

April 6, 1926.

1,579,985

W. WHEELER

COMBINED PRIMING AND COMPRESSION RELEASE VALVE

Filed August 30, 1924

2 Sheets-Sheet 1

FIG. 1.

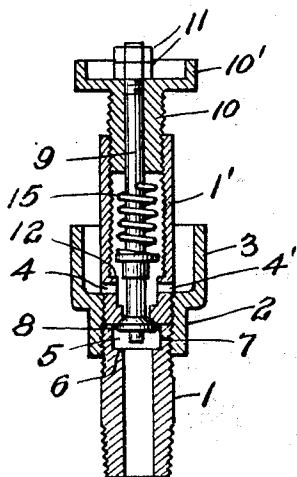


FIG. 2.

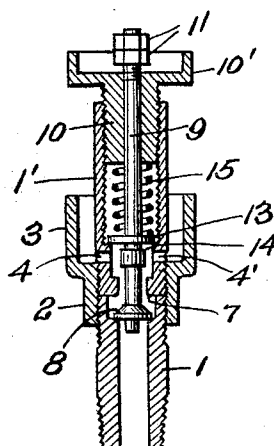


FIG. 3.

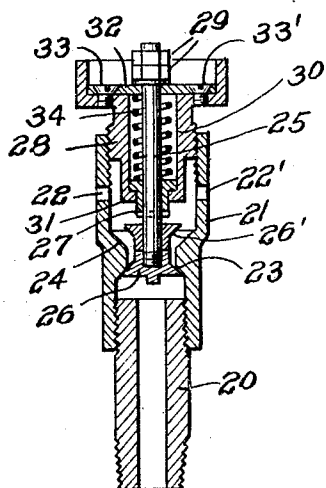
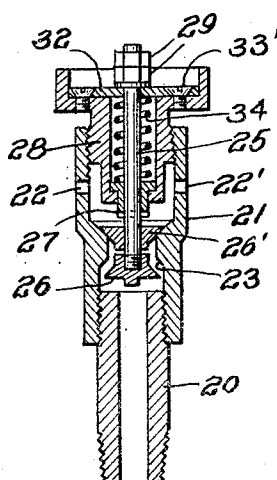


FIG. 4.



WITNESSES

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2 Sheets-Sheet 2

FIG. 5.

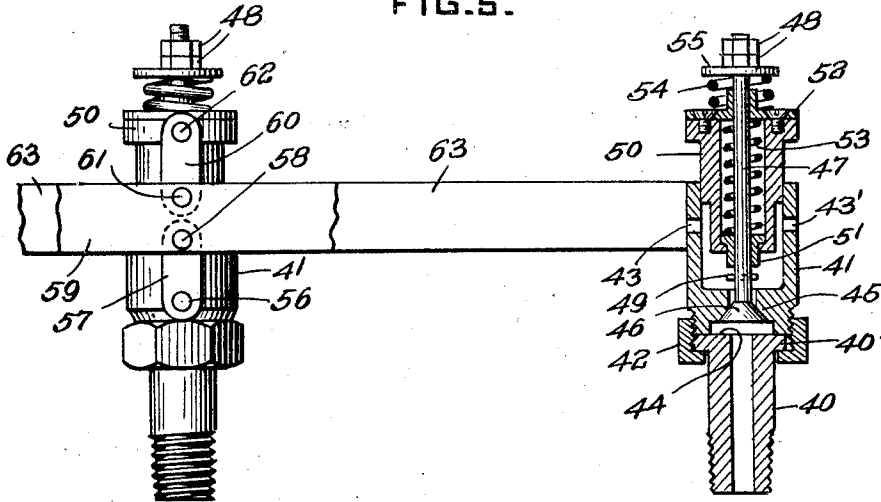


FIG. 6.

