the shovel, when swung upwardly into its raised dumping position, discharges its contents into the mine car. This structure is fully disclosed in the patents above referred to.

As is also disclosed in the above mentioned patents, the shovel or bucket 7 is supported by arms 9 which carry rollers 9' guided in substantially horizontal guideways 10 on the inner sides of the vertical side plates 6 of the upper frame 5. Thus the rollers 9' provide a rolling pivotal support for the shovel and the shovel supporting arms are swingably supported to turn on axes coincidental with the roller support axes as the shovel is swung about its fulcrum point, and as the shovel is swung upwardly from its lowered digging position, the rollers 9' move rearwardly along the guideways 10 and the guideways serve to confine the shovel as it swings upwardly to move in a predetermined curved path. Secured to the shovel arms are semi-circular segments 11 (see Fig. 1) having cable guiding grooves on their curved peripheries for receiving pairs of flexible spring-tensioned cables 12, 12 and 13, 13, each of which is secured at one end to the shovel arms and its other end to the upper frame 5. These pairs of cables serve to compel swinging movement of the shovel arms, thereby to effect movement of the shovel arms bodily longitudinally as they are swung and to provide, in effect, a moving fulcrum point for the shovel, and they serve to effect movement of the shovel through a wide arc as it moves between its lowered digging position and its raised dumping position. The arm segments, roller mounting and cable connections

are fully described in the patents above referred to.

For raising and to control lowering of the shovel on its roller mounting, there are provided side chains 14, 14 suitably fastened to the shovel side arms 9 and wound on chain drums 15 (see Figs. 3 and 5) fixed to a transverse drive shaft 16 journaled in self-aligning anti-friction bearings 17 supported by brackets 18 attached to the inner sides of the vertical side plates 6 in an improved manner to be later explained. A conventional reversible motor 19 is mounted on the upper frame 5 and has its power shaft operatively connected to a chain drive sprocket 20 engaging an endless drive chain 21, which, in turn, engages and drives a chain sprocket 22 fixed to the drum drive shaft 16 (Fig. 5) in adjacency to a chain drum. Carried by a cross plate 23 which braces the vertical side plates 6 above the drum drive shaft 16 are spring buffers 24 (Fig. 2) engageable by the shovel supporting arms 9 to provide a cushioned stop for the shovel when the latter assumes its raised dumping position. When the rearward movement of the shovel is abruptly stopped by the buffer springs, the shovel contents are discharged into the mine car M and the buffer springs also initiate forward return movement of the shovel from its raised dumping position, and when the center of gravity is passed, the shovel will drop down to its digging position under its own weight. To speed up the return of the shovel, the shovel lifting motor 19 is reversed to rotate the chain drums 15 in unwinding direction so that the shovel may freely drop down into its digging position. This structure also is described in the above mentioned patents.

Now referring to the improved eccentric adjusting device associated with the drum drive shaft 16, it will be noted that the bearing brackets 18 in which the shaft bearings 17 are supported have circular projections 25 extending outwardly through circular openings 26 in the side plates 6, and these circular projections have flattened surfaces 27 exteriorly of the side plates for engagement by a suitable turning instrument such as a wrench so that the bearing brackets 18 may be rotated into different positions. These circular projections 25 are eccentrically arranged with respect to the longitudinal axis of the drum drive shaft 16 as shown in Fig. 5 so that when the bearing brackets 18 are rotated, the longitudinal axis of the drum drive shaft may move in an arcuate path about the axes of rotation of the bearing brackets 18, as will later be explained. The vertical side plates 6 of the upper frame 5 are formed with a series of spaced, radially located openings 28, herein preferably four in number in each side plate, in which are received four bolts 29 for securing the brackets 18 to the side plates, and arranged in the side plates intermediate the openings 28 are similar openings 30, likewise four in each plate. Thus there are eight holes, spaced 45° apart, in each side plate. Formed in each of the bearing brackets 18 is a series of radially located openings 31, herein preferably twelve in number, and these openings are movable upon adjustment of the bearing brackets into registry with either the series of openings 28 or the series of openings 30. The bearing brackets 18 may be rotated through 180°, and the twelve openings 31 in the bearing brackets are disposed 30° apart so that the bearing brackets may be adjusted into thirteen positions 15° apart to move the longitudinal axis of the drum drive shaft 16 through 180° from a lower position in a plane including the parallel axes of the chain sprockets 20 and 22 to an upper position in the same plane. The drive chain 21 is of the pivoted link type having its links pivotally connected together by parallel hinge pins in a conventional manner, and the axis of rotation of the chain sprocket 22 upon adjustment of the bearing brackets through 180° is equal to half the distance between a pair of hinge pins so that when the total adjustment of the two sides of the chain has been made, the bearing brackets may be rotated to bring the longitudinal axis of the drum drive shaft 16 in its initial lower position back into the plane including the axes of the chain sprockets 20 and 22 so that a link may be detached from the chain to shorten the latter. Upon the removal of a link, any slackness in the shortened chain may be taken up by further adjustment of the bearing brackets. In pivoted link chains of certain types, it is necessary to remove two links and substitute an offset link in order to shorten the chain in the above manner. When the bolts 29 are removed, the bearing brackets may be turned to bring certain of the openings 31 into registry with the plate openings 30, and the bolts 29 may be inserted in the plate openings 30 in an obvious manner. It will be evident that a greater or less number of openings may be provided in the bearing brackets and side plates, as desired. By the provision of self-aligning bearings 17, it is possible to adjust the bearing brackets 18 individually, the bearings permitting tilting of the drive shaft 16 during such independent adjustment.

