

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

One World Technologies, Inc. D/B/A Techtronic Industries Power Equipment,
Petitioner,

v.

CHERVON (HK) LIMITED,
Patent Owner.

Case IPR2020-00885

U.S. Patent No. 9,648,805
Issue Date: May 16, 2017
Title: Locking Device, Telescopic Rod and
Mower Comprising the Locking Device

DECLARATION OF E. SMITH REED

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Patent Trial and Appeal Board
United States Patent and Trademark Office
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IPR2020-00885
Declaration of E. Smith Reed – '805 Patent

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TTI1001: U.S. Patent No. 9,648,805 (“the '805 patent”)

TTI1002: Prosecution History of the '805 Patent

TTI1003: Declaration of E. Smith Reed

TTI1004 – TTI1006: Reserved.

TTI1007: GB 2,386,813 (“Reichart”).

TTI1008: 16 CFR Part 1205 – Safety Standard for Walk-Behind Power Lawn Mowers (January 1, 2012).

TTI1009 – TTI1011: Reserved.

TTI1012: U.S. Patent No. 5,209,051 (“Langdon”).

TTI1013 – TTI1019: Reserved.

TTI1020: CN 202 109 551 U certified English translation.

TTI1021 – TTI1029: Reserved.

TTI1030: ANSI/OPEI B71.1-2012 revised/issued April 23, 2012 (“ANSI B71.1”)

TTI1031: JP 2003 130 017A original Japanese language.

TTI1032: JP 2003 130 017A certified English translation (“Idota”).

TTI1033: EP 08 223 346 A1 (“Pronzati”).

TTI1034: U.S. Patent No. 3,029,887 (“Schantz”).

TTI1035: U.S. Patent No. 7,179,200 (“Wu”).

I, E. Smith Reed, P.E., hereby declare as follows:

I. INTRODUCTION

1. My name is Edward Smith Reed. I am a Machine and Product Design Engineer Consultant at E. Smith Reed, P.E., PLLC of Fairlee, Vermont, a successor company of Reed Engineering Consultants, Inc. of Hanover, New Hampshire.

2. I have been retained as an expert witness on behalf of One World Technologies, Inc., d/b/a Techtronic Industries Power Equipment for the above-captioned Petition for Inter Partes Review (“IPR”) of claim 1 (“the Challenged Claim”) of U.S. Patent No. 9,648,805 (“the '805 patent”). I am being compensated for my time in connection with this IPR at my standard consulting rate of \$320 per hour. My compensation is in no way dependent on the outcome of this matter.

3. In this declaration, I provide my opinions based on the skill person’s understanding of features described in this patent. In forming the opinions expressed in this declaration, I relied upon my education and experience in the relevant field of the art, and have considered the viewpoint of a person having ordinary skill in the relevant art, as of 2012. My opinions directed to the invalidity of the Challenged Claims are based, at least in part, on the publications identified

in the Petition and discussed further below, which I have been instructed by Petitioner's counsel constitute prior art.

II. BACKGROUND AND QUALIFICATIONS

4. I have a Bachelors of Science degree in Mechanical Engineering (BSME) from the University of Arkansas (1968). I am a Licensed Registered Professional Engineer, licensed in the United States in the states of Vermont, New Hampshire and Minnesota. I have over 25 years of industry-related engineering experience, including experience designing products, including outdoor power turf maintenance products (power lawn mowers and turf care equipment), and experience as a manufacturing and industrial engineer. My experience includes the design and redesign of walk-behind and riding lawnmowers, as detailed below. My Professional Engineering licenses (my P.E. licenses) are specifically in the three fields of Mechanical Engineering, Manufacturing Engineering and Industrial Engineering. I am the owner of E. Smith Reed, P.E., PLLC, a company engaged in engineering consulting based in Fairlee, Vermont.

5. In earning my BS degree in Mechanical Engineering, included in the courses I completed were such subjects as Physics, Statics, Dynamics, Calculus, and Differential Equations, and upper-level courses that included Metallurgy,

Manufacturing Processes, Casting and Welding, Fluid Mechanics, Thermodynamics, Heat Transfer, Aerodynamics, Electrical Engineering Circuits, Aircraft Engines, Probability & Statistics, Dynamics of Machinery, and Machine Design. In addition, I am a Board Certified Diplomate in Forensic Engineering, certified through the National Academy of Forensic Engineers in accordance with the requirements and guidelines set forth by and accredited by the Council of Engineering and Scientific Specialty Board (CESB). I am a named inventor on four U.S. Patents, two of which are directly related to and used in the lawn and garden industry.¹ A complete Curriculum Vitae is attached as Exhibit A.

6. I am a member of or a long-term past member of several engineering societies, societies devoted to the promotion of the art and science of engineering in their particular field. Among the societies I have been or am a member of are the American Society of Mechanical Engineers, the Society of Automotive Engineers, the American Society of Agricultural and Biological Engineers, the Society of Manufacturing Engineers and the American Society for Quality. These societies develop, collect, publish and distribute engineering information related to their fields of interest. As a member of these particular societies, on a regular

¹ U.S. Patent No. 3,939,917, and 4,191,007.

basis, I have been provided with and I have taken advantage of the availability of technical papers, standards, engineering practices and data related to the fields of, among others, mechanical engineering, outdoor powered equipment, lawn and garden equipment, construction-related machinery and farm and agricultural machinery.

7. From 1970 to 1979, I held the positions of Design Engineer, Senior Design Engineer and Chief Product Engineer for The Toro Company in Minneapolis, Minnesota. Toro did and does today design, manufacture and sell lawn and garden products, including consumer mowers, products in direct competition with lawn and garden products sold by One World Technologies, Inc., and products sold by Chervon (HK) Limited. During the course of my work at The Toro Company, I was responsible for among other things, the engineering design of industrial riding mowers, walk-behind mowers, pull-behind mowers, tractors, utility vehicles and trailer type turf maintenance machines, and was involved in design reviews of other engineers' designs, including consumer lawn mowers (both walk-behind and riding mowers), garden tillers and snow throwers. In my positions at Toro, I was in part responsible for keeping up to date on the development and technology of products and machines that were or could be viewed as being relevant to turf maintenance and outdoor power equipment

products, including reviewing industry literature, attending trade shows, visiting competitive equipment dealers, meeting with customers and reading relevant patents, to name a few such activities.

8. In the 1975-1976 time frame, I designed and released for production a riding lawnmower that contained an electrical safety interlock circuit system with switches that detected when the mower operator was in a position safe for him to operate the mower, and when various mower operational controls were in safe positions for various mower operating situations, situations that would prevent the engine from starting unless the drive wheels and/or cutting blades were disengaged (in neutral), and would prevent the drive wheels and cutting blades from engaging (running) unless the operator was in the intended location on the seat behind the steering wheel. This was the industry's first successful such design.² In addition, on occasion, I investigated mower-related accidents and helped determine contributions, if any, the mowers' design to these accidents. When I could, I used this experience to develop design improvements to reduce the likelihood of such incidents in the future. Further, I initiated product manual changes and designed

² See Exhibit C, document "Lawnmower Electrical Interlock Circuit" (April 4, 1976).

and composed on-product warning labels to encourage safe operation and maintenance practices.

9. I have previously offered testimony as an expert witness. A list of my prior engagements in which I testified as an expert at trial or by deposition is attached as Exhibit B.

10. Based on my background and experience, as set forth more fully in my CV, I am familiar with the state of the art in the field of lawn and garden equipment, in particular, safety devices for lawn mowers, at least in the mid 2000's to mid 2010's. I am a technical expert in the fields relating to the asserted patents and other related fields, and I remain active in consulting in these fields.

11. Based on my professional experience, I believe I am qualified to testify as an expert on matters related to the patent that is the subject of this Petition.

III. UNDERSTANDING OF THE LAW

12. I am not a legal expert and therefore I offer no opinions on the law. However, I have been informed and am aware of legal standards that are relevant to my analysis, as summarized below.

13. I have been informed and understand that an issued patent claim is presumed valid and establishing a patent claim to be unpatentable in an *inter partes* review (“IPR”) or post-grant review (“PGR”) proceeding requires proof by “preponderance of the evidence,” which I understand means proof that it is more likely than not that the claim is unpatentable.

14. I have been informed and understand that the first step in an unpatentability analysis involves construing claims, as necessary, to determine their scope. Second, the construed claim language is then compared to the disclosures of the prior art.

15. I have been informed and understand that claims are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art (“POSITA”) at the time of the alleged invention, in light of the patent specification and prosecution history. I have been informed that claim construction is a matter of law and that the final claim constructions for this proceeding will be determined by the Patent Trial and Appeal Board.

16. I have been informed and understand that a patent claim may be declared unpatentable if it is anticipated by, or rendered obvious in view of, prior art.

17. I have been informed and understand that a patent is to be understood from the perspective of a POSITA. Such an individual is considered to possess normal skills and knowledge in a particular technical field (as opposed to being a genius). I have been informed and understand that in considering what the claims of a patent require, what was known prior to that patent, what a prior art reference discloses, and whether an invention is obvious or not, one must use the perspective of such a person of ordinary skill in the art.

18. I have been informed and understand that a patent claim is obvious under 35 U.S.C. § 103, and therefore unpatentable, if the claimed subject matter, as a whole, would have been obvious to a person of ordinary skill in the art as of the priority date of the patent based on one or more prior art references and/or the knowledge of one of ordinary skill in the art.