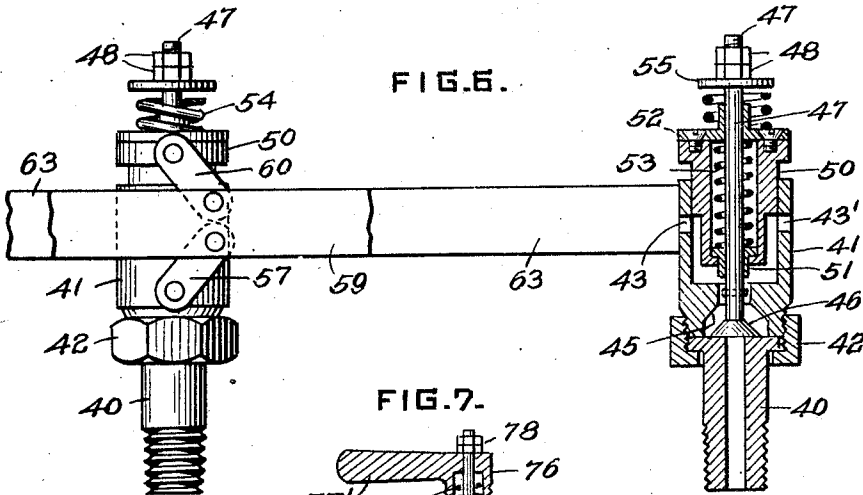
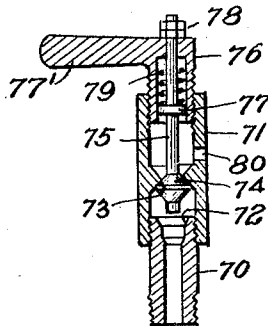


FIG. 7.



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UNITED STATES PATENT OFFICE.

WELLS WHEELER, OF SHARPSVILLE, PENNSYLVANIA.

COMBINED PRIMING AND COMPRESSION RELEASE VALVE.

Application filed August 30, 1924. Serial No. 735,093.

To all whom it may concern:

Be it known that I, WELLS WHEELER, a citizen of the United States, and a resident of Sharpsville, in the county of Mercer and State of Pennsylvania, have invented a new and useful Improvement in Combined Priming and Compression Release Valves, of which the following is a specification.

This invention relates to valves, and particularly to a combined priming and compression release valve for use in connection with internal combustion motors.

In automobiles, especially trucks, equipped with heavy motors, great difficulty is experienced in manually cranking the engine, whenever necessary. This is particularly true in case the driver happens to be a person who is not physically strong. It is an object of this invention to provide a combined priming and compression release valve which not only permits easy priming of the motor to facilitate starting, but permits any predetermined amount of the compressed charge to be released during the compression strokes of the engine, thereby enabling the operator to readily crank the same.

It is a special object to provide a valve of the character referred to which is simple, compact, strong and durable, easily manipulated, economical to fabricate, and highly efficient in operation.

It is also a special object to provide a valve which can be easily and quickly adjusted to vary the amount of the charge released in accordance with the desires of the operator, and in consequence vary the power required for cranking the motor.

It is a further special object to provide a compression release valve for internal combustion motors which can be connected to the engine cylinders by inserting the same in the threaded openings ordinarily provided for the pet cocks commonly employed, which can be set to obstruct the escape of the compressed charge merely under the weight of the valve stem and attached parts or under the additional resistance of an adjustable tension means, which can be readily set to positively prevent escape of the charge after the motor has been started, and which will automatically function to prevent ingress of air to the engine cylinders during the suction strokes of the motor.

These and other objects of the invention will more fully appear when taken in conjunction with the following description and the appended claims.

In the accompanying drawings, Fig. 1 is a vertical sectional view through the preferred embodiment of the invention, illustrating the valve head in its raised condition and positively forced to its seat to prevent escape from the engine cylinder; Fig. 2 a similar view showing the compression spring placed under tension and the valve stem in its lowered position, in which it functions to prevent ingress of air to the motor; Figs. 3 and 4 views corresponding to Figs. 1 and 2, showing a modified form of the invention; Fig. 5 a view partly in side elevation and partly in vertical longitudinal section of a still further modified form showing the valve head locked in its raised condition to prevent escape of fluid from the motor; Fig. 6 a view corresponding to Fig. 5 showing the relative positions which the parts assume when the valve head is in its lowered position; and Fig. 7 an additional modified form of the invention illustrated in vertical section.

