May 30, 1950 J. E. MURPHY 2,509,516

FOOT CONTROL VALVE SPRING LIFTER

Filed March 4, 1949 2 Sheets-Sheet 1

Fig. 1.

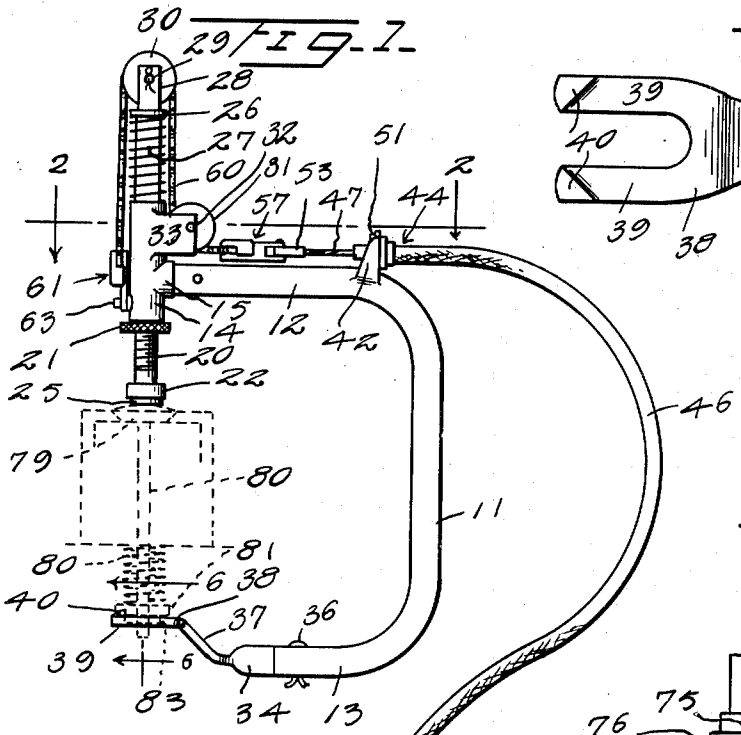


Fig. 3.

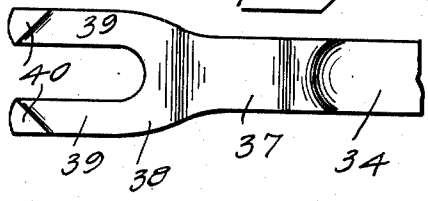


Fig. 5.

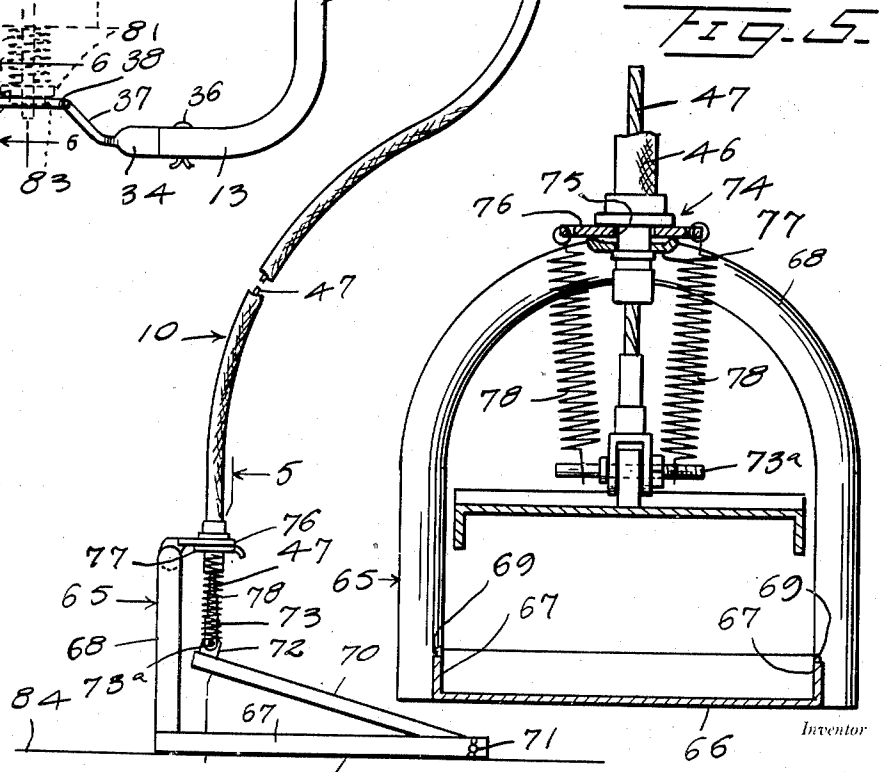
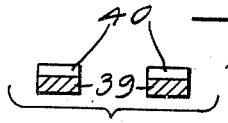


Fig. 6.



