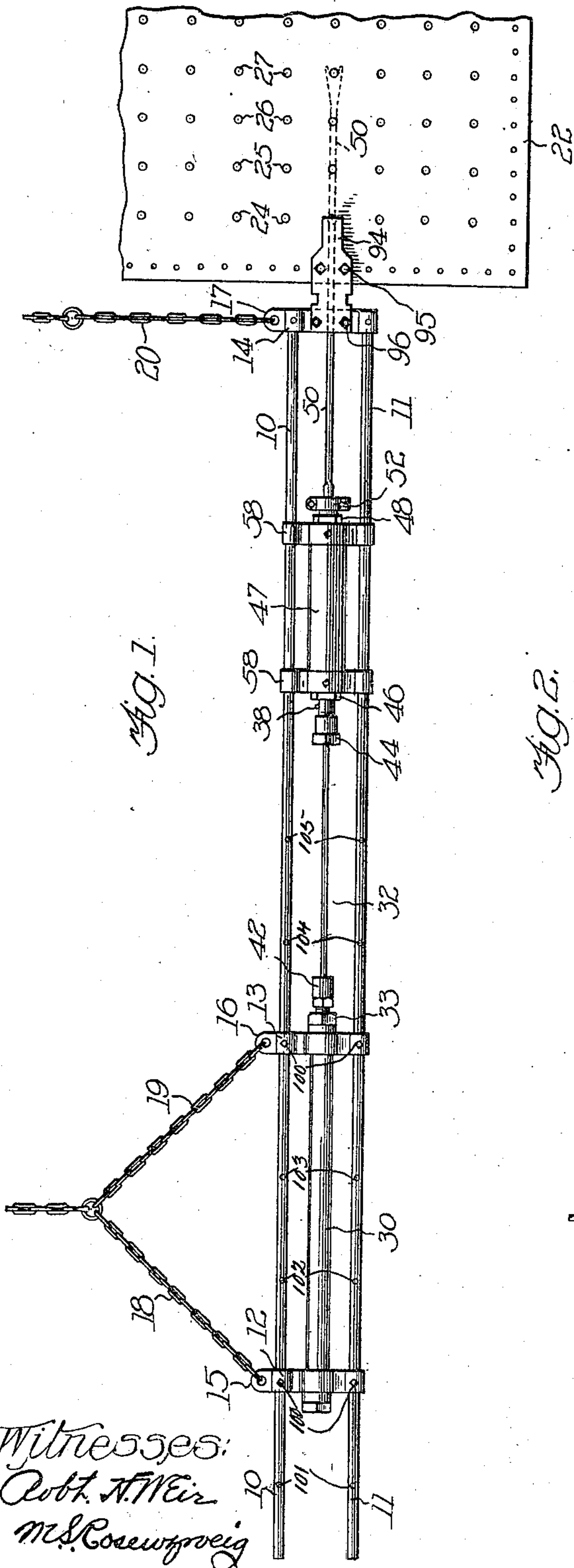


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STAY BOLT BREAKER.
APPLICATION FILED NOV. 1, 1909.

964,129.

Patented July 12, 1910.