19. I have been informed and understand that an obviousness analysis must consider (1) the scope and content of the prior art, (2) the differences between the claims and the prior art, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations, if any, of non-obviousness (such as unexpected results, commercial success, long felt but unmet need, failure of others, copying by others, and skepticism of experts).

20. I have been informed and understand that a single prior art reference can render a patent claim obvious under 35 U.S.C. § 103 if any differences between that reference and the claims would have been obvious to a person of ordinary skill in the art. Alternatively, I have been informed and understand that a prior art reference may be combined with other references to disclose each element of the invention under 35 U.S.C. § 103. Thus the teachings of two or more references may be combined in the same way as disclosed in the claims, if such a combination would have been obvious to one having ordinary skill in the art. I have been informed and understand that a reference may also be combined with the knowledge of a person of ordinary skill in the art, and that this knowledge may be used to combine multiple references. I have further been informed and understand that a person of ordinary skill in the art is presumed to know the relevant prior art. I have been informed and understand that the obviousness analysis may take into account the inferences and creative steps that a person of ordinary skill in the art would employ.

21. In determining whether a prior art reference would have been combined with other prior art or other information known to a person of ordinary skill in the art, I have been informed and understand that the following principles may be considered:

- whether the references to be combined involve non-analogous art;
- whether the references to be combined are in different fields of endeavor than the alleged invention in the Patent;
- whether the references to be combined are reasonably pertinent to the problems to which the inventions of the Patent are directed;
- whether the combination is of familiar elements according to known methods that yields predictable results;
- whether a combination involves the substitution of one known element for another that yields predictable results;
- whether the combination involves the use of a known technique to improve similar items or methods in the same way that yields predictable results;
- whether the combination involves the application of a known technique to a prior art reference that is ready for improvement, to yield predictable results;
- whether the combination is “obvious to try”;

- whether the combination involves the known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces, where the variations are predictable to a person of ordinary skill in the art;
- whether there is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention;
- whether the combination requires modifications that render the prior art unsatisfactory for its intended use;
- whether the combination requires modifications that change the principle of operation of the reference;
- whether the combination is reasonably expected to be a success; and
- whether the combination possesses the requisite degree of predictability at the time the invention was made.

22. I have been informed and understand that in determining whether a combination of prior art references renders a claim obvious, it is helpful to consider whether there is some teaching, suggestion, or motivation to combine the references and a reasonable expectation of success in doing so. I understand, however, that a teaching, suggestion, or motivation to combine is not required.

IV. MATERIALS CONSIDERED FOR THIS DECLARATION

23. In addition to my general knowledge, education, and experience, I considered the '805 patent, its file history, the references cited by the '805 patent, and the materials discussed in this declaration and the materials listed as exhibits in this IPR, in forming my opinions.

V. SUMMARY OF OPINIONS

24. Based on my review of the '805 patent and its prosecution history, the other materials I have considered, and my knowledge and experience, my opinions are as follows:

25. Claim 1 of the '805 patent is invalid for the following grounds:

Ground	Claim	Basis	References
1	1	§103	Langdon in view of Wu or Pronzati

Ground	Claim	Basis	References
2	1	§103	Langdon in view of Idota in further view of Wu

VI. SUMMARY OF THE '805 PATENT

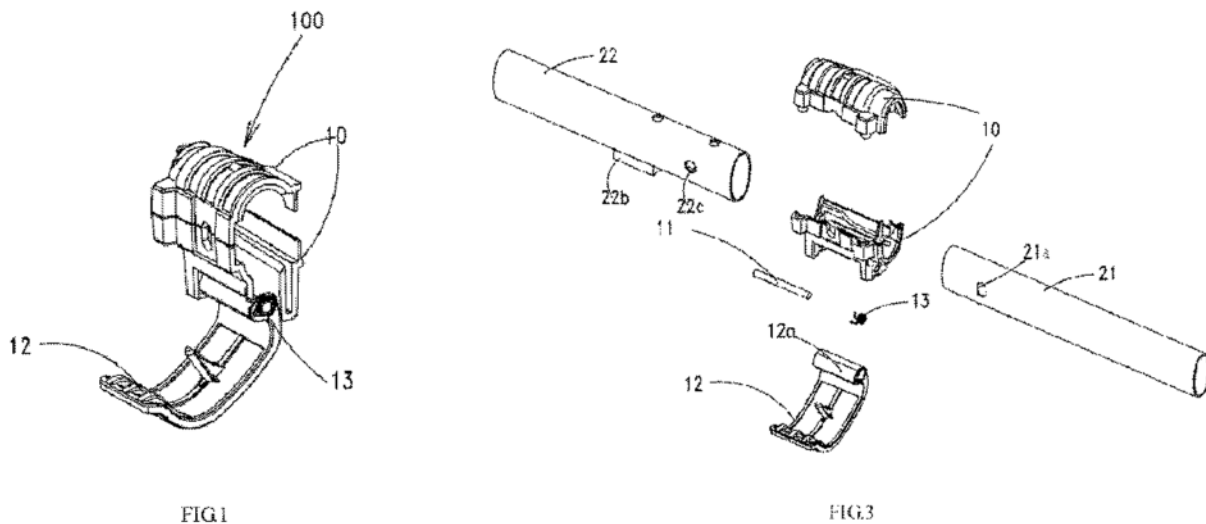
A. Brief Description

26. The '805 patent claims priority to a foreign filing date later than May 16, 2013, and is therefore subject to the first-to-invent (AIA) provisions of 35 U.S.C. §§ 102-103. It claims priority to Chinese patent application CN2013-10502603 filed October 23, 2013.

27. The '805 patent describes a locking device for use for instance in locking telescoping handles on a walk-behind lawn mower. The device includes a clamp to apply pressure upon the inner and outer tubes of the telescoping handle, a frictional section on the clamp to hold the clamp in place when closed, and a locking reinforcement member (such as an elongated post for insertion into aligned through-holes) to hold the inner and outer tubes of the telescoping handle at a designated position in relationship to each other when the clamp is closed.

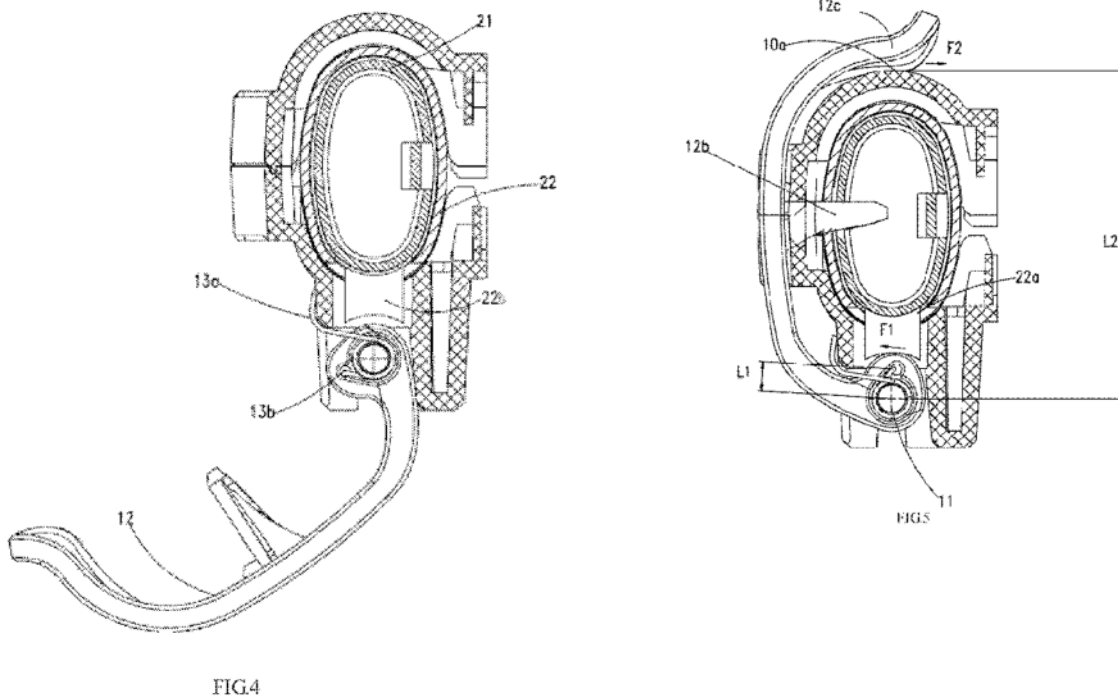
28. Figures 1 and 3 illustrate the disclosed locking device including a base 10, a pivoting shaft 11 (visible in Fig. 3), and an operating lever 12. The base 10

can be composed of two parts, as shown in the exploded view in Figure 3. One end of the operating lever 12 is hinged to the base 10 via pivoting shaft 11. A repulsion generating member 13 is arranged between the base 10 and the operating lever 12.



29. The hinge created by pivoting shaft 11 allows the device to have a locking position, whereby the operating lever 12 is brought flush to base 10 (see Figure 4), and a releasing position whereby the operating lever is rotated away from base 10 (see Figure 5).

30.



31.