Inventor

Joseph E. Murphy

By John N. Randolph

Attorney

May 30, 1950 J. E. MURPHY 2,509,516

FOOT CONTROL VALVE SPRING LIFTER

Filed March 4, 1949 2 Sheets-Sheet 2

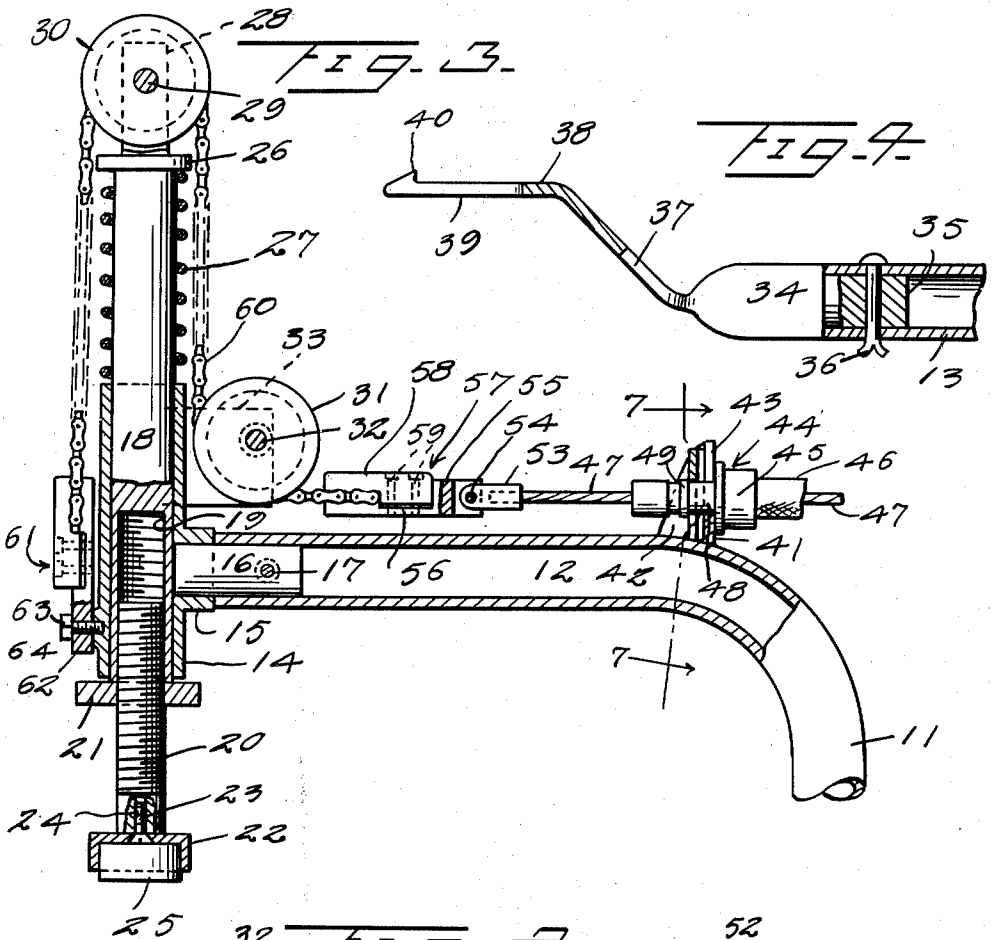


Fig. 3.

Fig. 4.

