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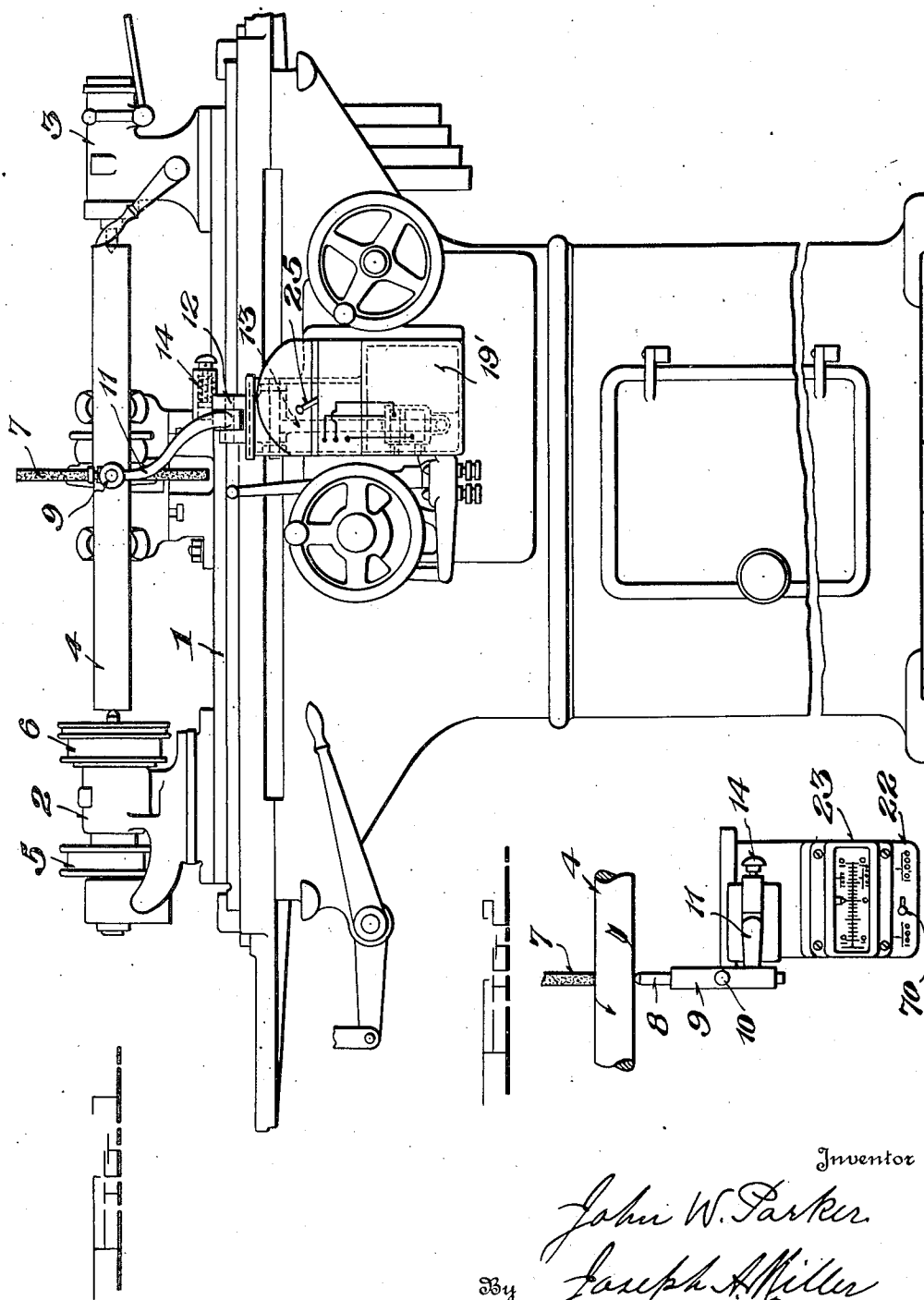
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1,835,807

MEASURING MACHINE

Filed June 18, 1928

4 Sheets-Sheet 1



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Dec. 8, 1931.