32. When the operating lever 12 is in a releasing position, the repulsion generating member is in either a natural condition or may have a relatively small pretension force applied. TTI1001, 3:5-13. When the operating lever 12 is in a locking position, the repulsion generating member is in a compressed condition.

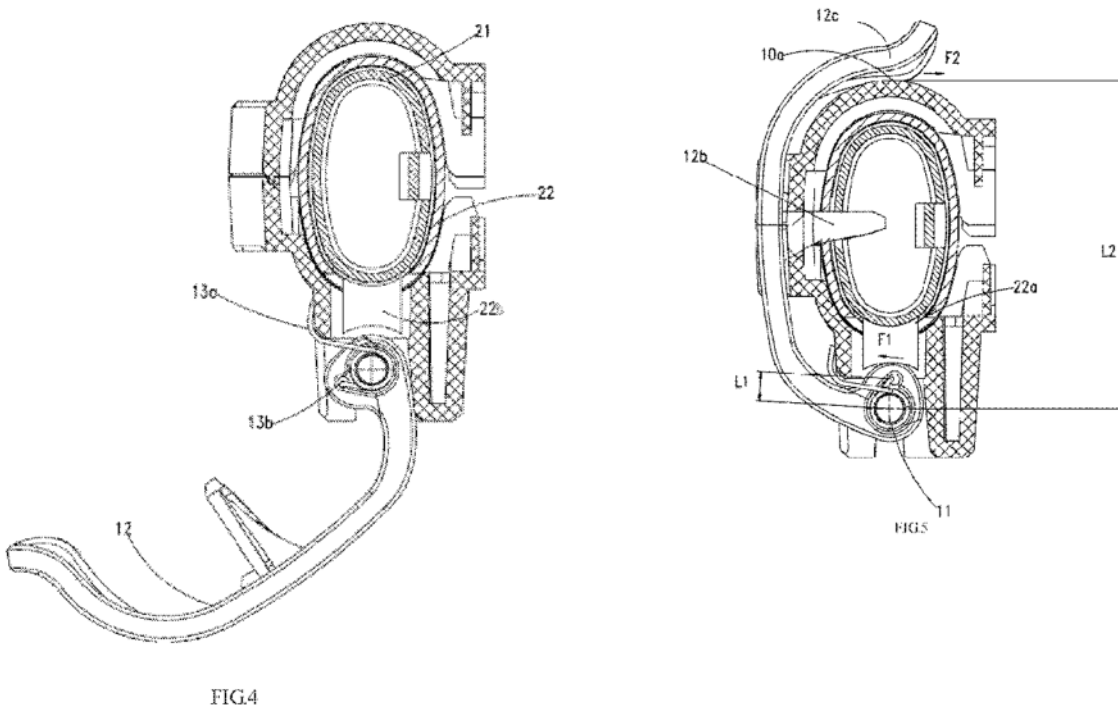
Id. The repulsion generating member serves the purpose of giving an indication to the user that the operating level has not reached the locking position due to abnormal operation, the repulsion generating member forcing the operating lever to return to the releasing position. *Id.* at 2:23-28.

B. Telescopic Rod

33. The disclosed locking device 100 forms a portion of a disclosed telescopic rod 20, the telescopic rod also including an inner tube 21 and an outer tube 22. The inner tube 21 and outer tube 22 are slidably arranged such that the inner tube 21 can be slid into outer tube 22 to collapse the telescopic rod, or be drawn from the outer tube 22 to extend it. TTI1001, 2:3-7. The outer tube 22 is provided with a through hole 22a (Fig. 5) that allows a locking member 12a (Fig. 3) on the operating lever 12 to pass through in order to compress the inner tube 21 when rotated into a locking position. *Id.*, 3:22-26; Figs. 3, 5. The outer tube 22 is further provided with a compression member 22b residing in through hole 22a, which is used to fix the inner tube 21 more firmly. *Id.*, 3:28-30; Figs. 4, 5. Both the outer tube 22 and inner tube 21 are provided with hole 22c and 21a, respectively, through which a locking reinforcement member 12b residing on the operating lever 12 may pass simultaneously when the two holes 22c and 21a are in alignment. *Id.*, 3:31-35. The locking device 100 thus locks the relative position between the inner tube 21 and outer tube 22 by compressing inner tube 21 with operating lever 12 when holes 22c and 21a are in alignment. TTI1001, 3:22-35.

C. Operation Lever

34. The disclosed locking device exhibits an operation lever 12 hingedly attached to a base 10 by pivoting shaft 11 whereby the locking device is in a locking position when the operation lever 12 is rotated flush with the base 10 (Figure 4), and a releasing position when the operation lever is rotated away from the base 10 (Figure 5.)



35. The operation lever 12 includes the locking member 12a disposed at the end proximal to the pivoting shaft 11. *Id.*, 2:67-3:4. The locking member 12a is a cam configured to press through the through hole 22a on outer tube 22 to

compress the inner tube 21 via compression member 22b as the operation lever 12 is rotated to the locking position. (See Figs. 4, 5.) At the opposite end, the operation lever 12 includes a friction portion 12c. *Id.*, 3:37-41. When the operation lever 12 is moved to the locking position, the friction portion 12c is tightly engaged with the outer wall 10a of the base 10, holding it in locking position. *Id.* Between the locking member 12a and the friction portion 12c, the operation lever 12 includes a locking reinforcement member 12b, shown as a post in Figure 4. *Id.*, 3:33-35. When moving operation lever 12 into the locking position, locking reinforcement member 12b can be engaged with hole 22c in the outer tube 22 and hole 21a in the inner tube 21 simultaneously if such holes are aligned. *Id.*, 3:60-4:2. Now in the locking position, the friction portion 12c is engaged with outer wall 10a of the base 10 such that the friction force overcomes the force of the repulsion generating member acting to return the operation lever 12 to the releasing position. *Id.*, 3:52-59.

36. However, if holes 21a and 22c are not in alignment when the user attempts to rotate the operation lever 12 to the locking position, a so-called “abnormal operation of the user,” the locking reinforcement member cannot engage the holes, and operation lever 12 will not be permitted into the locking position. *Id.* In such condition, the repulsion generating member 13 disposed

between operation lever 12 and base 10 applies a force returning operation lever 12 to the releasing position. *Id.*, 4:2-13.

D. Prosecution History of the '805 Patent

37. The application for the '805 patent was filed October 17, 2014, as an original U.S. application serial no. 14/517,233, claiming priority to Chinese application 2013-10502603, itself filed October 23, 2013. It was filed with claims 1-20 that included six claims drawn to the locking device alone, 8 claims drawn to a telescopic rod comprising an inner tube, an outer tube, and the locking device, and 6 claims drawn to a mower having a pushing handle comprising the telescopic rod.

38. In its first Office Action, the USPTO declared each of the claims subject to a restriction/election requirement, along the locking device, telescopic rod, mower trichotomy. TTI1002, 93. The Applicant selected the mower claims, *id.* at 97, which the Examiner subsequently rejected over the lawnmower disclosed in Barlow in view analogous art outside of lawn and garden equipment: Melic (a lock for a safety fence support post), Solomon (a lock for a vertically adjustable table), and Sicz (an adjustable bicycle seat post assembly). *Id.*, 115-18.

39. The Applicant responded by amending the lone remaining independent claim adding limitations describing the inner and outer tubes, clarifying that the locking reinforcement member extends through the holes in both the inner and outer tubes when the operating lever is in the locking position. *Id.*, 142-43, 147. The Examiner again rejected the claims as obvious over Barlow in combination with Melic, Sicz, and Solomon, and in further combination of Webber, a seat adjustment apparatus for an exercise machine. *Id.*, 157-61.

40. The Applicant requested continued examination, and amended the lone remaining independent claim to its final state, describing the friction portion of the operating lever, and further clarifying that “the frictional portion of the operating lever engages the outside surface of the base to provide a fictional [sic] retention force to counteract the force of the repulsion generating member on the operating lever.” *Id.* 189-90, 193.

41. After subsequent exchanges with the USPTO that are immaterial to the Petition, the '805 patent was granted on May 16, 2017.

E. The Critical Date of the Challenged Claims

42. The '805 patent claims priority to a Chinese patent application filed October 23, 2013. TTI1001, 1. Petitioner's counsel informs me they do not

believe it is important to this Declaration to determine the actual priority date to which each Challenged Claim is entitled because the prior art relied upon herein was published prior to the oldest priority date or otherwise qualifies as prior art.

F. Level of Ordinary Skill in the Art

43. A person of ordinary skill in the art (“POSITA”) as of October 23, 2013, which is the earliest alleged priority date of the Challenged Patent, would have had at least a bachelor’s degree in mechanical engineering, electrical engineering, or similar technical field, with at least three years of relevant product design experience. An increase in experience could compensate for less education.

44. A person of ordinary skill in the art would know and understand terms commonly used in the lawn and garden and outdoor power equipment industry, would know and understand materials commonly used in turf maintenance products, would know and understand engineering mechanical drawings, engineering specifications and engineering document control, would have an understanding of turf maintenance issues and practices, would have an understanding of customers' needs and expectations, and would have a basic understanding of how to read and understand technology concepts presented in relevant patents and patent publications.

