Dec. 30, 1952 A. L. BARRETT 2,623,398

PIVOTED LINK CHAIN

Filed Oct. 21, 1948

Fig. 1.

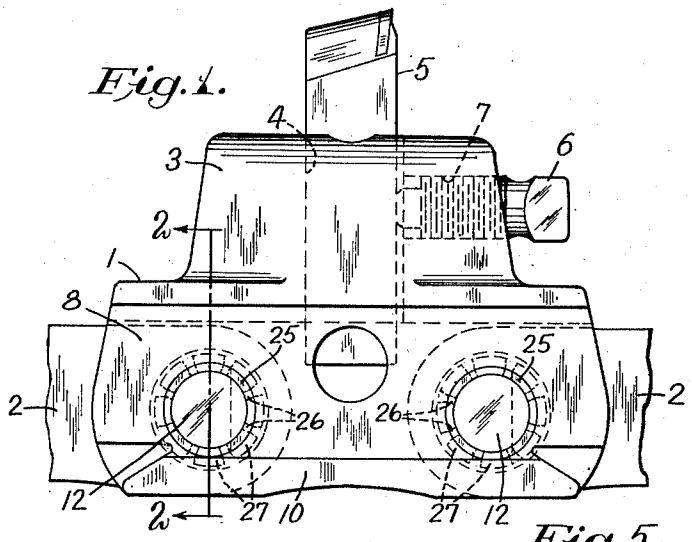


Fig. 5.

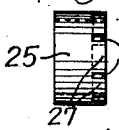


Fig. 6.

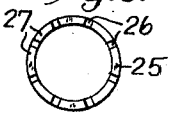


Fig. 2.

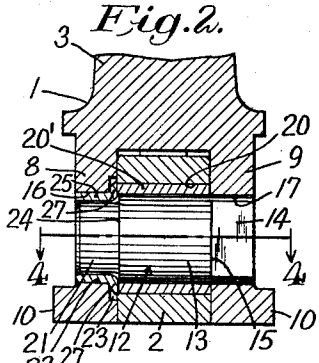


Fig. 3.

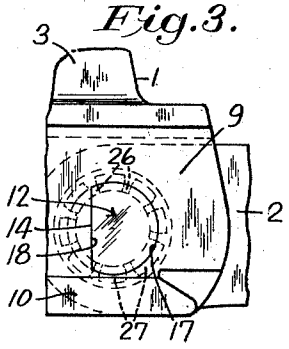


Fig. 4.

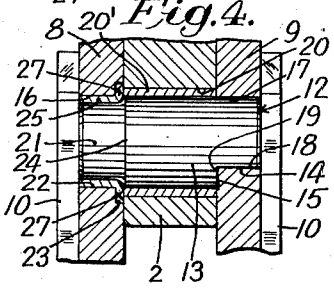


Fig. 7.

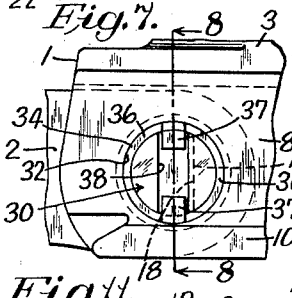


Fig. 8.

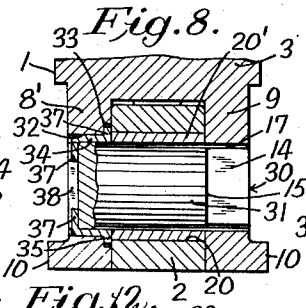


Fig. 9.

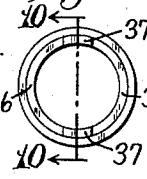


Fig. 10.

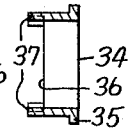


Fig. 11.

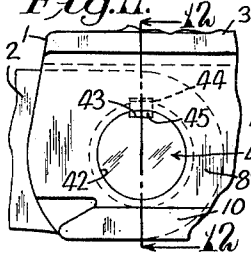


Fig. 12.