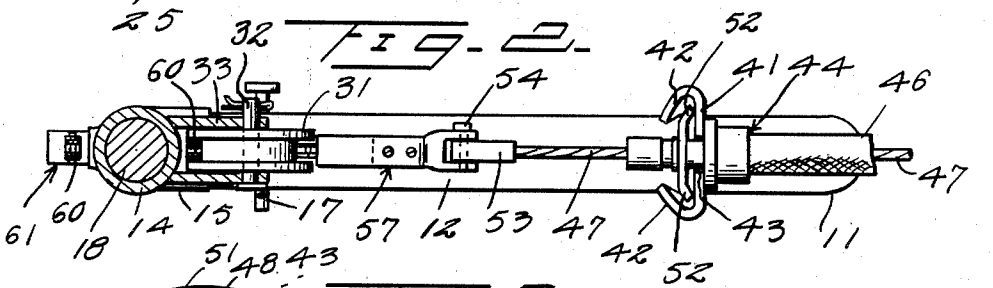


Fig. 2.

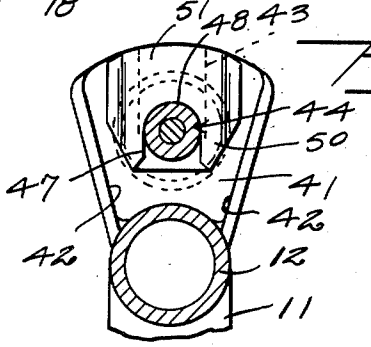


Fig. 7.

Inventor

Joseph E. Murphy

By John N. Randolph

Attorney

Patented May 30, 1950 2,509,516

UNITED STATES PATENT OFFICE

2,509,516

FOOT CONTROL VALVE SPRING LIFTER

Joseph E. Murphy, Cleveland, Ohio

Application March 4, 1949, Serial No. 79,621

7 Claims. (Cl. 29—215)

1

This invention relates to an improved construction of valve spring lifter or compressor and more particularly to a foot control device for holding the valve spring of an intake or exhaust valve of an internal combustion engine in a raised or compressed position so that the valve spring retainer or pin can be applied to or removed from the valve stem.

More particularly, it is an object of the present invention to provide an apparatus of the aforedescribed character of mechanical construction and foot actuated so that both hands of the operator will be free for use in applying or removing the valve spring retainer or pin and wherein the operator may utilize the sense of feel or touch in determining the amount of foot pressure required to retain the valve spring in a raised or compressed position.

Still a further object of the invention is to provide a valve spring lifter or compressor of extremely simple construction which may be economically manufactured and sold and which will be extremely durable and efficient for accomplishing its intended result.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view showing the valve spring lifter or compressor in an applied position;

Figure 2 is an enlarged horizontal sectional view thereof taken substantially along a plane as indicated by the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary vertical sectional view, partly in side elevation, of a portion of the device;

Figure 4 is a similar view of another portion thereof;

Figure 5 is an enlarged vertical sectional view taken substantially along a plane as indicated by the line 5—5 of Figure 1;

Figure 6 is an enlarged cross sectional view of a portion of the apparatus, taken substantially along a plane as indicated by the line 6—6 of Figure 1;

Figure 7 is an enlarged cross sectional view taken substantially along a plane as indicated by the line 7—7 of Figure 3, and

Figure 8 is a top plan view of a portion of the lower part of the yoke of the apparatus.

Referring more specifically to the drawings, the foot control valve spring lifter or compressor in its entirety is designated generally 10 and includes a substantially yoke-shaped handle 11 which is preferably tubular throughout its length and rigid and which includes substantially parallel upper and lower end portions 12 and 13, respectively. A sleeve 14 is provided intermediate of its ends with a transversely disposed boss 15, as best seen in Figure 3, in which is secured one end of a rod 16 the other end of which projects outwardly therefrom and is sized to fit relatively snug in the open end of the upper yoke portion 12 and which is secured fixedly thereto by a pin or the like 17 which extends diametrically through said portion 12 and through the rod 16 and fixedly mounts the sleeve 14 on the end of the yoke portion 12 and perpendicular to the axis thereof.