In the preferred form of the invention shown in Figs. 1 and 2, the tubular valve body for convenience in assembling comprises the longitudinally aligned sections 1 and 1', the former being exteriorly threaded adjacent its lower extremity for insertion in the customary openings provided for the reception of the usual pet cocks to permit release of compression in the several cylinders of the motor. The walls of each of these sections is also exteriorly threaded adjacent the contiguous abutting ends thereof for cooperation with the internally threaded bore of a sleeve 2 forming a continuation of the priming cup 3 which surrounds the body of the valve. The threaded engagement afforded between the sleeve of the priming cup and the sections of the valve body rigidly holds the parts in proper assembled relation, while facilitating both the manufacture and the assembly and disassembly of the several parts. The vertically extending wall of the cup is spaced from the exterior of the valve body so as to conveniently hold a suitable priming liquid in an obvious fashion, and the section 1' is provided with a

plurality of spaced openings, such as indicated at 4, 4', establishing communication between the interior of the priming cup and the passage extending through the valve body.

The upper end of the bore of the section 1 is preferably slightly enlarged as at 5 so as to form the opposed offset portions 6 and 7 which serve as valve seats, and are customarily especially finished to provide surfaces adapted for this purpose.

A valve head 8 equipped with faces adapted to cooperate with the respective valve seats 6 and 7 is disposed within the recess 5, and has attached thereto a valve stem 9 extending longitudinally of the valve body and terminating beyond the upper open end thereof. This open end is interiorly threaded, and is adapted to threadedly receive a bodily adjustable plug 10 equipped with the flanged portion 10', the peripheral face of which may be knurled to facilitate adjustment. The valve stem 9 extends through a central bore in the plug 10, and carries at its upper extremity a terminal abutment, which may consist of the nuts 11 as illustrated in the drawings.

The bore of the section 1', immediately above the openings 4, 4', is provided with a shoulder 12 upon which is adapted to rest, when the parts are in certain relative positions, a supporting spring seat in the form of a washer 13. The spring seat is of the floating type being loose upon the valve stem 9, and is adapted to cooperate with a second abutment 14 in the form of an enlarged portion of the stem, the second abutment being disposed intermediate the extremities of the valve stem.

A coiled compression spring 15 encircles the valve stem and rests at its lower end directly upon the spring seat 13, and is of such proportions that when the plug 10 is adjusted to the position shown in Fig. 1 of the drawings, to completely release the spring of tension, the inner end of the plug is raised entirely out of contact with the upper extremity of the spring.

In use, the lower threaded extremity of the section 1 of the valve body is screwed directly into the threaded openings customarily provided for the insertion of the pet cocks employed in the heads of the cylinders of an internal combustion motor. It is understood that one of the valves forming this invention is screwed into the head of each of the cylinders of the motor.

Normally, during the running of the motor, the plug 10 is adjusted so as to raise it into abutting relation with the terminal abutment 11 for the purpose of lifting the valve stem 9 and the valve head 8 to the position shown in Fig. 1 of the drawings. In this position, the face on the valve head which is adapted to cooperate with the valve

seat 7 is forcibly pressed and positively held to its seat, thus preventing any escape of fluid upwardly through the bore of the valve body.

Should it be desirable to prime the motor, the plug 10 is turned slightly so as to lower it within the section 1', thus permitting the head 8 to assume a mid position between the valve seats 6 and 7. With the valve head in this position, any priming liquid injected into the interior of the cup 3 will readily find its way through the openings 4, 4', downwardly around the valve head 8 and into the cylinder of the motor.

By screwing the plug further into the section 1', the valve head is permitted to lower until it rests upon the valve seat 6, as shown in Fig. 2 of the drawings, which shows the relative positions which the parts assume when the plug 10 initially contacts the compression spring 15 when screwed inwardly of the section 1'. It is noted that with the parts in this position, the intermediate abutment 14 on the valve stem is spaced slightly below the spring seat 13. By screwing the plug 10 into the valve body a greater extent, the compression spring may be placed under various degrees of tension, as desired.

If the valve is adjusted so that the head 8 is permitted to cooperate with the valve seat 6, ingress of air is prevented during the suction strokes of the motor, but any outward flow through the passage or bore of the valve body during the compression strokes will cause the valve head and valve stem to be lifted.