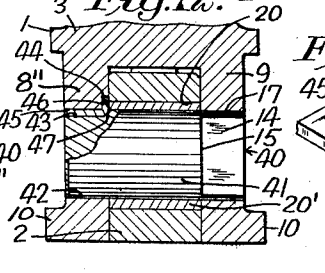
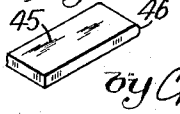


Fig. 13.



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Patented Dec. 30, 1952

2,623,398

UNITED STATES PATENT OFFICE

2,623,398

PIVOTED LINK CHAIN

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Application October 21, 1948, Serial No. 55,812

17 Claims. (Cl. 74—254)

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This invention relates to pivoted link chains and more particularly to improved locking means for securing the hinge pins or pintles against rotation and axial displacement with respect to the chain blocks of a pivoted link chain such as a mining machine cutter chain.

In pivoted link chains and particularly in mining machine cutter chains it is desirable to lock the hinge pins or pintles which pivotally connect the chain blocks and the strap links together, against rotation and axial displacement with respect to the chain blocks so that wear is concentrated on the relatively inexpensive strap links and wear bushings. While locking means for hinge pins or pintles for pivoted link chains are well known, the present invention contemplates improvements over such known locking means in that the hinge pins or pintles are not only effectively locked in position but also the locking means may be readily released. The locking means of the present invention is comparatively simple and rugged in design and includes replaceable parts which are comparatively inexpensive and readily obtainable. Special tools for assembling and dismantling the hinge pins or pintles with respect to the chain parts are unnecessary.

An object of the present invention is to provide an improved pivoted link chain. Another object is to provide an improved chain having improved locking means for the hinge pins or pintles between the pivotally connected chain links. Yet another object is to provide an improved hinge pin lock which may be readily placed in locking relation with the hinge pin and associated chain part and which may be readily released. A further object is to provide improved means for locking the hinge pins of a mining machine cutter chain to the chain blocks, to hold the hinge pins against rotation and axial displacement with respect to the blocks. Still another object is to provide improved hinge pin locking means embodying a locking element which is deformable when driven in locking position positively to lock the hinge pin in place. A still further object is to provide an improved lock for a hinge pin and embodying locking means respectively cooperating with opposed surfaces on the pin to hold the pin against axial displacement with respect to the associated chain part. Yet another object is to provide improved means for locking the hinge pin against rotation with respect to its associated chain link. A further object is to provide improved locking means for a hinge pin and including an outwardly facing

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surface on the pin for preventing axial displacement in one direction, and a deformable locking element engaging an opposed surface on the pin for preventing axial displacement thereof in the opposite direction. Still another object is to provide an improved deformable locking sleeve for securing a hinge pin against axial displacement in one direction with respect to its associated chain link. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings there are shown for purposes of illustration three forms which the invention may assume in practice.

In these drawings:

Fig. 1 is a fragmentary side elevational view of a pivoted link cutter chain with which one illustrative form of the invention is associated.

Fig. 2 is a detail cross sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary side elevational view looking toward the opposite side of the chain from that shown in Fig. 1.

Fig. 4 is a horizontal sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a side elevational view of the deformable locking sleeve.

Fig. 6 is an end view of the locking sleeve.

Fig. 7 is a fragmentary side elevational view of a cutter chain with which a modified form of the invention is associated.

Fig. 8 is a detail cross sectional view taken on line 8—8 of Fig. 7.

Fig. 9 is an end view of a modified form of a deformable locking sleeve which is used with the chain shown in Fig. 7.

Fig. 10 is a longitudinal section taken on line 10—10 of Fig. 9.

Fig. 11 is a fragmentary side elevational view of a cutter chain with which another illustrative form of the invention is associated.

Fig. 12 is a detail cross sectional view taken on line 12—12 of Fig. 11.

Fig. 13 is a perspective view of the deformable locking element used with the cutter chain shown in Fig. 11.