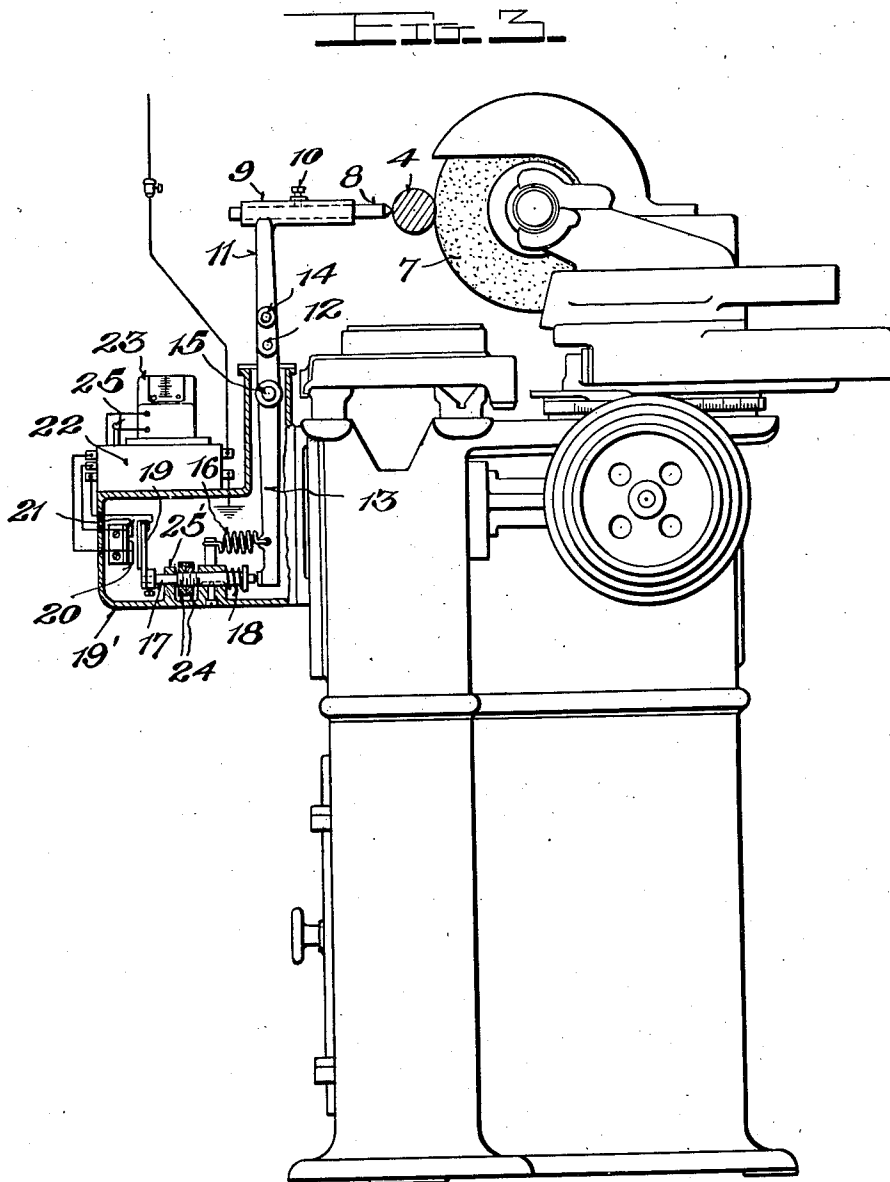
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4 Sheets-Sheet 2