VII. CLAIM CONSTRUCTION UNDER 37 C.F.R. §§ 42.104(b)(3)

A. “repulsion generating member” (Claim 1)

45. The Challenged Patent’s specification describes several forces generated within the locking device. When describing the operation of the operation lever, the Challenged Patent’s specification states that “[t]he beneficial effect of the described devices lies in that owing to the repulsion generating member being arranged between the base and the operating lever, the repulsion force is applied to the operating lever during the movement from the releasing position to the locking position, therefore when the operating lever does not completely reach the locking position due to abnormal operation, the operating lever will return to the releasing position because of the repulsion force, and thereby provide an indication to the user.” TTI1001, 2:19-28; *see also id.*, 3:5-13; 4:14-55; 5:13-23. This is in contrast to the force of the friction portion that must overcome it for the operation lever to maintain in the locking position. *See id.*, 3:52-59.

46. The repulsion of the operation lever, biasing it towards the releasing position is further elucidated by the specification describing preferred embodiments of the repulsion generating member. One disclosed embodiment is a torsion spring that is in a compressed condition when the operating lever is in a

locking position. *Id.*, 3:8-11. A second embodiment discloses magnets placed opposite each other on the body and operation lever, oriented such that the north poles face each other, causing a repulsion when the operating lever is in the locking position. *Id.*, 4:35-50. “When the operating lever 12 is positioned between the releasing position and the locking position, the operating lever 12 will return to the releasing position under the action of the repulsion force between the two magnets...” *Id.*, 4:35-55.

47. The Challenged Claim includes a repulsion generating member disposed in the locking device and “generating a repulsion force for application to the operating lever during the movement of the operating lever from the releasing position to the locking position.” A POSITA having read the specification would have understood that the claimed repulsion generating member repulses the operating lever as the user attempts to move it into the locking position, whereby if movement into the locking position is not completed, the repulsing force generated by the repulsion generating member, would bias the operation lever back towards the releasing position, indicating to her that the locking member is not locked.

48. Accordingly, I submit that the appropriate construction of the term “repulsion generating member” in the Challenged Patent is: a member that

generates a force repulsing the operating lever away from the locking position and towards the releasing position.

VIII. Background Technology Known By Persons Of Ordinary Skill In The Art

49. A POSITA would have known that the problems – and solutions – asserted in the Challenged Patent had existed long before its earliest priority date.

A. Electric Mowers Already Had Telescopic Handles

50. Electric lawnmowers were known since the 1920's, if not earlier, and battery-powered lawnmowers date at least to the 1950's. Examples include Langdon, U.S. 5,209,051 and Reichart, GB2,386,813. (TTI1012 and TTI1007.)

51. A POSITA would have turned to Langdon (TTI1012, U.S. 5,209,051) which included two telescoping members 62, 82, with locking means 69 to reduce the mower's storage footprint. *Id.*, 4:1-20. Langdon's telescoping tubes 62, 82 were lengthwise adjusted by a "spring biased pin [69] to lock the handles in [an] operative push position." *Id.*, 4:6-8; Figure 5.

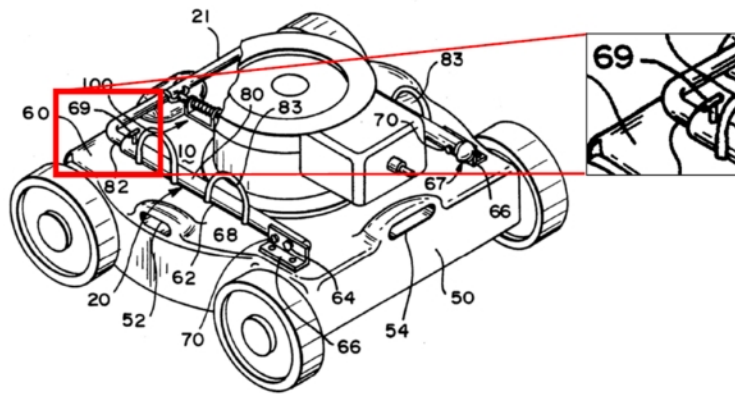
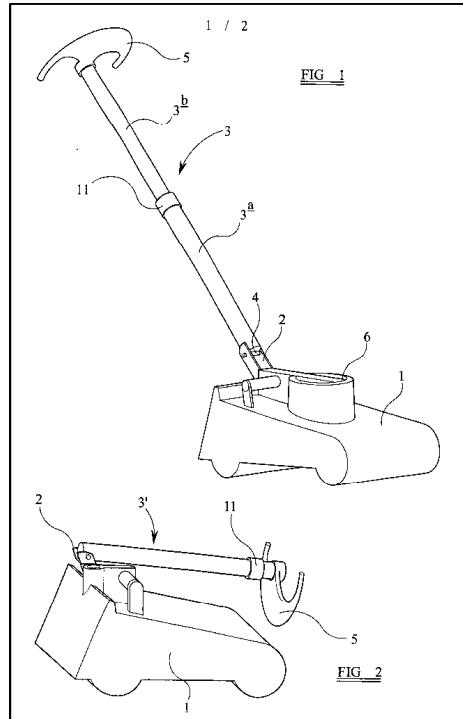
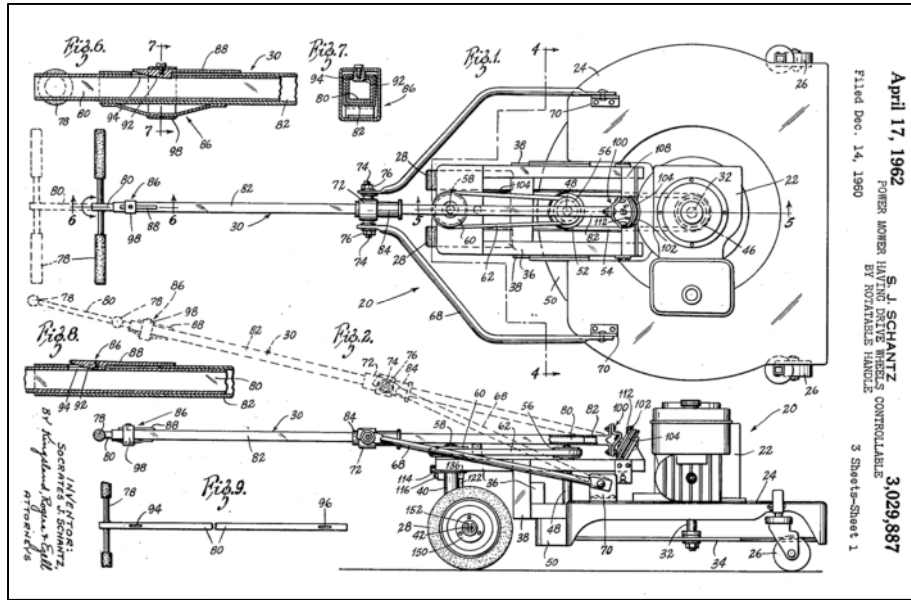


FIG. 5

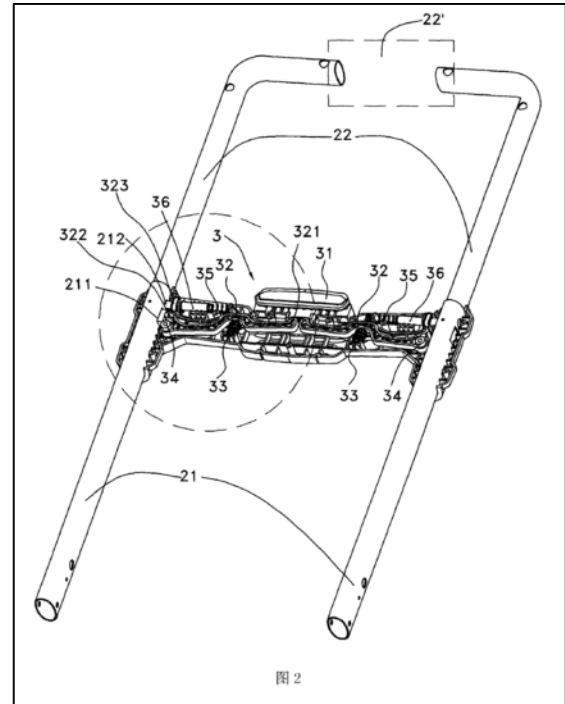
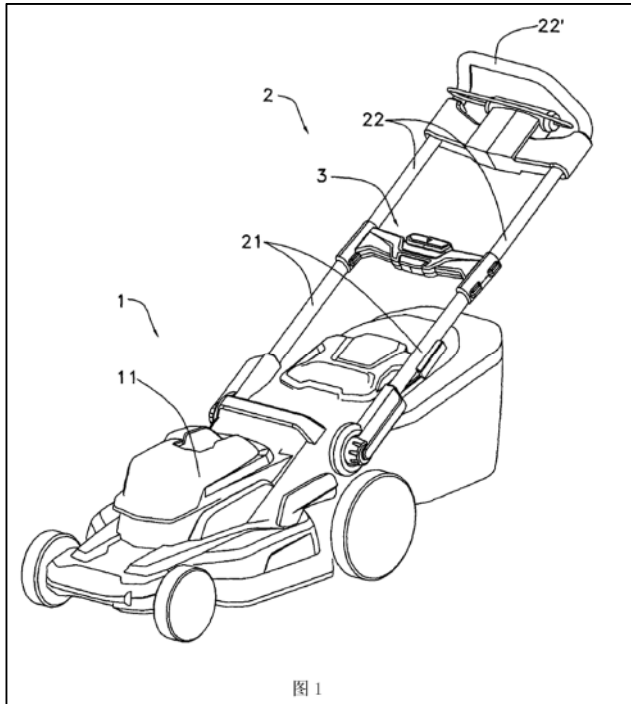
52. Yet another mower taught by Reichart (TTI1007, GB 2,386,813) put many of these ideas together with a telescoping handle 5 that preferably locked at an in-use angle but could rotate to a vertical non-use position or all the way over the main body for storage. *Id.*, 4:8-20; Figures 1-2. As with previous examples, above, Reichart contemplates a cut-grass collector at the rear of the mower. *Id.*, 2:1-10.