In the several illustrative embodiments of the invention the improved pin locking means is for purposes of illustration shown associated with a mining machine cutter chain including a chain block 1 pivotally connected to strap links 2. The chain block has a lateral lug 3 formed with a right angle socket 4 for receiving the shank of a conventional cutter bit 5. A set screw 6 threaded with an opening 7 in the front of the block lug

is engageable with the bit-shank to secure the bit firmly in cutting position on the chain block. The chain block has parallel side portions or side plates 8 and 9 at its base and these side portions are formed integral with the block-lug and have lateral gibs 10 adapted to run in the guideway of a conventional mining machine cutter bar. Evidently, the improved pin locking means may be associated with pivoted link chains of various other types.

In the embodiment shown in Figures 1 to 6 inclusive hinge pins or pintles 12 secured to the block are pivotally engaged by the strap links 2 which project between the side portions 8 and 9 of the block-base, as shown in Fig. 2. Each hinge pin has a cylindrical body 13 of uniform external dimensions and one end portion of the pin-body is cut away to provide a plane face 14 and an outwardly facing shoulder 15. The side portions 8 and 9 of the block-base have axially aligned openings 16 and 17 and the opening 16 is circular while the opening 17 is partially circular and is formed with a flat side 18. Upon assembly of the chain links the hinge pins are inserted endwise through the openings 16 to bring their cutaway portions within the openings 17 with the plane surfaces 14 on the pins abutting the flat sides 18 of the openings, as shown in Figs. 3 and 4, to hold the pins against rotation in the openings. When the hinge pins are so positioned the outwardly facing shoulders 15 abut at 19 the inner surface of the block-side-portion 9, as shown in Fig. 4, to prevent axial displacement of the hinge pins in one direction with respect to the chain block. The non-circular openings 17 may preferably be formed by broaching while the circular opening 16 may be drilled. The strap links 2 have circular openings 20 and wear bushings 20' are fitted therein and, when the parts are assembled relative to the links and block, as shown, the wear bushings engage the pin bodies intermediate the block-side-portions 8 and 9 with the walls of bushing-bores in pivotal contact with the exterior peripheries of the pin-bodies. The end portion 21 of each hinge pin opposite from the cutaway end portion is reduced in cylindrical cross section so that an annular space 22 is provided between the walls of the bore 16 and the exterior periphery of the reduced portion 21. The inner face of the base side portion 8 is annularly recessed at 23 and these annular recesses are concentric and communicate with the annular spaces 22. An outwardly facing shoulder 24 opposed to the shoulder 15 is formed at the juncture of the reduced portion 21 with the pin body 13. In this improved construction, a deformable locking sleeve 25 having uniform internal and external dimensions, has one end portion longitudinally slotted at 26 at equally spaced points to provide deformable fingerlike portions 27 between the slots. When the hinge pins have been properly assembled with respect to the chain block and strap links, these locking sleeves are inserted endwise in the annular spaces 22 and are moved inwardly axially of the pins to bring their slotted ends into contact with the outwardly facing shoulders 24 on the pins and, when so positioned, the sleeves may be suitably driven, as by hammering, inwardly to cause their fingerlike portions 27 to spread or bend outwardly to the position shown in Fig. 2, with the fingerlike portions received in the annular recesses 23, thereby positively to lock the hinge pins against axial displacement in the direction opposite from the direction of insertive movement of the pins with respect to the block and strap link openings. Thus the hinge pins are positively locked against rotation and axial displacement with respect to the chain block. When it is desired to remove the hinge pins from the chain parts they may be driven outwardly to the left as viewed in Figs. 2 and 4 causing the pin-shoulders 24 to shear off the deformed or bent fingerlike portions 27 of the sleeves. When the parts are again assembled new locking sleeves may be driven into position to lock the parts.