If the setting of the parts is such that the valve stem and its attached parts need merely be lifted against their own weight, it is evident that very little flow through the valve passage would occur before the valve head 8 is raised sufficiently to contact its seat 7, whereas by setting the plug 10 so as to exert various degrees of tension upon the compression spring 15, the amount of the compressed charge escaping past the valve head before it is brought into contact with its seat 7 may be varied at the will of the operator. It is noted that the initial upward movement of the valve head from the position shown in Fig. 2 to that at which the intermediate abutment 14 is brought into contact with the spring seat 13 takes place merely under the resistance offered by the weight of the valve stem 9 and its attached parts, but as soon as the abutment 14 contacts the spring seat 13 any further continued upward movement of the valve head is resisted either by the weight of the compression spring 15 or by the tension to which it is adjusted by the plug 10.

It is thus seen that the valve described readily lends itself to a wide range of adjustment, and that the same can be conveniently and quickly set by the operator to

permit the necessary amount of escape of compressed charge from the engine cylinders to enable him to readily crank the motor. After the valves have been installed on the motor, the driver of the vehicle by several trial tests may determine the particular adjustment of the plug 10 which best meets his requirements, and can subsequently quickly adjust the plug to this position whenever cranking becomes necessary.

In the event that priming only is desired, it is obvious that the valve head 8 will be moved merely slightly below the setting shown in Fig. 1, and after the priming fluid has been permitted to flow into the engine cylinders, will be again set to the position shown therein.

In the modified form of the invention shown in Figs. 3 and 4, the tubular valve body comprises the sections 20 and 21, the former being threadedly engaged within the lower end of section 21. The wall of the section 21 is provided with a plurality of openings such as shown at 22, 22', establishing communication between the atmosphere and the interior of the valve body, and the priming cup may be dispensed with if desired. The interior of the bore of the section 21 is equipped with the valve seats 23 and 24 which are adapted to cooperate with complementary faces formed upon a two-part valve head attached to the lower end of the valve stem 25. One part 26 of the valve head is rigidly attached to the stem while the remaining part 26' of the valve head is slidably mounted upon the stem, being positioned between the part 26 and pin 27 extending transversely through the valve stem.

As in the preferred form of the invention, a bodily adjustable plug 28 threadedly engages the interiorly threaded upper end of the section 21, and is adapted to cooperate with a terminal abutment 29 fixed to the projecting portion of the valve stem.

In this modification, the plug 28 is equipped with a centrally disposed enlarged bore 30 in the bottom of which is seated a sleeve 31 projecting downwardly through the plug and adapted to contact the transverse pin 27. The upper end of the bore 30 is closed by means of a plate 32 conveniently held in position in any desired manner as by the screws 33-33'. Interposed between the sleeve 31 and the plate 32 is a compression spring 34, the valve stem being threaded through the sleeve 31, the compression spring and a central opening in the plate 32, all in the fashion as clearly shown in the drawings.

By turning the plug 28 so as to withdraw it from the section 21, the plate 32 is brought into contact with the terminal abutment 29 and raises the valve head so as to bring the part 26 thereof into seating relation with the valve seat 23, and when the parts are in

this position, as shown in Fig. 3, escape of fluid from the engine cylinders is prevented.

By lowering the plug 28 slightly from the position in Fig. 3, both the parts 26 and 26' of the valve head will be moved out of contact with their cooperating valve seats, so that any priming liquid injected through the openings 22 or 22' will readily find its way to the engine cylinder.

After the plug 28 is lowered sufficiently to permit the valve part 26' to contact its seat 24, ingress of air into the engine cylinder will not only be prevented, but any outward flow from the cylinder during the compression strokes will cause the valve part 26' to be lifted into contact with the pin 27, which upon its continued upward movement against the tension of compression spring 34 will bring the valve part 26 into contact with the valve seat 23 to prevent further escape. By suitably adjusting the position of the plug 28 within the valve body, the effective resistance offered by the spring 34 to the closing movement of the valve during its upward travel, may be varied at will so as to permit a greater or less amount of the compressed charge to escape, in an analogous fashion to that previously described in connection with the preferred form of the invention.

In Figs. 5 and 6, a still further modified embodiment of the invention has been illustrated. In this embodiment, the sections of the valve body are indicated respectively at 40 and 41, the section 40 being equipped with a radially extending flange 40' at its upper extremity which cooperates with an interiorly threaded union 42 for binding the two sections of the valve body into assembled relation. The wall of the section 41 is equipped with suitable openings 43 and 43', similar to these of the previously described forms.