53. Schantz (TTI1034, U.S. 3,029,889) is an even older electric lawnmower (3:19-23) whose handle 30 included a telescoping tube 80 nested inside a handle extension 82. *Id.*, 3:65-72; Figures 1-3, 5-9. The tubes were locked in place lengthwise by a spring-biased detent 92 that mated with one of several aligned holes 94, 96 and itself was held in place by a slidable, locking ring 98. *Id.*, 3:73-4:19; 6:18-25.



54. By 2011, the Patent Owner itself had publicly disclosed a push-type lawn mower whose handle retracted thanks to plural telescoping handle members. TTI1020 (CN202019551U), Figs. 1-4 (note members 21, 22).



B. By 2012, ANSI Standards and Federal Regulations Required Safety Mechanisms To Keep Users at a Safe Distance From a Lawn Mower's Motor

55. A POSITA would know that well before 2012, industry guidelines and governmental regulations imposed many restrictions intended to make lawnmowers more safe. Among them were U.S. federal regulations codified at 16 CFR 1205 (effective 1982; exhibit TTI1008 is the January 1, 2012 edition) which applied to electrically powered mowers as well as those powered by a gasoline engine (*id.*, 1205.3(7), (9)); and ANSI B71.1 (TTI1030) which provided industry guidance. They “prescribe[d] safety requirements for certain walk-behind

[consumer-grade] power lawn mowers ... intended to reduce the risk of injury to consumers....” TTI1008, 1205.1(a). Accordingly, a POSITA would have been motivated to design lawnmowers according to those regulations, and to make obvious modifications to turn non-complying mowers in the prior art into compliant designs.

IX. GROUND 1: CLAIM 1 IS OBVIOUS UNDER AIA 35 U.S.C. § 103 OVER LANGDON (U.S. 5,209,051) IN VIEW OF WU (U.S. 7,179,200) AND SCHANTZ (U.S. 3,029,887).

56. Langdon (TTI1012) was published May 11, 1993, before the earliest foreign priority date of October 10, 2013, before the earliest foreign priority date of October 23, 2013, claimed by the '805 patent. It qualifies as prior art under AIA 35 U.S.C. 102(a)(1) as a “patented [or] printed publication ... before the effective filing date of the claimed invention[.]”

57. Wu (TTI1035) was filed August 3, 2005, before the earliest alleged effective priority date claimed by the '805 patent, and qualifies as prior art under 35 U.S.C. 102(a)(2).

58. Neither Langdon nor Wu was cited in the '805 patent or its prosecution history.

[IP]³ 1. A mower, comprising:

59. If the preamble is deemed a limiting element of the claim, then Langdon discloses a mower. The “Title of Invention” is “Lawn Mowers including Push Handles,” and its Abstract indicates that the disclosure is directed to a “rotary lawn mower...” TTI1012, at 1. Figure 5 illustrate a walk-behind lawnmower with a telescoping handle 21, shown below collapsed and folded for storage:

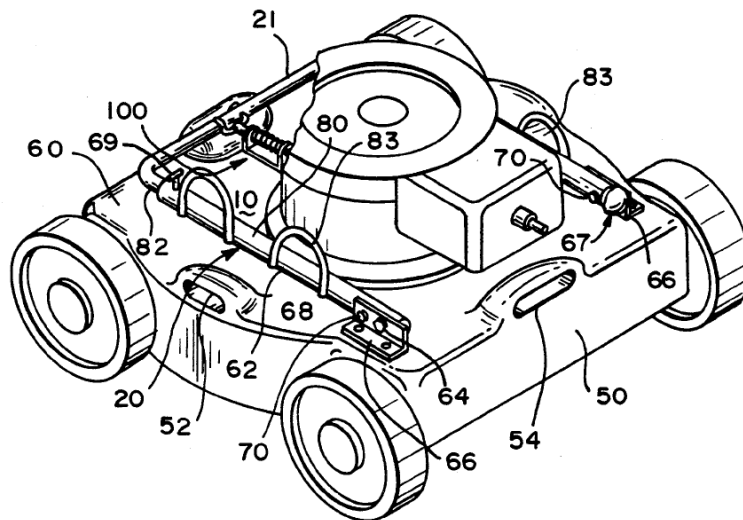


FIG. 5

³ Counsel added these reference letters to help track the claim language.

[1a] a main body;

60. Langdon's mower has a main body "deck 10 having a substantially flat upper portion and downwardly extending edge portions." TTI1012, 2:3-5.

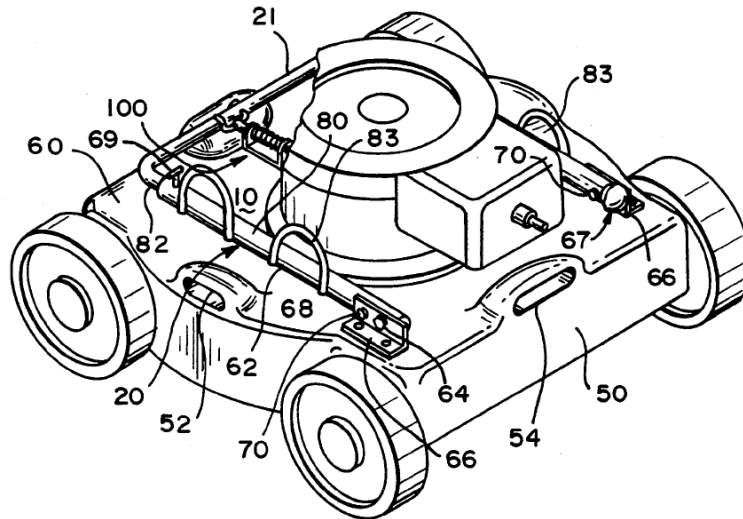
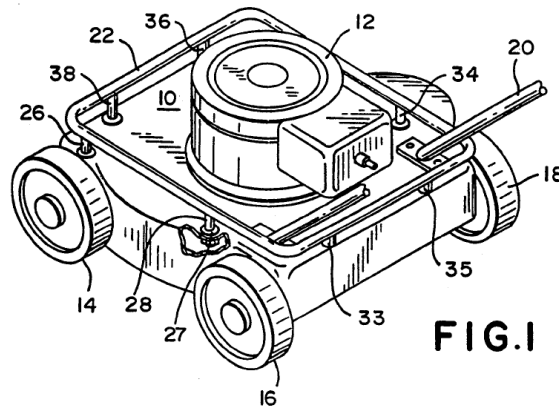


FIG. 5

[1b] four wheels supporting the main body; and;

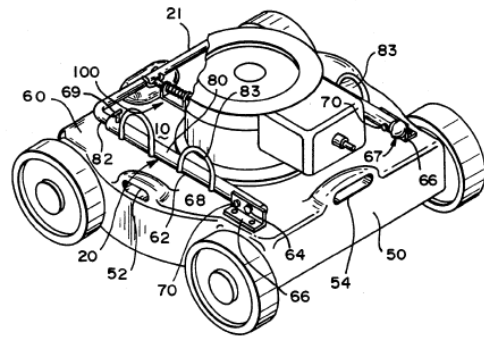
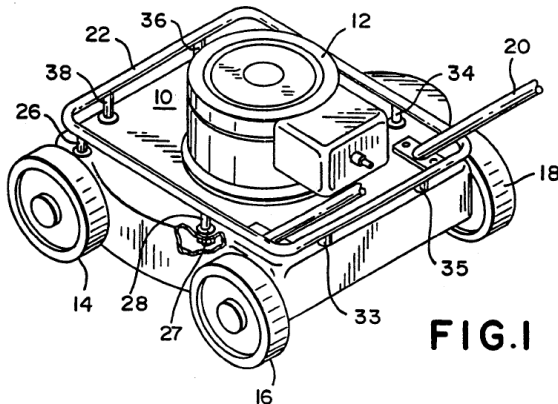
61. Langdon's mower utilizes four wheels supporting the main body.
"Fig. 1 is a pictorial view of one embodiment of the invention." TTI1012, 2:2-3.



62. “Four wheels with three of the wheels typically illustrated at reference numerals 14, 16, and 18 are affixed to opposite edges of the mower deck. The fourth wheel is not visible in this view.” TTI1012, 2:10-13.

[1c] a handle connected to the main body, the handle comprising a telescopic rod, wherein the telescopic rod comprises: an inner tube; an outer tube; and

63. Langdon discloses a handle connected to the main body, handle[s] 20. “In operation, the operator pushes on a handle 20 to propel the mower along the ground to mow vegetation.” *Id.*, 2:13-15.