28 SHEETS—SHEET 1.

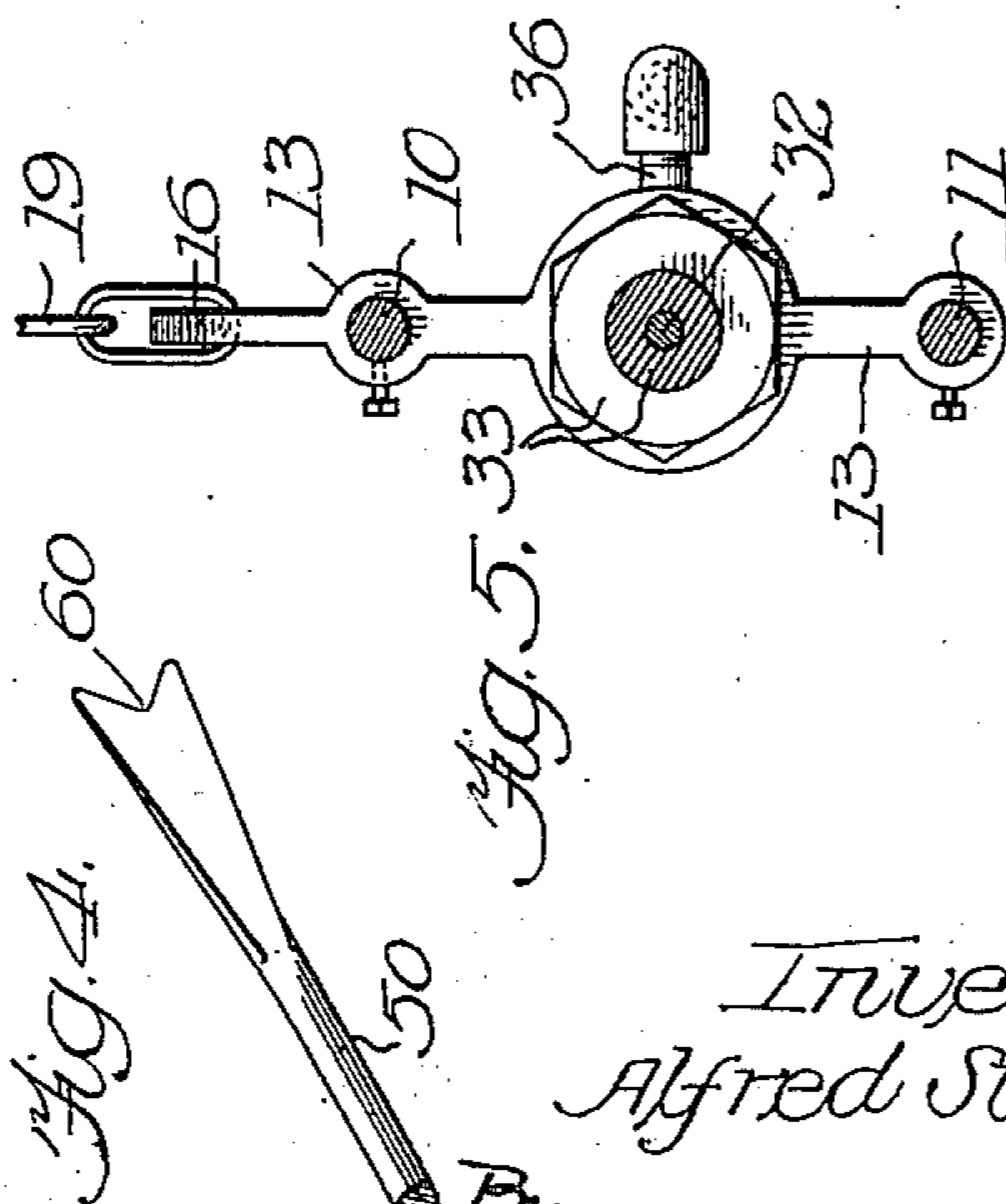