In the modified embodiment shown in Figs. 7 to 10, inclusive, a hinge pin 30 has a circular body 31 of uniform external diameter and the circular opening 32 in the side portion 8' of the chain block is of larger diameter than the diameter of the pin body. The right-hand end of the pin, as viewed in Fig. 8, and the opening 17 in the block-side-portion 9 are the same as those of the embodiment above described. An annular recess 33 is formed in the inner face of the block-side-portion 8' and is concentric and communicates with the opening 32. A locking sleeve 34 has an annular flange 35 at one end and the opposite end of the sleeve is arcuately cut away at 36 to provide deformable fingerlike portions 37. Prior to assembly of the chain parts the sleeve 34 is placed in the opening 32 from the inner side of the block-side-portion 8' with the flange 35 received in the annular recess 33 and the hinge pin is then inserted through the opening 32, the sleeve bore and the link bushing to bring its cutaway end portion within the opening 17 in the block side portion 9, as shown in Fig. 8. With the hinge pin so positioned the flat face 14 of the pin abuts the flat side wall 18 of the opening 17 to prevent rotation of the pin with respect to the block and with the shoulder 15 abutting the inner face of the block-side-portion 9 to prevent axial displacement of the pin with respect to the block in its direction of insertive movement. The fingerlike portions 37 of the sleeve are then deformed by bending to bring the same into a transverse slot 38 cut in the adjacent end of the pin thereby locking the pin against axial displacement in the opposite direction. Otherwise this embodiment is similar to that above described.

In the modified construction shown in Figs. 11, 12 and 13 a hinge pin 40 has a cylindrical body 41 of uniform external diameter and the side portion 8'' of the chain block has a circular opening 42 in which the pin body fits when the parts are assembled. The right-hand end of the pin as viewed in Fig. 12 and the opening 17 in the block-side-portion 9 are the same as those of the other embodiments. In this instance the pin is longitudinally slotted at 43 along its periphery and a lateral notch 44 in the inner face of the block-side-portion 8'' communicates with the bore 42. When the slot 43 and the notch 44 are in registry a flat key 45 having a rounded or beveled end 46 is inserted in the pin slot 43 within the bore 42 and is suitably driven inwardly to cause the curved end surface 47 of the pin slot to deflect or bend laterally its inner end portion to bring the latter into the notch 44 thereby positively to lock the pin against axial displacement in the direction opposite from its direction of insertive movement. When it is desired to remove the hinge pin the latter may be driven outwardly toward the left as viewed in Fig. 12 to cause the inner end of the pin slot to shear off the bent portion of the key. When it is again desired to reassemble

the parts a new locking key may readily and cheaply replace the one destroyed.

As a result of this invention improved locking means is provided for hinge pins or pintles of a pivoted link chain whereby the pins are rigidly locked against axial displacement and rotation with respect to the associated chain part. By the provision of the deformable locking element which is driven into place lengthwise of the hinge pin to effect bending of a portion thereof the hinge pin is firmly locked in place. The deformed or bent portions of the locking means may be readily sheared off by driving out the pins and the locking means may be easily placed in position upon assembly. The flattened and shouldered end portion of the pin serves positively to lock the pin against rotation and endwise displacement in one direction relative to the chain block, while the deformable locking element serves to lock the pin against axial displacement in the opposite direction, resulting in a structure which is extremely simple in design while adequately serving the intended purpose. The deformable locking means is not only simple and rugged in design but may also be readily and cheaply replaced. Special tools for assembling and dismantling the chain are unnecessary. Other advantages of the invention will be clearly apparent to those skilled in the art.

While there are in this application specifically described three forms which the invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be further 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 a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and locking means for said pin for holding the latter against axial displacement with respect to one of said associated links, said locking means including an outwardly facing surface on said pin, an inwardly facing surface on said one of said links, and a deformable locking element lying longitudinally against the outer surface of said pin outwardly of said pin-surface and engaging said one of said links, said locking element adapted to be driven from the exterior of the chain bodily lengthwise of said pin to bring its inner end inwardly against said pin-surface to cause the latter to deflect the inner end of said element laterally in a direction radially of said pin against said link surface.

2. In a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and means for securing said pin to one of said associated links including opposed outwardly facing surfaces on the end portions of said pin, one of said surfaces engaging an inwardly facing surface on said one of said links to prevent axial displacement of said pin in one direction, and a deformable locking element adapted to be driven lengthwise of said pin inwardly against said opposed pin surface to deflect the inner end of said locking element into engagement with an opposed inwardly facing surface on one of said links.