2

A plunger rod 18 extends reciprocally through the sleeve 14 and is provided with an internally threaded socket 19 which opens outwardly of the lower end thereof for adjustably receiving the threaded extension or rod 20, the lower end of which projects downwardly from said socket 19. The extension or rod 20 is provided with a lock nut 21 which is adjustable on the threaded portion thereof and adapted to bear against the lower end of the rod 18 to retain the extension 20 in a plurality of extended positions with respect thereto. A downwardly opening socket member 22 is secured to the lower, free end of the extension or rod 20 preferably by a screw fastening 23 which extends through the bed thereof and into a restricted threaded recess 24 of the rod 20. The socket 22 may, if desired, be supported by the fastening 23 for swivel movement relatively to the extension 20 and has a valve engaging member 25 suitably secured therein and which projects from the open lower end thereof. The valve engaging member or block 25 is preferably formed of a non-metallic material such as rubber which will not damage or slip when in engagement with a valve, as will hereinafter be described.

The plunger rod 18 extends normally to substantially above the guide sleeve 14 and is provided at its upper end with a collar 26 forming a seat for one end of an expansion coil spring 27, the opposite end of which seats on the upper end of the sleeve 14 and which is disposed around the upper portion of the plunger rod 18. The collar 26 is provided with upwardly extending spaced arms 28 through which extends a pin 29 on which is journaled a grooved pulley 30 which is rotatably disposed between said arms 28. A similar grooved pulley 31 is journaled on a pin 32 which is supported by a pair of arms 33 which project laterally from the upper portion of the sleeve 14 and which are disposed directly over a part of the upper yoke portion 12, as best illustrated in Figure 2, and said pulley 31 is rotatably disposed between said arms 33.

A relatively short rod 34, as best seen in Figures 1 and 4, has one end thereof abutting against the open end of the lower yoke portion 13 and is provided at said end with a restricted shank 35 which fits snugly into the open end of

the lower yoke portion 13 and is fixedly secured thereto by a headed pin or fastening 35 which extends transversely through the parts 13 and 35, as best seen in Figure 4. A bar 37 is fixed to and projects from the other end of the rod 34 and includes an inner portion which is inclined upwardly and outwardly from said rod 34 and a bifurcated free end portion 38 which is upwardly offset with respect to the axis of the parts 13 and 34 and the plane of which is disposed substantially parallel to the plane of said parts 13 and 34. The furcations 39 of the bifurcated portion 38 are each provided at its free end with an upwardly extending portion forming a stop 40 for a purpose which will hereinafter become apparent and which is best illustrated in Figures 4, 6 and 8.

The upper yoke portion 12, adjacent its inner end is provided with an upstanding transversely disposed ear 41 which preferably forms an integral part of the yoke 11 and which is preferably provided with reinforcing side flanges 42, as best seen in Figures 2, 3 and 7. The ear 41 is provided with an upwardly opening slot or notch 43 to receive the restricted intermediate portion of a clamp and guide, designated generally 44, which has an enlarged end 45 in which is secured one end of a semi-flexible tubular cable 46 which is preferably formed of steel and through which a smaller steel cable 47, possessing a greater degree of flexibility, reciprocally extends. A portion of the cable 47 projects from the end of the cable 46 and said end of the flexible member 47 extends reciprocally through the guide 44. The clamp and guide 44 includes an intermediate portion 48 which engages in the slot 43 and with the enlarged flanged end 45 of the clamp and guide 44 disposed against the outer side of the ear 41. The clamp and guide 44 is provided with an enlargement or collar 49 defining the opposite end of the restricted portion 48 and which is engaged detachably by the bifurcated end 50 of a clamping plate 51, as best seen in Figure 7, the slot of the bifurcated portion 50 of which is sized to fit over the restricted guide portion 48. The clamping plate 51 is provided with inturned side edge portions 52 which yieldably bear against the opposite, inner side of the ear 41, as best seen in Figure 2, for yieldably clamping the clamp and guide 44 to the ear 41.

Said end of the flexible member 47, beyond the clamp and guide 44, is suitably secured in a socket member 53 through an end of which extends a pin 54 which engages the legs of a bifurcated end 55 of a clamp section 56 forming a part of the clamp, designated generally 57, and also including a detachable section 58 which is attached to the section 56 by fastenings 59. The clamp sections 56 and 58 are provided with complementary portions for engaging and clamping one end of a chain or other flexible member 60 which extends from the clamp 57 around the under side of the pulley 31 thence upwardly and over the pulley 30. The opposite, depending end of the chain 60 is similarly secured in a clamp 61 which differs only from the clamp 57 in that one section thereof in lieu of being provided with the bifurcated end 55 has an aperture 62 for receiving a screw fastening 63 which engages a threaded opening of a boss 64 formed on the sleeve 14 adjacent the lower end thereof and on the side thereof opposite to the boss 15, so that the last mentioned end of the chain 60 is held stationary or anchored to the sleeve 14.