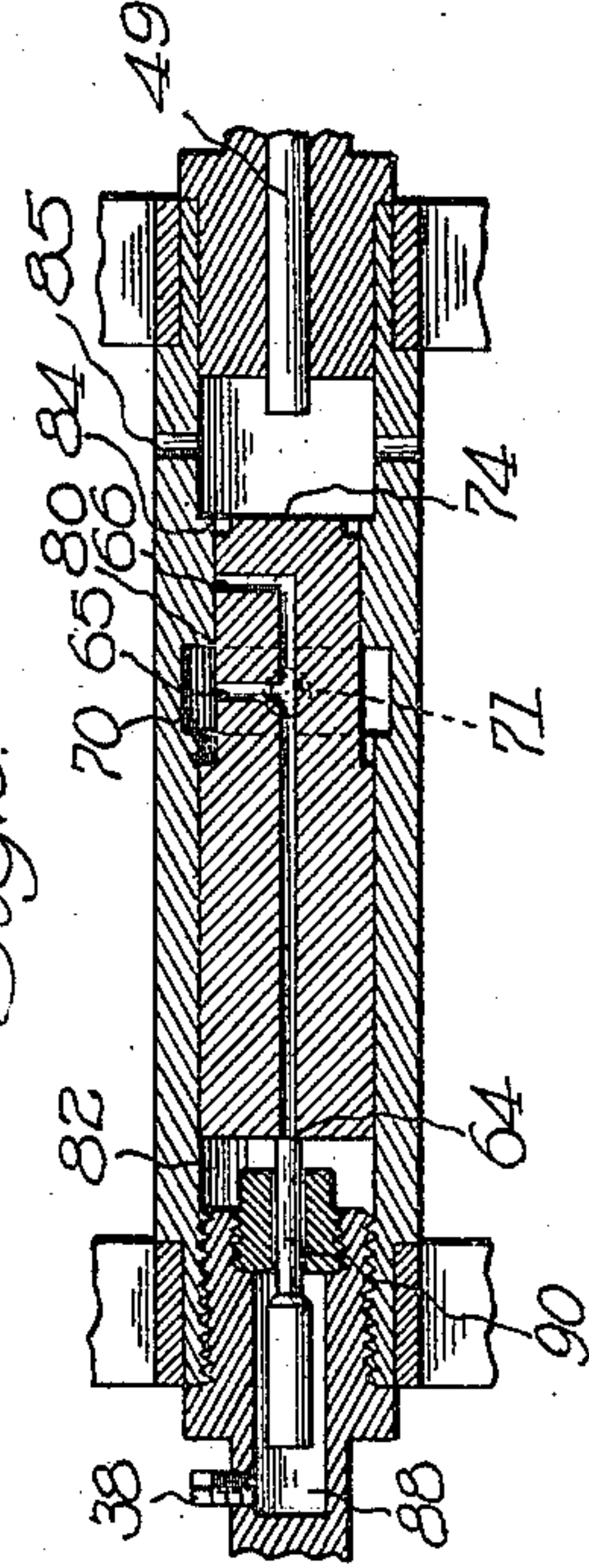
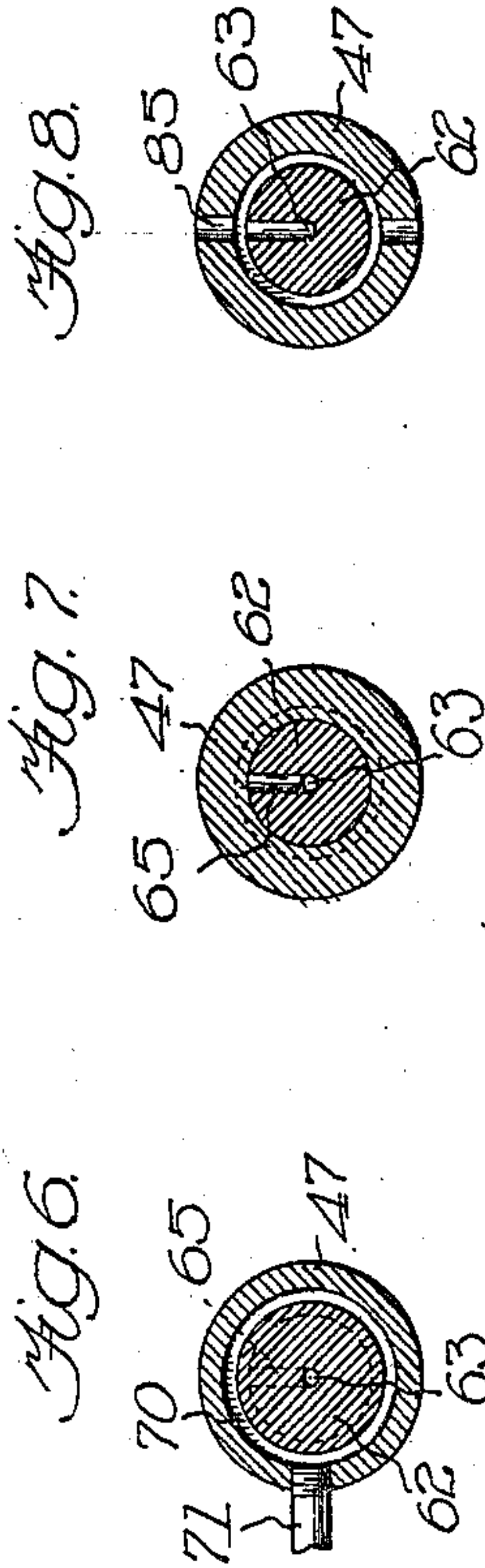