As a result of this invention, an improved adjusting device is provided for elements of the drive of the bucket lifting mechanism of a shovel loader, whereby the driving elements may be relatively adjusted as desired. By the provision of the eccentric adjusting device for the drive chain of the shovel lifting mechanism, the distance between the chain sprockets may be readily adjusted to vary the tension of the drive chain. By associating the eccentric adjusting device with the bearing brackets for the drum drive shaft of the shovel lifting mechanism, the structure is simplified and may be adapted to a conventional shovel loader with a minimum of change. The adjusting device is simple and rugged in design and may be easily adjusted into position simply by removing the attaching bolts, rotating the bearing brackets and reinserting the attaching bolts. These and other advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In an eccentric adjusting device for a transmission chain, the combination with a drive sprocket, a driven sprocket, an endless transmission chain engaging said sprockets, a shaft to which one of said sprockets is secured, a bearing bracket for said shaft and a support for said bracket, of an adjustable eccentric mounting for said bearing bracket including an eccentric portion on the latter engaged in a bore in said support, said shaft journaled in said bracket on an

axis offset from and parallel to the axis of said eccentric portion, said bracket being adjustable on its eccentric mounting to move said shaft in an arc struck from the eccentric portion axis bodily to change the position of the axis of said shaft to vary the distance between the sprocket axes, thereby to adjust the chain tension.

2. In an eccentric adjusting device for a transmission chain, the combination with a transmission shaft, a bearing bracket for said shaft in which the latter is journaled, a support for said bracket, a drive sprocket, a driven sprocket, one of said sprockets secured to said shaft, and an endless transmission chain engaging said sprockets, of an eccentric mounting for said bearing bracket on said support, said bracket being adjustable on its eccentric mounting to move said shaft in an arc to vary the distance between the sprocket axes, thereby to vary the chain tension, and means for securing said bracket to said support in its different adjusted positions.

3. In an eccentric adjusting device for a transmission chain, the combination with a shaft, a bearing bracket in which said shaft is journaled, a support for said bracket, a drive sprocket, a driven sprocket, one of said sprockets being secured to said shaft and an endless transmission chain engaging said sprockets, of an eccentric mounting for said bearing bracket on said support, said bracket being adjustable on its eccentric mounting to move said shaft in an arc to vary the distance between the sprocket axes, thereby to vary the chain tension, and means for securing said bracket to said support in its different adjusted positions and including bolts receivable in registering openings in said bracket support and said bracket.

4. An eccentric adjusting device for a transmission chain comprising, in combination, a transmission shaft, a bearing bracket for said shaft, a bracket support, said bearing bracket having a circular projection arranged eccentrically with respect to the longitudinal axis of said shaft and rotatably mounted in a circular opening in said bracket support, a series of spaced openings in said bracket movable upon rotation of said bracket with respect to its support into registry with openings in said support, and bolts receivable in the registering openings for securing said bracket in adjusted position to said support, said bracket upon release of said bolts being rotatable on its eccentric mounting to move said shaft in an arc.

5. An eccentric adjusting device for a transmission chain comprising, in combination, a transmission shaft, a bearing bracket for said shaft, a bracket support, said bearing bracket having a circular projection arranged eccentrically with respect to the longitudinal axis of said shaft and rotatably mounted in a circular opening in said bracket support, a series of spaced openings in said bracket movable upon rotation of said bracket with respect to its support into registry with openings in said support, and bolts receivable in the registering openings for securing said bracket in adjusted position to said support, said bracket upon release of said bolts being rotatable on its eccentric mounting to move said shaft in an arc, and said circular projection extending outwardly from said bracket support and being formed for engagement with suitable turning means whereby said bracket may be rotated into its different adjusted positions.