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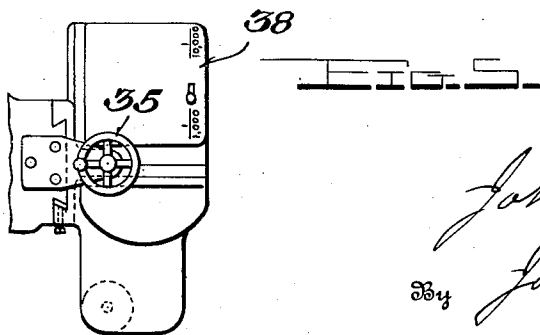
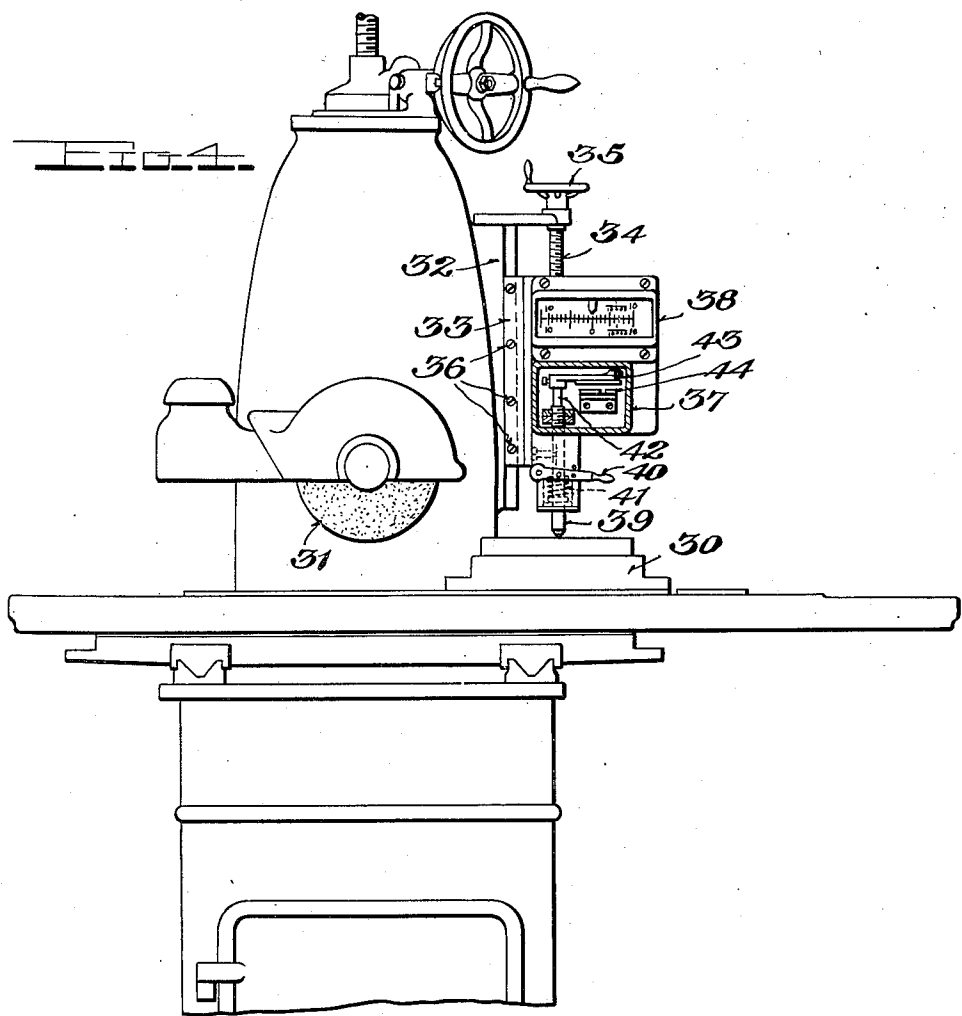
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4 Sheets-Sheet 3