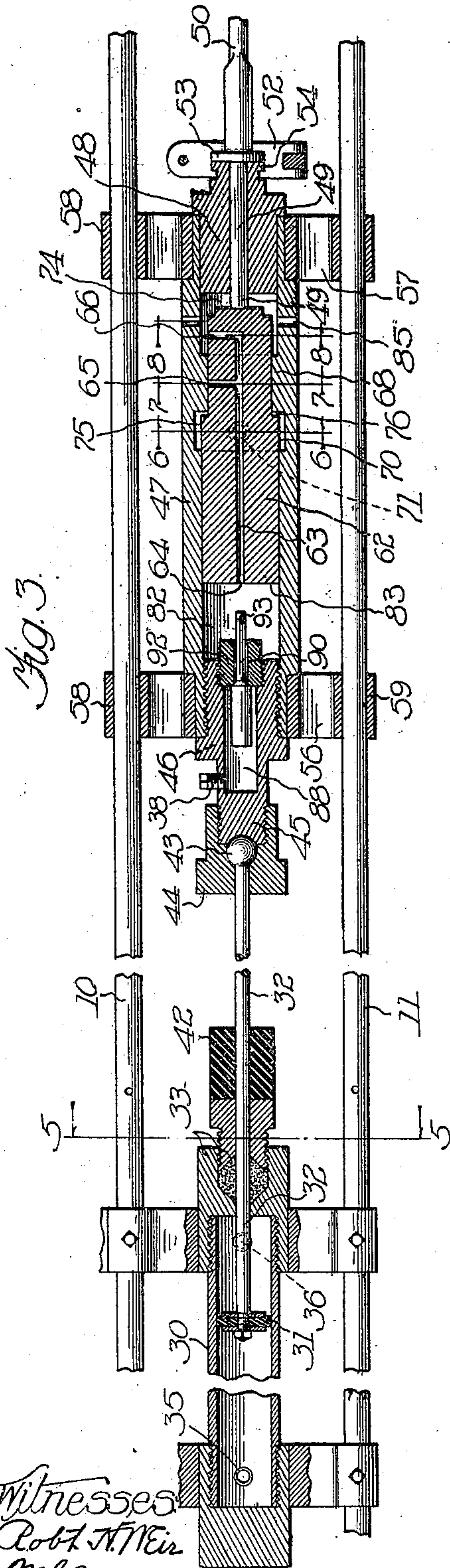