64. Further, Langdon's mower includes handles 20 connected to the main body, deck 10, via brackets 66.

65. According to the specification, "push handles 20 comprise a lower tubular portion 62 pivotally attached by pivot means 64 to brackets 66 mounted on the deck 10." TTI1012, 4:2-4. Each of Langdon's handle[s] 20 further comprise telescopic rods, inner tube ("upper push handle portion 82"), which slides into outer tube ("lower tubular portion 62").

66. "The upper hand gripping portion 21 of the handles 20 comprise tubular members 82, one shown, which are telescoped upwardly and inwardly into tubular member 62. By this construction, the upper push handle portion 82 is pushed into lower member 62 thereby shortening the overall length of the push

handles attached to the deck 10. When collapsed as shown at 80, the push handle is approximately the length of the deck.” TTI1012, 4:12-20. A POSITA would understand the combination of upper push handle portion 82 and lower member 62 (also called “lower tubular portion 62”) to constitute a telescopic rod further constituting a handle for the mower’s main body.

[1d] a locking device, wherein the inner tube is slidably connected to the outer tube, the locking device locking the relative position between the inner tube and the outer tube, wherein the locking device comprises: a pivoting shaft; an operating lever; a base; and a repulsion generating member, the base being sleeved on the outer tube and the pivoting shaft being arranged on the base, a first end of the operating lever being provided with a locking member for rotating around the pivoting shaft relative to the base, the repulsion generating member being arranged between the base and the operating lever and generating a repulsion force for application to the operating lever during the movement of the operating lever from the releasing position to the locking position,

67. Langdon discloses a locking device, locking means 69, wherein the inner tube, upper push handle portion 82, is slidably connected to the outer tube, lower tubular portion 62, and the locking device means 69 locks the relative position between the inner tube and the outer tube. *Id.*, 4:1-20. Langdon’s telescoping tubes 62, 82 are held in place by a “[s]uitable locking means 69 such as a spring biased pin to lock the handles in [an] operative push position.” *Id.*, 4:6-8; Figure 5.

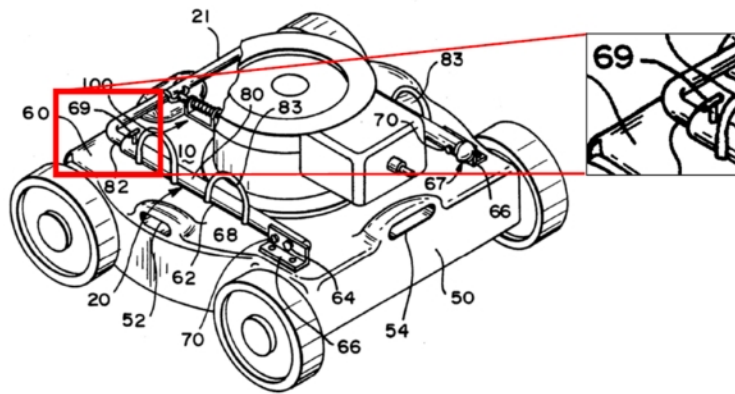
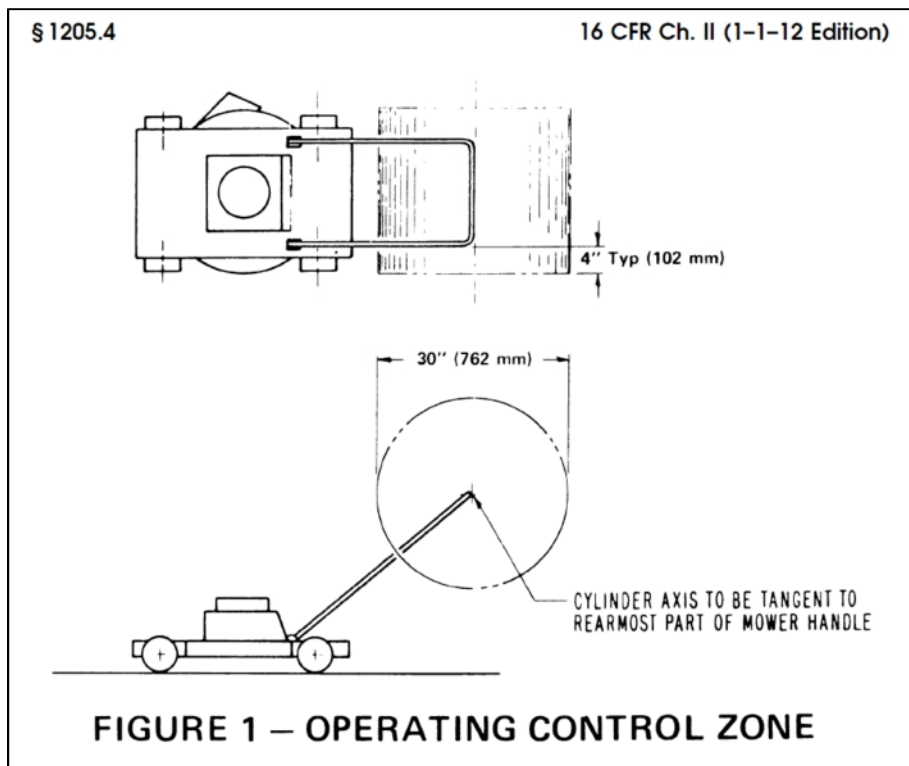


FIG. 5

68. A POSITA would have recognized that a significant drawback to Landon's lockable, telescoping handle is its inability to adjust to different lengths so that persons of different heights could comfortably and ergonomically work with the mower. Accordingly, a POSITA would have been motivated to make the handle's length adjustable.

69. In addition, well before the oldest priority date claimed by the Challenged Patent, safety requirements were increasingly imposed on the lawnmower industry. Among them were U.S. federal regulations codified at 16 CFR 1205 (effective 1982; exhibit TTI1008 is the January 1, 2012 edition) which applied to electrically powered mowers as well as those powered by a gasoline engine (*id.*, 1205.3(7), (9)) and "prescribe[] safety requirements for certain walk-

behind [consumer-grade] power lawn mowers ... intended to reduce the risk of injury to consumers....” TTI1008 (1205.1(a)). Those regulations required the motor’s normal starting controls to be “located within the operating control zone” which was defined essentially as a cylinder within 15 inches of the rearmost part of the mower handle. TTI1008 (1205.3(a)(11) (*see* definitional illustration below); 1205.5(c)).



70. Also among safety requirements were those that were included in the American National Standards Institute, Inc. industry standard ANSI/OPEI B71.1-2003 (updated version ANSI/OPEI B71.1-2012 revised/issued April 23, 2012)

“Safety Specifications for Consumer turf Care Equipment - Walk-Behind Mowers and Ride-On Machines with Mowers.” TTI1030. This industry standard, in section 10.7.2, required “A positive up stop shall be provided that does not allow the rearward part of the handle to come closer than 700 mm (30 in) horizontally behind the closest path of the mower blades during normal operation.” TTI1030 at 16.

71. A POSITA would have recognized that one of the purposes of defining the “operating control zone” to be near the user was to keep control components away from the blade and lawnmower’s main body, and that the positive up stop required the control on the rearward part of the handle to be kept away from the mower blades. A POSITA would have further recognized that Langdon’s collapsible handle could bring its control components too close to the lawnmower main body to be considered safe for activation. First, the small size of Langdon’s spring biased pin 69 gives little visible indication to the user whether it is indeed locked into a through-hole. The pin 69 itself is notably small, and its engagement into the inner tube's intended locking through-hole might be so unclear or subtle that a user would be hard-pressed to discern that the tubes are successfully locked in place and/or whether the pin 69 has been jostled to an unlocked state during use. Second, when the handle is extended to its use position,

the pin 69 would be positioned approximately halfway down the handle, far enough away from the operator that the locked or unlocked state of the mechanism may not be noticed. Third and perhaps most importantly, the pin 69 would be located at the less visible underside of the handle when the handle is rotated to its use position, making it less likely that a user would notice if it is unlocked or becoming unlocked. Accordingly, a POSITA would have been motivated to adopt improved safety measures into Langdon's lawnmower to reduce the chance of injury to the user, and specifically to prevent the user from mistaking that the telescoping handle is not locked and unsuitable for safe operation. In other words, Langdon's handle can collapse or be on the verge of collapsing if locking means 69 is not properly locked in operational position, and the user might not notice the handle's dangerous condition. A POSITA would have understood Wu to offer obvious safety solutions for Langdon's mower.