3. In a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and locking means for said pin for holding the latter against axial displacement with respect to one of said associated links, said locking means

including an outwardly facing surface on said pin, an inwardly facing surface on said one of said links, and a locking sleeve having a slotted end to provide deformable fingerlike portions, said sleeve being insertible over and fitting the exterior periphery of one end of said pin and adapted to be driven from the exterior of the chain bodily lengthwise of said pin inwardly against said pin-surface for deflecting said fingerlike portions laterally in directions radially of said pin to bring said portions against said link-surface.

4. In a pivoted chain, associated chain links, a hinge pin pivotally connecting said links, and means for securing said pin to one of said associated links including opposed outwardly facing surfaces at the ends of said pin, one of said surfaces engaging an inwardly facing surface on said one of said associated links to prevent axial displacement of said pin in one direction, and a locking sleeve having a slotted end to provide deformable fingerlike portions, said sleeve being insertable over an end of said pin and adapted to be driven lengthwise of said pin inwardly against said opposed pin-surface to deflect said fingerlike portions laterally into engagement with an opposed inwardly facing surface on said one of said associated links.

5. In a pivoted link chain, associated chain links, a pivot pin pivotally connecting said links, and means for locking said pin against axial displacement with respect to one of said associated links including a longitudinal slot on the pin periphery at one end of said pin, a registering notch in said one of said associated links, and a deformable locking key adapted to be driven into said slot lengthwise of said pin inwardly against the inner end wall of said slot to cause lateral bending of the inner portion of said key into said notch.

6. In a pivoted link chain, chain links, a hinge pin pivotally connecting said links, and means for locking said pin against axial displacement with respect to one of said links including an opening in said one of said links of larger diameter than the pin body, and a deformable locking sleeve having an inner flange engaging an inwardly facing surface on said one of said links and having fingerlike outer portions adapted to be bent down against the outer end of said pin.

7. In a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and means for locking said pin against axial displacement with respect to one of said associated links including an opening in said one of said associated links of larger diameter than the pin body, and a deformable locking sleeve having an inner flange engaging an inwardly facing surface on said one of said associated links and having fingerlike outer portions adapted to be bent down against the outer end of said pin, said pin-end having a transverse grooove for receiving said bent fingerlike portions.

8. In a pivoted link chain, a chain block having opposed inwardly facing surfaces, a strap link, said block and link having axially alined openings, a hinge pin received in said openings for pivotally connecting said block and link together, said pin having an outwardly facing surface in adjacency to one of said block surfaces, and means for locking said pin against rotation and axial displacement in either direction with respect to said block, said locking means including a deformable locking element lying longitudinally against the outer peripheral surface of said

pin and engaging said block for locking said pin against axial displacement in one direction, said deformable locking element adapted to be driven inwardly from the exterior of the chain bodily lengthwise of said pin against said pin-surface to effect lateral bending of its inner portion, and when in locking position, having its laterally bent portion engaging said adjacent one of said inwardly facing block surfaces, and an opposite surface on said pin engaging the adjacent opposite block surface for locking said pin against axial displacement in the opposite direction.

9. In a pivoted link chain, associated chain links pivotally connected by a hinge pin, said links having axially aligned openings receiving said pin, said pin having oppositely facing surfaces, one pin-surface engaging an inwardly facing surface on one of said links to prevent axial displacement of said pin in one direction, and a deformable locking element engaging said pin and said one of said links and deformable into engagement with said opposed pin surface and an inwardly facing surface on said one of said links opposed to said first link surface to prevent axial displacement of said pin in the opposite direction.

10. In a pivoted link chain, associated chain links pivotally connected by a hinge pin, said links having axially aligned openings receiving said pin, said pin having oppositely facing surfaces, one pin surface engaging an inwardly facing surface on one of said links to prevent axial displacement of said pin in one direction, a deformable locking element engaging said pin and said one of said links and deformable into engagement with said opposed pin-surface and an inwardly facing surface on said one of said links opposed to said first link surface to prevent axial displacement of said pin in the opposite direction, and coacting means on said pin and said one of said links for preventing rotation of said pin in said opening with respect to said one of said links.