A treadle or pedal unit 65, as seen in Figures 1 and 5, includes a plate 66 which is adapted to rest on the floor or other surface and which is provided with upstanding complementary side flanges 67. An arch member 68 is disposed in an upright position perpendicular to the plate 66 and has the terminals of its legs secured to one end of the plate 66 preferably by means of weld connections 69 to the flanges 67. An elongated foot pedal 70 has one end thereof disposed between the side flanges 67 and at the end of the plate 66, remote to the arch 68 and pivotally connected thereto by a shaft or pin 71 which extends transversely therethrough and through the flanges 67. The opposite, free end of the pedal 70, which is disposed adjacent the arch 68, is provided with an upstanding apertured ear 72 which is received in the bifurcated end of a socket 73. The shank of a fastening 73a extends through apertures of the furcations of the socket 73 and through the aperture of the ear 72 for pivotally connecting said socket to the ear. The opposite, exposed end of the inner flexible member 47 is suitably anchored in the socket 73 and the opposite end of the outer, tubular member 46 is anchored in the enlarged end of a clamp and guide 74, corresponding to the clamp and guide 44 and the intermediate portion of which detachably engages in a slot 75 of a horizontal flange 76 which is fixed to the intermediate portion of the arch 68 and which extends therefrom so as to be disposed over the free end of the pedal 70. The clamp and guide 74 is retained in engagement with the flange 76 by a clamping plate 77 which corresponds to the clamping plate 51.

Two contractile coil springs 78 are anchored at corresponding ends to opposite sides of the flange 76 and have their opposite, depending ends secured to the ends of the fastening 73a for yieldably urging the free end of the pedal 70 upwardly.

From the foregoing it will be readily apparent that the intermediate portion of the frame or yoke member 11 may be utilized as a handle for positioning the block 25 in engagement with an intake or exhaust valve 79, as illustrated in Figure 1, and so that the lower end of the valve stem 80 thereof will extend through the slot of the bifurcated portion 38 and with the retaining washer 81 of the valve spring 82 resting on the furcations 39 and the spring retainer or pin 83 disposed in the slot of the bifurcated portion 38. With the plate 66 of the treadle unit 65 resting on a floor surface 84, as indicated in Figure 1, the operator or mechanic then places one foot on the pedal 70 to exert a downward pressure thereon causing a downward pull to be exerted on the flexible member 47 at the end thereof which extends through the clamp and guide 74 thereby causing a pull to be exerted on the opposite end of said cable 47 for moving the clamp 57 and the end of the chain, fastened thereto, toward the clamp and guide 44. As the opposite end of the chain 60 is anchored, when this occurs the plunger rod 18 will be drawn downwardly by the pull on the chain 60 through the guide sleeve 14 to cause the block 25 to exert a downward pressure on the valve 79. Since the valve 79 is seated and held against downward movement, the yoke 11 will be displaced upwardly thereby causing the bifurcated portion 38, which is rigid therewith to move upwardly relatively to the stem 80 for displacing the washer 81 and spring 82 upwardly so as to lift or compress the spring 82 and move it away from the retainer 83 which is thus exposed by the upward movement of the bi-