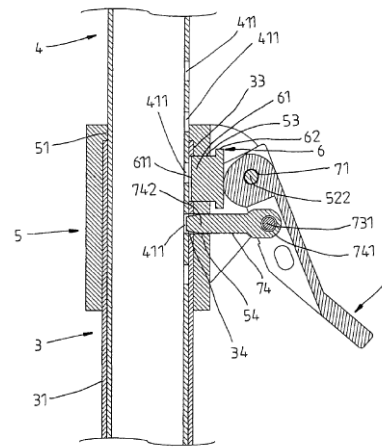
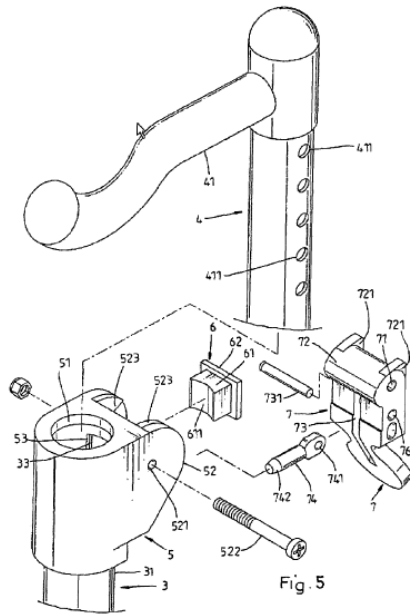
72. A POSITA would have been motivated to find safe alternatives to use as the locking means 69 in the Langdon telescoping mower handle. Such a POSITA would not have limited herself to telescoping handles in lawn equipment, but would broaden her search to include the myriad examples of telescoping handles throughout the mechanical arts. Telescoping handles were ubiquitous in the mechanical arts by 2012, and in some applications, preventing a telescoping

handle from collapsing and/or indicating when the handle was safely locked in an extended position was of paramount importance to prevent accidents. Particularly, a POSITA would be motivated to look to examples of locking telescoping handles where a person is pushing or walking behind a heavy load, and thus collapsing could cause injury and must be avoided.

73. Furthermore, the art itself suggests using a clamping device to hold two telescoping tubes at the proper length in a lawnmower. For instance, Reichart teaches that “[i]t is particularly advantageous to lock the telescoped tube parts by clamping devices in their length and which are operable by a box nut and fix the telescoped tube parts in a positive and/or non-positive manner with respect to one another.” *See, e.g.*, TTI1007 (Reichart), 2:20-23.

74. Wu teaches a lock for a telescoping handle. Wu directly addresses the concern that if the lock on an adjustable handle bar is not fastened tight, the handle bar may fall accidentally, resulting in an accident. TTI1035, 1:17-20. Wu addresses the problem by introducing a lock including a holder block fixed to an outer tube of a telescoping rod, a locking lever pivoted to the holder block for moving a locating rod into vertically aligned locating holes in the outer and inner

tubes of the telescoping rod, and a holding down block to compress the locking lever against the inner tube. TTI1035 at 1:27-40.



A pivoting shaft.

75. Wu discloses a locking device comprising a pivoting shaft, specifically, a pivot bolt 522. TTI1035, 2:63-67. This pivoting shaft is used to connect the locking lever to the holder block. *Id.* “The locking lever 7 comprises a cam 72 transversely disposed at the top, a first pivot hole 71 axially extending through the cam 72 and pivotally connected between the pivot holes 521 of the side lugs 52 of the holder block 5 by a *pivot bolt* [522]. . .” *Id.* The Wu pivot bolt

serves the exact same purpose as the '805 pivoting shaft – connecting the operation lever (locking lever 7) to the base (holder block 5).

An operating lever.... a first end of the operating lever being provided with a locking member for rotating around the pivoting shaft relative to the base.

76. Wu discloses a locking device comprising an operating lever, specifically, locking lever 7. “The adjustment structure is comprised of a holder block 5, a holding down block 6, and a locking lever 7 (see FIGS. 5 and 8).”

TTI1035, 2:35-37.

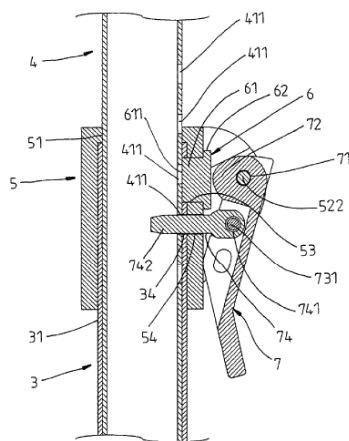
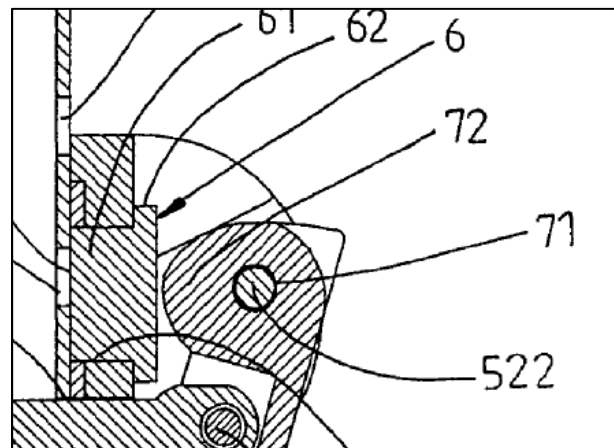


Fig. 9



77. Furthermore, the Wu locking device includes a locking member, cam 72, provided at a first end of the operating lever for rotating around the pivoting shaft relative the base: “The locking lever 7 comprises a cam 72 transversely

disposed at the top, a first pivot hole 71 axially extending through the cam 72 and pivotally connected between the pivot holes 521 of the side lugs 52 of the holder block 5 by a pivot bolt, ... , a second pivot hole 76 transversely extending across the sliding groove 73, and a locating rod 74 ... insertable through the locating hole 54 of the holder block 5 and the locating hole 34 of the respective vertical main frame bar 3 into one of the locating holes 411 of the respective handlebar 4 to lock the respective handlebar 4 to the respective vertical main frame bar 3 at the desired elevation.” TTI1035, 2:63-3:14.

78. A POSITA would understand that cam 72, being offset from the pivotal axis defined by pivot hole 71, rotates around the pivoting shaft relative to the base, as required by this limitation.

79. Further, Wu's locking lever 7 performs the same task in the same way as the '805 patent's operation lever 12: “When turning the locking lever 7 toward the holder block 5, the positioning tip 742 of the locating rod 74 will be forced through the locating hole 54 of the holder block 5 and the locating hole 34 of the respective vertical main frame bar 3 into one of the locating holes 411 of the respective handlebar 4 (see FIG. 9). At this time, the cam 72 will be forced against the holding down block 6, causing the inwardly curved front surface 611 of the

holding down block 6 to hold the handlebar 4 in the respective vertical main frame bar 3, and therefore the handlebar 4 is locked to the respective vertical main frame bar 3 at the desired elevation. On the contrary, when reversed the locking lever 7, the positioning tip 742 of the locating rod 74 is disengaged from the respective locating hole 411 of the respective handlebar 4, allowing the handlebar 4 to be moved vertically relative to the respective vertical main frame bar 3 to the desired elevation (see FIG. 8).” TTI1035 3:15-31. Wu’s forcing the locating rod 74 disposed on locking lever 7 through locating hole 34 of the vertical main frame bar 3 and locating hole 411 of the handlebar 4 is exactly the same as the '805 patent forcing locking reinforcement member 12b of operation lever 12 through hole 22c of the outer tube 22 and hole 21 a of the inner tube 21 to effect locking the two telescoping tubes in place relative to each other.

A base..., the base being sleeved on the outer tube and the pivoting shaft being arranged on the base.

80. Wu discloses a locking device comprising a base, namely holder block 5. Like in the '805 patent, holder block 5 is sleeved on the outer tube (vertical main frame bar 3), and the operation lever (locking lever 7) is arranged on the base via a pivoting shaft (pivot bolt 522):

81. “The holder block 5 is fixedly fastened to the top end 31 of the respective vertical main frame bar 3, comprising a vertical coupling hole 51, which receives the top end 31 of the respective vertical main frame bar 3, a transverse insertion slot 53 and a locating hole 54 disposed in communication with the vertical coupling hole 51 corresponding to the longitudinal sliding slot 33 and locating hole 34 of the respective vertical main frame bar 3 respectively (see FIG. 5), two parallel side lugs 52, each side lug 52 having a transversely extending pivot hole 521 for the connection of the locking lever 7, and two stop blocks 523 respectively formed integral with the side lugs 52 for stopping against a respective stop block 721 of the locking lever 7 to limit the turning angle of the locking lever 7 relative to the holder block 5 (see FIG. 5).” TTI1035 at 2:41-55.

A repulsion generating member... the repulsion generating member being arranged between the base and the operating lever and generating a repulsion force for application to the operating lever during the movement of the operating lever from the releasing position to the locking position.

82. Langdon discloses a “spring biased pin to lock the handles in [an] operative push position,” lower tubular portion 62 with upper push handle portion 82. *Id.*, 4:6-8; Figure 5.