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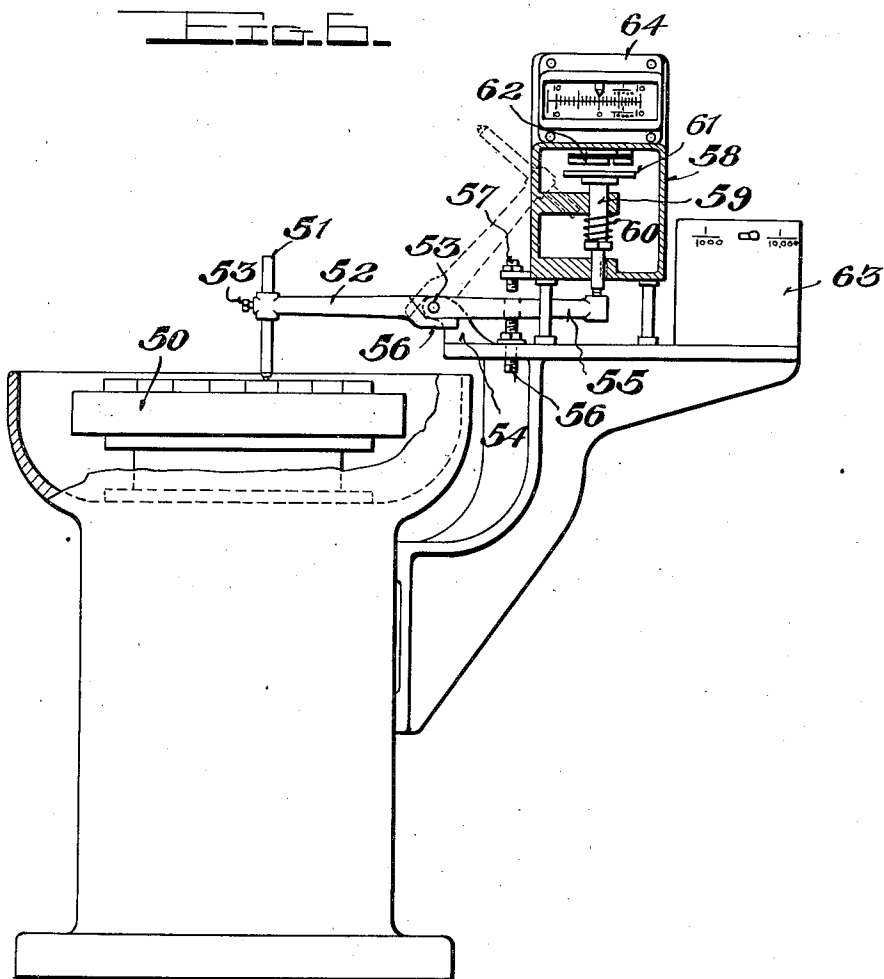
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MEASURING MACHINE

Filed June 18, 1928

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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MEASURING MACHINE

Application filed June 18, 1928. Serial No. 286,134.

This invention relates to certain new and useful improvements in measuring machines and pertains more particularly to an electrical measuring machine which is employed in connection with grinding machines, planers or the like.

The primary object of the invention is to provide a machine of this type in which an electrical indicator is employed to indicate the various measurements, and more particularly an indicator which has various sets of graduations so as to selectively indicate the measurement in one thousandths and ten thousandths of inches.

A further object of the invention is to provide a device of this type which is provided with a work contacting element or anvil and to provide means whereby such element can be easily and quickly moved into and out of engagement with the work, thereby to permit the latter to be removed from or applied to the machine without interference from such element.

The invention has further and other objects which will be later set forth and manifested in the course of the following description.

In the drawings:—

Figure 1 is a front elevation of the invention;

Figure 2 is a fragmentary top plan view;

Figure 3 is an end elevation partly broken away and in section;

Figure 4 is an end elevation of a modified form of the invention;

Figure 5 is a fragmentary top plan view of Figure 4, and

Figure 6 is an end elevation, partly broken away and in section of a modified form of the invention.