furcated portion 38. It will thus be readily apparent that after the bifurcated portion 38 is moved upwardly the retainer or pin 83 can be readily removed from or applied to the stem 80. It will also be readily apparent that as soon as pressure is exerted by the block 25 on the valve 79 by foot pressure on the pedal 70 that the upper portion of the apparatus 10 will be retained by this clamping engagement with the valve structure so that the yoke 11 no longer has to be manually held leaving both hands of the operator free for applying or removing the spring retainer or pin 83. It will likewise be readily obvious that the direct mechanical connection between the pedal 70 and plunger 18, through the flexible members 47 and 60 will afford the operator or mechanic a needed sense of feel to indicate the amount of pressure required to hold the spring 82 properly compressed or lifted and will enable the mechanic to readily slack off this pressure in proper amounts to permit the spring 82 to be gradually released from its compressed condition for removal from the valve stem 80. It will also be readily apparent that the extension rod 20 may be advanced or retracted with respect to the plunger rod 18 by backing off the lock nut 21 to adjust the apparatus 10 to valve stems of different lengths and so that the travel of the plunger rod 18 relatively to the guide sleeve 14 may be minimized.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A valve spring lifter or compressor comprising a yoke, a valve spring engaging bifurcated member at one end of said yoke, a guide sleeve at the opposite end of said yoke and disposed perpendicular to said bifurcated member, a plunger rod reciprocally disposed in said guide sleeve and having a lower valve engaging portion, a pulley journaled on the opposite, upper end of said plunger rod, a flexible member having one end anchored to said guide sleeve on the side thereof, remote to the yoke and trained over said pulley, a guide on said yoke in which a portion of said flexible member is reciprocally disposed, and a foot pedal unit adapted to rest on the floor and including a base and a foot pedal pivotally connected at one of its ends to said base, the opposite end of said food pedal being connected to the opposite end of said flexible member for exerting a pull thereon when the last mentioned end of the foot pedal is swung downwardly for pulling the sleeve and yoke upwardly relatively to the plunger rod.

2. A valve spring compressor or lifter as in claim 1, and spring means disposed on the plunger and bearing on the upper end of said guide sleeve for normally urging the plunger rod upwardly relatively to the guide sleeve and yoke.

3. A valve spring compressor or lifter as in claim 1, said valve engaging lower portion of the plunger rod comprising a threaded extension rod engaging a threaded recess of the plunger rod and provided at its lower end with a block of a resilient material for yieldably and frictionably engaging an intake or exhaust valve, said extension rod being provided with a lock nut for engagement with the lower end of the plunger rod for adjustably retaining the extension rod in a plurality of extended positions.

4. A valve spring compressor and lifter as in claim 1, a grooved pulley journaled on the upper portion of the guide sleeve, above a portion of the yoke and under which said flexible member is trained, said flexible member including a length of sprocket chain trained over said pulleys and anchored at one end to the guide sleeve, a cable pivotally connected at one end thereof to the opposite end of said chain and extending through the flexible member guide, an ear on said yoke to which the guide of said flexible member is detachably clamped, a tubular conduit, possessing a lesser degree of flexibility than said cable, through which a portion of the cable reciprocally extends and in which said portion is guided, said tubular conduit having one end secured to the flexible member guide, and a second flexible member guide detachably secured to the foot pedal unit above the free end of the foot pedal and to which the opposite end of said tubular member is secured.

5. A valve spring lifter comprising a frame having a bifurcated lower end for engagement under a valve spring, a post having a lower valve engaging end for engagement on a valve, said frame having a sleeve portion slidable on said post, pulleys journaled on the upper end of the post and on said sleeve portion, a flexible member trained over the pulley of the post and under the pulley of the sleeve portion and having one end anchored to the sleeve portion and the opposite end extending from the pulley which is mounted on said sleeve portion, an elongated tubular guide member possessing a lesser degree of flexibility than said flexible member and through which the flexible member reciprocally extends from the last mentioned pulley, said tubular guide member having one end detachably anchored to the frame, a foot treadle unit having a base adapted to rest on a floor surface and provided at one end thereof with an upstanding portion to which the opposite end of said tubular guide member is detachably secured, a foot pedal having one end swingably connected to said base and a free end disposed adjacent said upstanding portion, said foot pedal being mounted for swinging movement in a vertical plane and being connected to the opposite end of said flexible member for causing the frame to be elevated relatively to the post when the foot pedal is pressed downwardly for exerting a pull on the flexible member.

6. A valve spring compressor and lifter as in claim 5, and spring means for yieldably urging the frame downwardly relatively to said post.

7. A valve spring compressor and lifter as in claim 5, and spring means for yieldably urging the frame downwardly relatively to said post, and spring means for yieldably urging said foot pedal upwardly.

JOSEPH E. MURPHY.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
93,548	Morelle	Aug. 10, 1869
1,468,121	Marts	Sept. 18, 1923
1,510,542	Burrows	Oct. 7, 1924
2,362,185	Brammer	Nov. 7, 1944