11. In a pivoted link chain, a chain block having parallel side portions at the base thereof, a strap link extending between said block-side-portions, said side-portions and said strap link having axially aligned openings, a hinge pin received in said openings, said pin having oppositely facing surfaces, one pin surface engaging an inner surface of one of said side portions to prevent axial displacement of said pin in one direction, and a deformable locking element engaging said opposed pin-surface and deformable into engagement with an inwardly facing surface on said other side portion to prevent axial displacement of said pin in the opposite direction.

12. In a pivoted link chain, a chain block having parallel side portions formed with axially aligned openings, the opening in one side portion being circular and the opening in said other side portion being partially circular and having a flat side, a hinge pin, with which a strap link disposed between said side portions is adapted pivotally to engage, having a cylindrical body, said body being cut away at one end of said pin to provide a flattened side engaging said flat side of said opening for preventing rotation of said pin relative to said block, said cut away end of said pin also providing an outwardly facing shoulder engaging the inner side surface of said other block-side-portion to prevent axial displacement of said pin in one direction, said pin having an outwardly facing surface opposed to said shoulder, and a deformable locking element adapted to be driven axially of said pin into engagement with said opposed pin surface to cause lateral bending of its inner portion into engagement with an inwardly facing surface on said one side portion of said block to prevent axial displacement of said pin in the opposite direction.

13. In a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and locking means for said pin for holding the latter against axial displacement with respect to one of said associated links, said one of said links having side portions provided with aligned transverse bores for receiving said pin, said locking means including an outwardly facing surface on said pin provided by a reduced end portion of said pin, an inwardly facing surface on said one of said links and lying in adjacency to said pin surface, and a locking sleeve having a slotted inner end providing deformable fingerlike portions, said sleeve fitting the bore in one of said link portions and surrounding the reduced end of said pin, said sleeve when positioned, adapted to be driven lengthwise of said pin in said bore to bring its inner end against said pin-surface to cause the latter to deflect said fingerlike portions laterally against said link surface.

14. In a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and locking means for said pin for holding the latter against axial displacement with respect to one of said associated links, said locking means including an outwardly facing surface on said pin, an inwardly facing surface on said one of said links, and a straight locking element of uniform cross section lying longitudinally against the outer surface of said pin and engaging said one of said links, said locking element being deformable and adapted to be driven bodily inwardly lengthwise of said pin against said pin surface to cause the latter to bend a portion of said element laterally into engagement with said link surface.

15. In a pivoted link chain, associated chain links, a hinge pin pivotally connecting said links, and means for securing said pin to one of said associated links to prevent endwise displacement of the pin including opposed oppositely facing surfaces on said pin and said one of said links, and a deformable locking element insertable in position from the outer side of the chain after said links and pin are assembled and adapted to be driven inwardly to deform solely by bending an inner end portion tto bring surfaces on said element into tight abutting engagement with said opposed surfaces on said pin and said one of said links.

16. In a pivoted link chain, a chain block, a strap link, said block and said link having axially alined openings, a hinge pin received in said openings for pivotally connecting said block and link together, said pin having an outwardly facing surface, a deformable locking element lying longitudinally against the outer peripheral surface of said pin and extending within the block opening in engagement with an inwardly facing surface on said block for locking said pin against axial displacement in one direction, said locking element having an end portion deformable by bending from the exterior of the chain block into lateral engagement with said outwardly facing pin surface, and said pin having an opposed outwardly facing surface engaging an opposed inwardly facing surface on said block for locking said pin against axial displacement in the opposite direction.

17. In a pivoted link chain, associated chain

links providing a pair of side link portions and an intermediate link portion, a hinge pin pivotally connecting said intermediate portion with said portions, and means for locking said pin against axial removal from said portions including oppositely facing surfaces on said hinge pin, one pin-surface engaging an inwardly facing surface on one of said side link portions to prevent axial displacement of said pin in one direction, and a deformable locking element engaging said pin and the other of said side link portions and deformable into engagement with said opposed pin surface and an inwardly facing surface on said other of said side link portions opposed to said first link-portion-surface to prevent axial displacement of said pin in the opposite direction.

ARTHUR LEE BARRETT.

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