In showing of the present invention, a grinding machine is illustrated in Figure 1, which has a bed 1 a headstock 2 and a tailstock 3, the work 4 being held between the two and may be rotated by a belt drive applied to either the pulley 5 or 6. The bed 1 reciprocates past the grinding wheel 7, the latter being rotated in any suitable manner and the bed 1 likewise being reciprocated in any suitable or well known manner all of the above features forming no part of the pres-

ent invention. The grinding wheel is also advanced step by step toward the work 4, by any suitable means well known in the art. As the work is ground down to required size, it is necessary to ascertain the reduction in size as the work progresses in order to reach the predetermined diameter which the work is to have. Referring now to Figure 3, a work engaging anvil or element 8 is employed, which is adjustably mounted in a sleeve 9 and held adjusted therein by a screw 10. A lever mechanism is employed to support the sleeve 9 and is composed of an upper member 11 rigidly secured to the sleeve 9 and pivoted at 12 to a lower member 13. The member 11 can be swung about its pivot 12 to move the element 8 away from the work, and in order to hold the member 11 in position a latching device 14 composed of a spring pressed pin which fits in a socket provided therefor in the member 11, is employed. It will be seen that by releasing the pin 14, the member 11 can be swung about its pivot 12. The member 13 is pivoted at 15 to the machine and at its lower end has a spring 16 connected thereto, the spring acting to move the member 13 outwardly and thereby the member 11 inwardly to hold the anvil 8 against the work. A slidable rod 17, tensioned by a spring 18 is mounted in a housing 19, in which latter the member 13 is pivoted, the rod 17 being engageable with the lower end of the member 13 and carries a movable condenser plate 19 on its outer end. The condenser plate 19 is adapted to cooperate with fixed condenser plates 20 and 21 which latter are in circuit with a control 22 having a galvanometer 23 associated therewith. In order to limit the sliding movement of the rod 17 so as to prevent contact of condenser plate 19 with plates 20 and 21, and thus prevent short circuiting, stop nuts 24 are mounted on the rod 17 and by engagement with post 25 prevent contact of plate 19 with either 20 or 21. In order to throw either of the plates 20 or 21 into circuit, a switch 25 is employed. Since the control 22 and galvanometer form no part of the present invention, same being of common commercial form, except as herein-

after noted no description thereof is deemed necessary.

Referring now to Figure 4 of the drawings, a surface grinding machine is illustrated in which the reciprocating table 30 carries the work past a grinding wheel 31, the latter being rotated as is usual in the art.

The entire measuring unit in this form of the invention is mounted on a slide 33 carried by a vertical slideway 32. The slide is vertically adjusted by means of a threaded rod 34 connected thereto and operated by means of a hand wheel 35. The slide is clamped in set position by means of screws 36 and carries a control 37 for galvanometer 38, as above referred to. In this form of the invention, the work contacting member 39 may be raised and lowered by means of a pivoted hand operated lever 40, the lever in its upper position holding the anvil 39 spaced from the work so that the latter will not contact therewith. A spring 41 is employed to tension the anvil, that is mounted on a sliding rod 42 to which latter a movable condenser plate 43 is secured, the plate being designed to engage with the fixed condenser plates 44.

Figure 6 of the drawings illustrates a further modification of a surface type of grinding machine, in which the work 50 is engaged by a vertically disposed anvil 51 the latter being adjustable in a socket at the outer end of a horizontal lever 52 and is adjustably secured therein by means of a set screw 53. The lever 52 is pivoted at 53 to a lug 54 carried by the frame of the machine. A second lever member 55 is also pivoted at 53 and is engaged on its under surface by an extension 56 formed on the member 52. It will thus be seen that downward movement of the member 52 will effect upward movement of the member 55. Downward movement of the member 55 is limited by a stop screw 56 carried by the frame, and upward movement thereof is restricted by a similar stop pin or screw 57 carried by housing 58.

A sliding rod 59, tensioned by a spring 60 is disposed in the housing 58 and has its lower end projecting therewithout and engaged by the rear end of the lever member 55. The rod 59 is tensioned by a coil spring 60, and has a fixed condenser plate 61 thereon, which latter is adapted to cooperate with either of the two fixed condenser plates 62. A control 63 and a galvanometer 64 are provided as in the other forms of the invention. As shown in dotted lines, due to the pivoting of the member 52, the anvil 51 can be swung upwardly to the dotted line position, thereby to enable the work to be removed and new work applied.