The upper extremity of section 40 is preferably finished to form a valve seat 44 and an inwardly projecting portion upon the interior of the section 41 is likewise formed as a valve seat 45. A valve head 46 attached to a stem 47 is adapted to cooperate with the seats 44 and 45, and as in the previous forms the stem 47 carries at its upper end a terminal abutment 48.

The stem 47 is also equipped with a transversely extending pin 49, corresponding to the pin 27, and the upper end of the section 41 is fitted with a bodily movable plug 50 corresponding generally to the plug 28 of Figs. 3 and 4, with the exception that it is not threadedly engaged with the section 41 of the valve body but is merely telescopically received and slidably fits therein. The lower end of the bore of plug 50 is equipped with a sleeve 51, its upper end closed by a plate 52, and has a coiled compression spring 53 interposed between the sleeve and plate, all

as in the embodiment illustrated in Figs. 3 and 4.

Interposed between the plate 52 and the terminal abutment 48 is a short coiled compression spring 54 which rests directly upon the plate 52 at one end, and is adapted to contact at its other end a washer 55 slidably fitted upon the valve stem adjacent the terminal abutment 48.

In Figs. 5 and 6, two of the series of valves on the motor have been illustrated, these being associated with adjacent engine cylinders, it being understood that each of the cylinders is equipped with one of the valves, as in the forms previously described.

Pivottally attached at one end as at 56 to the section 41 is a link 57 having its opposite end pivottally attached as at 58 to a bodily movable bar 59. A second link 60 is likewise pivottally attached to the bar 59 at one end as at 61, and at its opposite end as at 62 to the upper end of the plug 50. Another bar, corresponding to the bar 59, is indicated at 63, which is likewise similarly operatively connected to the section 41 and the plug 50, but at the opposite side of the valve body from the parts designated by the reference numerals 56-62.

The operation of the embodiment illustrated in Figs. 5 and 6 will be obvious from the previous description of the remaining two forms of the invention. Whenever the valve head 46 is seated against the seat 45, escape of fluid from the motor is prevented, while when the valve head 46 is permitted to assume its lowered position in contact with the seat 44, it will function to permit the escape of a predetermined quantity of the compressed charge outwardly through the valve body and the openings 43, 43', in accordance with the setting of the plug 50 and the tension of the compression spring 53.

The position of the plug 50 of the several valves of the respective cylinders of the motor are adapted to be moved in unison by bodily moving the bars 59 and 63, in an obvious fashion. When the bars are moved so as to bring the links 57 and 60 to a position in alignment with the axis of the valve body, the head 46 will be forcibly pressed against its seat 45. The relative positions which the parts assume with this setting are shown in Fig. 5 of the drawings. Fig. 6 illustrates the same parts with the links 57 and 60 moved to an angular position, and with the plugs 50 and the valve head 46 to their lowered positions.

It is noted that with the forms of the invention shown in both Figs. 3 and 4, and in Figs. 5 and 6, that by properly proportioning the dimensions of the several parts, escape of fluid from the interior of the cylinder may not only be positively prevented by means of the parts and the adjustments heretofore described, but alternatively by moving

the valve stem downwardly. In the form shown in Figs. 3 and 4, by adjusting the plug 28 downwardly a sufficient extent to cause the transverse pin 27 to abut the valve part 26', this valve part may be forcibly and positively pressed to its seat 24 which will preclude the escape of fluid outwardly from the engine cylinders in a similar manner to the forcible pressing of the valve part 26 to its seat 23 by lifting the valve stem by contact with the terminal abutment 29. Likewise, contact of the sleeve 51 with the transverse pin 49 can be utilized to forcibly press the head 46 upon the seat 44 for a similar purpose.

In the modification illustrated in Fig. 7, the valve body comprises the sections 70 and 71, the section 70 being threadedly engaged with the lower end of section 71. The upper end of section 70 is provided with a valve seat 72 while the passageway through the section 71 is equipped with the valve seat 73 spaced therefrom. The valve head 74 is provided with faces at the opposite sides thereof adapted to cooperate with the respective valve seats when the same is in its lowered and raised positions. The head 74 is carried by a rod 75 projecting upwardly beyond the valve body, and extends through a recessed adjusting nut 76, equipped with the laterally projecting handle 77, the adjusting nut 76 being threadedly engaged within the section 71.