6. An eccentric transmission adjusting means comprising, in combination, a stationary frame, a transmission shaft, a bearing bracket for said shaft eccentrically mounted on said frame for rotary adjustment relative thereto, a driving element, a driven element operatively connected to said driving element, one of said elements being secured to said shaft, said bearing bracket being rotatable on its eccentric mounting relative to said frame to move said shaft bodily in a curved path to adjust the position of the element secured thereto with respect to said other element, and means for securing said bearing bracket in its adjusted position to said stationary frame.

7. An eccentric transmission adjusting means comprising, in combination, a stationary frame, a transmission shaft, a bearing bracket for said shaft eccentrically mounted on said frame for rotary adjustment relative thereto, a driving element, a driven element operatively connected to said driving element, one of said elements being secured to said shaft, said bearing bracket being rotatable on its eccentric mounting relative to said frame to move said shaft bodily in a curved path to adjust the position of the element secured thereto with respect to said other element, and means for securing said bearing bracket in its adjusted position to said stationary frame, said securing means including openings in said bracket movable into registry with openings in said frame and securing bolts receivable in the registering openings.

8. An eccentric transmission adjusting means comprising, in combination, a stationary vertical frame, a transmission shaft, a bearing bracket for said shaft eccentrically mounted on said frame at the inner side thereof for rotary adjustment relative thereto, a driving element, a driven element operatively connected to said driving element, one of said elements being secured to said shaft, said bearing bracket being rotatable on its eccentric mounting relative to said frame to move said shaft bodily in a curved path to adjust the position of the element secured thereto with respect to said other element, and means adjustable from the outer side of said frame for securing said bracket in its adjusted position with respect to said frame.

9. An eccentric transmission adjusting means comprising, in combination, a stationary vertical frame, a transmission shaft, a bearing bracket for said shaft eccentrically mounted at the inner side of said frame, a driving element, a driven element operatively connected to said driving element, one of said elements being secured to said shaft, an eccentric mounting for said bearing bracket on said frame including an outward eccentrically located cylindrical projection rotatable in an opening in said frame and eccentrically arranged with respect to the longitudinal axis of said shaft, said bracket being rotatable on said eccentric projection to move said shaft in a curved path to adjust the position of the element secured thereto with respect to said other element, and means for securing said bracket in its adjusted position to said frame, said bracket projection extending outwardly through its opening in said frame and formed exteriorly of said frame for engagement with suitable rotating means whereby said bracket may be rotated when said securing means is released.

10. A chain tension adjusting device comprising a stationary frame, a rotatable bearing bracket having a bore and a cylindrical projection arranged eccentrically with respect to said bore and rotatably supported on said frame, a bearing in

said bore, a transmission shaft journaled in said bearing and arranged with its axis parallel to the axis of rotation of said eccentrically located projection, whereby said bracket provides an eccentric mounting for said shaft, a chain sprocket fixed to said shaft, said bracket being rotatable on its eccentric mounting relative to said frame to move said shaft in an arc to change the location of the sprocket axis, and means for securing said bracket to said frame in its different positions of adjustment.

11. A chain tension adjusting device comprising, in combination, spaced supports, a chain sprocket shaft arranged between said supports, eccentrically mounted bearing brackets carried by said supports respectively, self-aligning antifriction bearings carried by said brackets respectively, and in which the opposite ends of said sprocket-shaft are journaled, and means for effecting independent adjustment of said brackets to adjust said shaft bodily into different parallel

positions with respect to said supports, said self-aligning bearings permitting tilting of said shaft with respect to its positions of parallelism without binding during such independent adjustment of said brackets.

FIESCO B. ENGEL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,171,347	Morse	Feb. 8, 1916
1,580,308	Lawson	Apr. 13, 1926
2,268,570	Osgood	Jan. 6, 1942

FOREIGN PATENTS

Number	Country	Date
13,282	Great Britain	1905

Certificate of Correction

Patent No. 2,538,675 January 16, 1951

FIESCO B. ENGEL

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 8, list of references cited, under "UNITED STATES PATENTS" add the following:

844,892	Pfander	Feb. 19, 1907
2,281,875	Gleissner	May 5, 1942

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of September, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.