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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

ALFRED STERNER, OF CHICAGO, ILLINOIS.

STAY-BOLT BREAKER.

964,129.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed November 1, 1909. Serial No. 525,775.

To all whom it may concern:

Be it known that I, ALFRED STERNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Stay-Bolt Breakers, of which the following is a specification.

In locomotive boilers the interior wall adjacent to the fire box is attached to the outer wall by metallic stay-bolts which it is necessary to remove whenever replacement of the interior wall, which wears much more rapidly than the exterior wall, is necessary.

This invention consists in a machine capable of being mounted at one end of the boiler for the purpose of successively cutting away or breaking all the stay-bolts which are in the path of the device.

The object of this invention is to provide such a device which can be readily mounted in position ready to cut or break stay-bolts; which will perform its work easily and efficiently with a great saving of labor and which is not liable to get out of order under the different conditions of service.

The invention consists in the whole device, capable of carrying out the foregoing objects, to be hereafter described and claimed.

Referring to the drawings, Figure 1 is a side elevation of the preferred form of the device of this invention in working position adjacent to a boiler whose stay-bolts are to be broken or cut. Fig. 2 is a plan view of the parts illustrated in Fig. 1. Fig. 3 is a vertical central sectional detail view through the principal parts illustrated in Fig. 1. Fig. 4 is a perspective detail view of the cutting tool. Fig. 5 is a sectional detail view on the line 5—5, Fig. 3. Figs. 6, 7 and 8 are sectional detail views on the lines bearing corresponding numerals in Fig. 3. Fig. 9 is a vertical sectional view through the hammer corresponding to the right hand portion of Fig. 3, showing the hammer, piston and valves in a different position.

As shown in Fig. 1, two parallel guiding track members 10 and 11, preferably made of good size piping or the like, are connected together by suitable spacing members

12, 13 and 14, the upper ends of the spacing members being provided with loops 15, 16 and 17 to which suspending chains 18, 19 and 20 are attached for the purpose of holding the device, as shown in Figs. 1 and 2, in front of the boiler, consisting of an outer plate 22, and an inner plate 23 connected together by a plurality of vertical rows of rivets or stay-bolts, 24, 25, 26, 27, etc.

Rigidly attached to or mounted at the rear of track members 10 in the spacing members 12 and 13 by any suitable device is a hollow driving cylinder 30 within which is slidably mounted a piston 31, whose piston rod 32 passes through a stuffing-box device 33 of ordinary construction toward the forward or working end of the machine. At opposite ends of this cylinder 30 are ports or passageways 35 and 36 at opposite ends of air pipe 37, in turn connected to a supply pipe in which is a three-way valve 39, of ordinary construction operated by a handle 40 or other suitable device, adapted to be operated so that, by rotating this handle 40 through one hundred and eighty degrees, compressed air, provided by any suitable source of supply, not shown, may be admitted from the valve to either end of the cylinder 30, as desired, or may be shut off entirely.

At the end of the stuffing-box 33 heretofore described is a cushioning device, in the particular case here illustrated a large piece of rubber 42. At the forward end of the piston rod 32 is a ball 43 forming a part of a ball and socket joint within the cap 44 screw threaded upon the end portion 45 of cylinder head 46 to be hereafter described. This ball and socket joint serves to allow the parts connected to the driving cylinder to drive the stay-bolt breaking tool forward without undue strain, should some deviation from alinement of the parts occur. At the forward end of the device is a cylinder 47 which will for convenience be called the hammer-cylinder, having at one end the removable cylinder head 46 heretofore referred to and at the opposite end a cylinder head or end 48 which may be made integral with the walls of the cylinder, if desired.

Through this cylinder end 48 the extreme end portion 49 of the tool shank or rod 50 passes, and is held in position by any suitable clamping device such as 52 embracing a flange 53 upon the tool shaft and a flange 54 upon the cylinder end. These parts may be made in one piece if desired. This hammer cylinder 47 and attached parts just described is suspended or slung upon the rods 10 and 11 by means of supporting members 56 and 57 slidably mounted in bearing members 58 and 59 upon the respective rods 10 and 11. At the outer end of the member 50 heretofore described is a cutting or breaking tool or hammer 60, best seen in Fig. 4, of such a length that it can engage and cut successively horizontal rows of rivets 24, 25, 26, 27, etc.

From the foregoing it will readily be seen that by admitting air through the valve 39 to the left hand side of piston 31, as viewed in Fig. 3, the piston will be moved to the right in Fig. 3 with the result that the forward or hammer cylinder 47 and attached parts will slide in bearings 58 and 59 to the right along the rods 10 and 11 and that by reversing the position of handle 40 and admitting air to the right hand side of piston 31 the parts will be moved in a reverse direction and that if this motion takes place too quickly the cylinder 47 is cushioned by rubber block 42 when member 44 strikes it. In other words, by means of valve 39 the operator can force the tool 60 to move in either direction, as desired, transversely to the rows of rivets or stay-bolts in the boiler.