In all forms of the invention, it will be seen that there are two readings which can be had on the galvanometer namely one as to one thousandths of an inch and the other as to ten

thousandths of an inch, and in order to cause the movable condenser plate in each form of the invention to selectively cooperate with one of the fixed condenser plates, a switch 70 shown in Figure 2, is applied to the galvanometer and is operable to place either of the fixed plates in circuit. Thus by merely throwing the switch, the reading can be had as to one thousandths or ten thousandths of an inch. It will further be noted that in each form of the invention, the work engaging anvil controls the movement of the movable condenser plate with relation to the selected one of the fixed condenser plates, whereby the reading is electrically obtained through the galvanometer.

It will be obvious that the invention can also be applied to the tail stocks of measuring machines of the type disclosed in my co-pending application filed of even date, Serial No. 286,133, wherein the movable element of the two capacitor circuits is illustrated as being operated by or partaking of all of the movements of the spindle of the tail stock, which spindle corresponds to the sliding rod 17, Fig. 3, of the instant application.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. An electrical measuring device for work trimming machines including work contacting means, means to maintain said work contacting means in constant positive pressure against the work as the trimming progresses, a plurality of condenser circuits each including a condenser plate and a common condenser plate connected to the work contacting means, a multirange galvanometer, and means whereby said galvanometer may be selectively inserted into any of the condenser circuits.

2. An electrical measuring device for work trimming machines including an arm, means whereby said arm is kept in constant positive pressure against the work as trimming progresses, a plurality of capacitor circuits each including a fixed plate and a single condenser plate carried by the arm which acts to change the capacitance of said capacitor circuits as it responds to the movements of the arm, a multirange galvanometer, and means whereby said galvanometer may be selectively inserted into any of the capacitor circuits.

3. An electrical measuring device for trimming machines including movable work engaging means, means whereby said work engaging means is kept in constant positive pressure against the work as trimming progresses, two capacitor circuits each having a fixed plate and having one movable plate in common said movable plate being carried by the work engaging means so as to move therewith, a multirange galvanometer having ranges whose ratio is that of the capacitance

of the two circuits, and means whereby said galvanometer may be selectively inserted into the capacitor circuits whereby to obtain readings on the respective scales of the galvanometer.

4. An electrical measuring device for trimming machines including work contacting means, means whereby said work contacting means is kept in positive pressure against the work as the trimming progresses, two capacitor circuits comprising two distinct elements one of which consists of a single plate, the other of which consists of a pair of plates having a predetermined ratio of areas, one of said elements being carried by said work contacting means so as to move therewith, a multirange galvanometer having ranges whose ratio is that of the capacitance of said circuits, and means whereby said galvanometer may be selectively inserted into the said capacitor circuits whereby to obtain readings on the respective scales of the galvanometer.

5. In an electrical measuring device, work contacting means, two capacitor circuits, one capacitor element of which comprises a single plate, the other capacitor element of which comprises a pair of plates having a predetermined ratio of areas, one of said elements being connected to said work contacting means, a multirange galvanometer having ranges whose ratio is that of the capacitance of said circuits, and means whereby said galvanometer may be selectively inserted into the said capacitor circuits whereby to obtain readings on the respective scales of the galvanometer.

6. An electrical measuring device for work trimming machines including work contacting means, a plurality of condenser circuits each including a condenser plate and a common condenser plate connected to the work contacting means, a multirange galvanometer, and means whereby said galvanometer may be selectively inserted into any of the condenser circuits.

7. An electrical measuring device for trimming machines including work contacting means, two capacitor circuits comprising two distinct elements one of which consists of a single plate, the other of which consists of a pair of plates having a predetermined ratio of areas, one of said elements being carried by said work contacting means so as to move therewith, a multirange galvanometer having ranges whose ratio is that of the capacitance of said circuits, and means whereby said galvanometer may be selectively inserted into the said capacitor circuits whereby to obtain readings on the respective scales of the galvanometer.

In testimony whereof I have signed my name to this specification.

JOHN W. PARKER.