The valve stem 75 is equipped with an intermediate abutment 77, and a terminal abutment 78 in the form of a nut at the upper extremity thereof. A coiled compression spring 79 is seated within the recess of the adjusting nut 76, being confined between the intermediate abutment 77 and the bottom of the recess.

In order to provide for escape of the fluid passing upwardly past the valve head to the atmosphere, the section 71 is provided with escape openings such as indicated at 80.

By turning the adjusting nut 76 so as to withdraw it from the section 71, it can be brought into abutting relation with the terminal abutment 78 to bring the valve head into locked relation with the valve seat 73, as illustrated in the drawings. With the valve in this position escape of fluid from the engine cylinders is positively precluded. However, when adjusting the nut 76 so as to project a greater distance within the section 71, the valve head 74 may be lowered so as to permit it to cooperate with the valve seat 72, in a manner similar to that described in connection with the remaining embodiments of the invention. It is also obvious that by properly proportioning the length of the compression spring employed, the valve may be made to function so as to be urged towards the seat 72 merely under the influence of gravity due

to the weight of the parts directly associated with the valve head and stem, or the spring may be placed under various degrees of tension to resiliently force the valve head upon the seat 72, as desired, similar to the adjustments set forth in connection with the previously described embodiments.

I claim:

1. A combined priming and compression release valve for internal combustion motors comprising a tubular body, a valve seat interposed in the bore of said body, a plug closing one end of said body, a stem passing through the said plug, a valve head at one extremity of said stem cooperating with said valve seat, an abutment at the opposite extremity of the stem adapted to be contacted by the plug and moved in one direction, a spring seat intermediate the extremities of the stem, and a compression spring interposed between the said spring seat and plug, said plug being bodily adjustable towards and away from the said valve seat, a cup surrounding the said body, said body being provided with an opening through its wall establishing communication between the interior of the cup and the interior of the bore of the body at a point between the valve seat and plug.

2. A combined priming and compression release valve for internal combustion motors comprising a tubular body, a valve seat interposed in the bore of said body, a plug closing one end of said body, a stem passing through the said plug, a valve seat at one extremity of said stem cooperating with said valve seat, an abutment at the opposite extremity of the stem adapted to be contacted by the plug and moved in one direction, a spring cooperating with the said stem and adapted when under compression to urge the valve head away from its seat, said spring being so proportioned and disposed that the said plug when moved in one direction will contact the spring to place it under tension, but when moved in the opposite direction will first move entirely out of contact with the spring to release the tension thereof and then contact the said abutment to forcibly bind the valve head to its seat.

3. A combined priming and compression release valve for internal combustion motors comprising a tubular body, a valve seat

interposed in the bore of said body, a plug closing one end of said body, a stem passing through the said plug, a valve seat at one extremity of said stem cooperating with said valve seat, an abutment at the opposite extremity of the stem adapted to be contacted by the plug and moved in one direction, a spring cooperating with the said stem and adapted when under compression to urge the valve head away from its seat, said spring being so proportioned and disposed that the said plug when moved in one direction will contact the spring to place it under tension, but when moved in the opposite direction will first entirely release the tension thereof and then contact the said abutment for forcibly binding the valve head to its seat, a cup surrounding the said body, said body being provided with openings through its wall establishing communication between the interior of the cup and the bore of the body at a point between the valve seat and plug.

4. A combined priming and compression release valve for internal combustion motors comprising a tubular body, a pair of spaced valve seats interposed in the bore of the body, a valve head having faces adapted to cooperate with the respective valve seats, an adjustable plug in one end of the body, a supporting shoulder in the body between said valve seat and plug, a floating spring seat adapted to rest upon said shoulder, a valve stem attached to the said head and extending through the spring seat and plug, a terminal abutment on the stem beyond the plug, a second abutment on the stem intermediate the head and said terminal abutment adapted to cooperate with the spring seat, a compression spring interposed between the spring seat and plug, the said second named abutment lying out of contact with the spring seat when one of said valve faces is in abutting relation with its seat, said plug when moved in one direction and brought into contact with said compression spring to increase its tension, and when moved in the opposite direction adapted to entirely release the tension of the spring and positively force the remaining valve face to its seat.

In testimony whereof, I sign my name.

WELLS WHEELER.