As mere moving the tool 60 along the rows of rivets under direct pressure of the cylinder 31 is not sufficient to sever the stay-bolts a pneumatic hammer device is provided within the cylinder 47 for operating this tool 60 like an ordinary pneumatic hammer tool so as to cut the staybolts. This pneumatic hammer device consists in placing within the cylinder 47 a piston 62 provided with a central passageway 63 having a central port opening 64 and side port openings 65 and 66. On the interior of the cylinder and projecting into it is an annular band of metal 68 of exactly the same width as the distance between the centers of the ports 65 and 66. Immediately adjacent to this ring 68, which is, as stated, of less diameter than the bore of the cylinder, is an annular recess 70 of greater diameter than that of the cylinder so that, as shown, there is always an air space in said recess surrounding the cylinder. This recess 70 is entered by a port or passageway 71 to which a hand valve 72 connected at its opposite end to a pipe 73 leading to any suitable source of compressed air supply is attached. The piston 62 is of such a length that, as shown in Fig. 3, its forward end 74

strikes against the rear end of the tool member 49. When the parts are in this position a shoulder 75 on the cylinder is at such a distance from the rear wall of ring 68 that a space is formed between the shoulder 75 and ring 68 and in communication with recess 70. The result of this construction is that when the parts are in the position of Fig. 3 and air is admitted from the valve 72 to space 70 the compressed air has a chance to engage the vertical front face of shoulder 75 and thus drive the piston 62 from the position of Fig. 3 to that of Fig. 9. As the parts approach this latter position, that is to say, as the port 65 passes the corner 80 of ring 68 it comes in communication with the air in space 70 with the result that said air passes through passageway 65 and passageway 63 out of port 64 into the space 82 at the rear of the cylinder in which it engages the rear end 83 of the cylinder and starts to drive it forward or toward the position of that in Fig. 3. As this motion takes place and the port 65 passes the corner 80 heretofore referred to, the air in space 82 acts by expansion in the ordinary manner and continues to drive the piston to the position of Fig. 3. As it reaches this position it strikes a hard blow against the end of tool rod 49 which blow is communicated to the cutting edge 60 in contact with the stay-bolts. As it approaches this last named position of Fig. 3 the port or passage 66 passes the corner 84 of ring 68 and comes into communication with exhaust port 85 so that the air, which has been doing the work described, in space 82 passes through passageway 63 and port 66 out of port 85 and has entirely dissipated its energy before the piston reaches the position of Fig. 3, in which position air entering space 70 is ready to repeat the operation. While there has been air in annular space 70 during the operation of this forward stroke of the piston the effective area of the shoulder 75 is so much less than that of the rear end 83 of the piston that the presence of this air has had a negligible effect upon the piston and this condition exists until the air in space 82 is exhausted through the port 85 sufficiently so that the pressure on shoulder 75 becomes great enough to start the piston to the left in Fig. 3, as desired.

The hammer just described is automatically oiled by means of an oil receptacle 88 formed within cylinder head 46 provided with an opening 89 through which oil may be placed within said receptacle and with a discharge valve 90 mounted in stuffing-box 92, the end of said valve being engaged by the end 83 of the piston 62 at each stroke of the piston to drive it to the left, sufficiently to permit a small quantity of oil to pass

from the recess or receptacle 88 into the space 82 of the cylinder where it comes in contact with and oils the piston 82. This valve is kept in its proper position at all times by the action of the air within the device.

In order that the machine described may be held in engagement with the work a detachable connecting plate or member 94 is provided, the same being attached to the boiler by bolts 95 and to connecting member 14 by bolts 96.

In the claims the word "breaking" will unless otherwise specified be used to include cutting or otherwise rendering the stay-bolts in removable condition.

In the complete operation of the device the workman mounts the mechanism in front of the row of stay-bolts to be cut, but with the cylinder 47 in such a position that piston 31 is at the extreme left hand end of its stroke, with the parts 42 and 44 in substantial contact with each other and the tool 60 in engagement with one bolt in the first row of stay-bolts 24 which is to be cut. The operator now admits air both to the port 35 of cylinder 30 and through the valve 72. The pressure of air in the cylinder 30 holds the tool 60 in contact with this first stay-bolt which is to be cut, while the cutting operation takes place by the hammering of the tool 60 in the manner described. As soon as the first stay-bolt is cut through, the pressure of air in cylinder 30 causes the cylinder 47 and all attached parts to move to the right until the tool 60 comes in contact with the next bolt in the next vertical row of stay-bolts 25 and the operation is repeated until the device reaches the position actually shown in Fig. 1 in which the tool 60 is just ready to cut the last bolt 27. When this has been done the operator reverses valve 39 so that air is admitted to the opposite side of the cylinder 31 and thereby forcibly pulls tool 60 out of contact with and clear of the stay-bolts previously cut. The operator now removes bolts 95 and by adjusting the chains 18, 19 and 20 upward or downward by any well known mechanism, not shown, brings the tool 60 in contact with the next horizontal row of stay-bolts above or below that one previously cut or broken; the bolts 95 are again inserted and the operation is repeated.

The straps 12 and 13 heretofore referred to are adjustable along the rods 10 and 11 by selectively inserting the bolts or pins 100 which secure them to rods 10 and 11 in other holes 101, 102, 103, 104, 105, provided for the purpose in said rods 10 and 11, as shown. By making this adjustment the length of cutting tool 50 may be varied as necessary. It should be noted that, as clearly shown in Fig. 2, the shaft of cutting tool 50 passes

through a hole 106 in spacing member 14, the shaft 50 being thus guided and supported against excessive side play by the edges of this hole.

The claims are:—

1. In a device of the class described, the combination of two parallel track members, means for supporting said track members in substantial alinement with a row of stay bolts to be broken, means for rigidly securing one end of the track in said position, a cylinder secured to said track members at a distance from the bolts to be broken, a piston in said cylinder provided with a piston rod extending in the direction of the bolts to be broken, means for admitting gas to either side of said cylinder so as to selectively force the piston in either direction, a second cylinder slidably mounted on said track members between the first cylinder and the bolts to be broken rigidly connected to the outer end of said piston rod, a pneumatic hammer device in said second cylinder and a cutting tool, operated by said hammer device, projecting from the second cylinder into engagement with the stay bolts to be cut for the purposes set forth.

2. In a device of the class described, the combination of two parallel track members, means for supporting said track members in substantial alinement with a row of stay bolts to be broken, means for rigidly securing one end of the track in said position, a cylinder detachably secured to said track members at a selected distance from the bolts to be broken, a piston in said cylinder provided with a piston rod extending in the direction of the bolts to be broken, means for admitting gas to either side of said cylinder so as to selectively force the piston in either direction, a second cylinder slidably mounted on said track members between the first cylinder and the bolts to be broken rigidly connected to the outer end of said piston rod, a pneumatic hammer device in said second cylinder and a cutting tool, operated by said hammer device, projecting from the second cylinder into engagement with the stay bolts to be cut for the purposes set forth.

3. In a device of the class described, the combination of two parallel track members, means for supporting said track members in substantial alinement with a row of stay bolts to be broken, means for rigidly securing one end of the track in said position, a cylinder secured to said track members at a distance from the bolts to be broken, a piston in said cylinder provided with a piston rod extending in the direction of the bolts to be broken, means for admitting gas to either side of said cylinder so as to selectively force the piston in either direction, a second cylinder slidably mounted on said track members between the first cylinder and

the bolts to be broken rigidly connected to the outer end of said piston rod, a pneumatic hammer device in said second cylinder and a cutting tool, operated by said hammer device, projecting from the second cylinder into engagement with the stay bolts to be cut, said cutting tool being guided against sidewise movement at a point between its ends and adjacent to the ends of the track

which are adjacent to the staybolts to be broken, for the purposes set forth. 10

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

ALFRED STERNER.

Witnesses:

DWIGHT B. CHEEVER,
MARGARET D. ROBB.