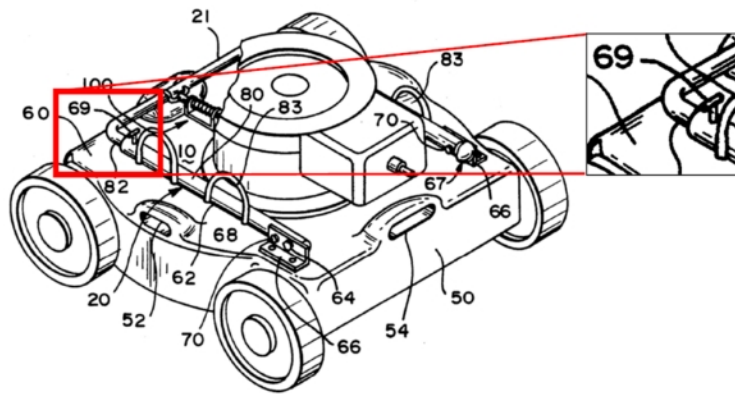
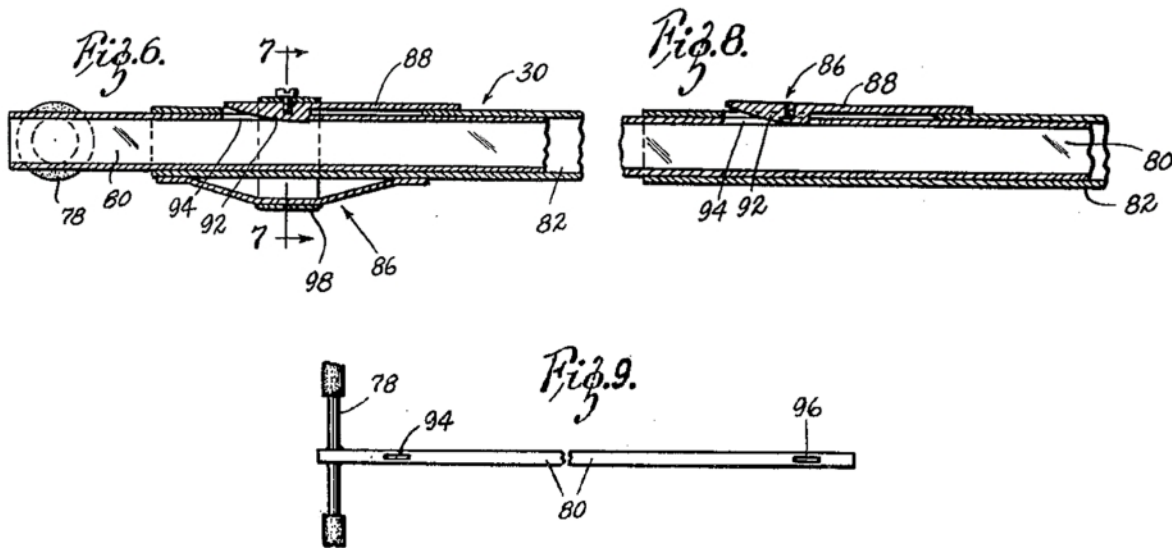


FIG. 5

83. In combining the locking pin of Langdon with Wu's locking device, a POSITA would have found it obvious to retain the disclosed spring, disposing it between the operating lever (locking lever 7) and the base (holding block 5) to continue biasing the locking pin of Wu (locating rod 74). However, a POSITA would have understood that unlike in basic Langdon where nothing but the spring holds the locking pin 69 in place, the locking lever 7 of Wu does not require biasing toward the locking position to keep the locating rod 74 engaged through the holes in the two telescoping tubes. This is because cam 72's force against the holding down block 6 works to hold the locking lever 7 in place, which in turn applies a force to hold locating rod 74 engaged through the holes in the two telescoping poles. Therefore, the need to bias the spring towards the locking position to hold the locking pin in the locking position no longer exists.

84. The prior art does disclose, however, a benefit to using a spring biased to *repulse* the locking pin towards the releasing position (unlocked) when some other means is used to hold the locking pin in place, as in Wu. A POSITA would, for instance, have been motivated to apply the teachings of Schantz, to bias the spring to repulse the locking pin. See TTI1034, 4:2-10.



85. Schantz teaches a telescoping handle for a lawnmower, locking the inner tube (“interior handle shaft element 80”) and outer tube (“handle extension shaft 82”) with a locking means 86. TTI1034, 3:65-4:1. The locking means comprises a locking member 88 comprising a “spring biasedly connected to the outer handle extension element 82” (the base). *Id.*, 4:1-3. A POSITA would understand from the drawings that this locking member 88 is a lever. The locking

member 88 comprises at one end a detent locking head 92 (analogous to the locking pin of Langdon and Wu) connected to outer pipe 82, and “adapted to be locked into locking slots 94 and 96” on inner tube 80. *Id.*, 4:1-6. This locking head 92 “is biased *out of engagement* with the slots,” and is held in to the slots by a locking ring 98, which “slid[es] into contact with the locking member 88 to depress the locking element into the slots to secure the locking engagement.” *Id.*, 6-10. In other words, the “spring biasedly connected to the outer handle extension element 82” forming the locking member 88 *repulses* the locking pin toward its releasing position. A POSITA would recognize that the locking member being “biased out engagement with the slots” also holds the locking ring 98 in place when the locking member is engaged in the slots, but would prevent the locking ring 98 from seating if the locking head 92 was not engaged in a slot. Thus, the outward bias provides the user with a visual indication that the telescoping handle is correctly locked.

86. Thus, Schantz teaches using a spring to repulse the lever guiding the locking pin into its releasing position. A POSITA would have been motivated to employ the biased out arrangement of Schantz to similarly bias out the lever of Wu, gaining the benefit an unlocked device is clearly, visually, unlocked.

[1e] wherein the inner tube has a first through hole and the outer tube has a cooperating second through hole, the operating lever further comprises a locking reinforcement member for engagement with the first through hole and the second through hole simultaneously when the first through hole and the second through hole are aligned and the locking member is moved towards the locking position, and

87. A POSITA would understand that the inner tube in Langdon's telescopic handle, upper push handle portion 82, has a first through hole, and the outer tube, lower tubular portion 62, has a second through hole, because the specification discloses that the two parts can be fixed relative to each other by "[s]uitable locking means 69 such as a spring biased pin to lock the handles in [an] operative push position." TTI1012, 4:6-8; Figure 5. A POSITA would understand that the "pin" fits through holes in both tubes to lock them together, as is ubiquitous in the art. The first through hole in the upper push handle portion 82 analogizes to locating hole 411 of the handlebar in Wu, while the second through hole in the lower tubular portion 62 analogizes to the locating hole 34 of the vertical main frame bar 3 in Wu. TTI1035 (Wu), 3:15-20.

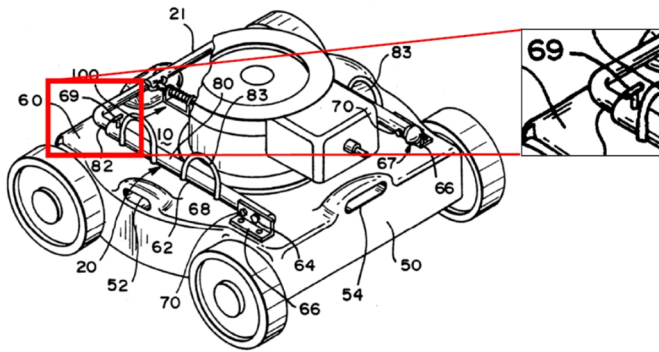


FIG. 5

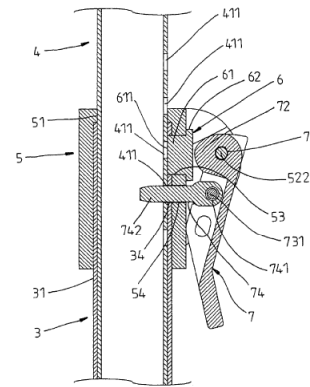


Fig. 9

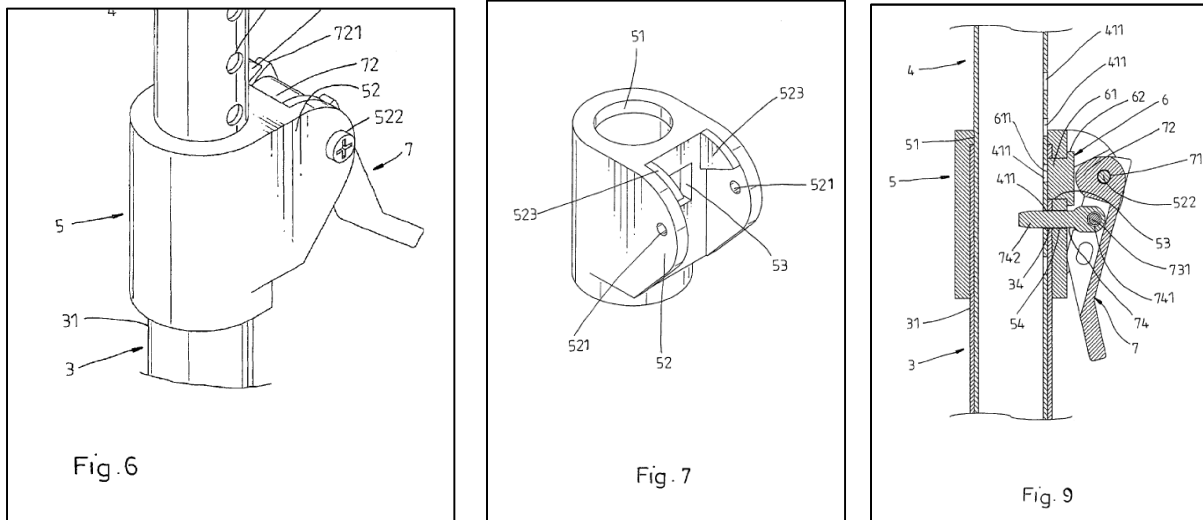
88. When combined with Wu, the combined locking means exhibits an operating lever (locking lever 7) that further comprises a locking reinforcement member (locating rod 74) for engagement with the first through hole (locating hole 411) and second through hole (locating hole 34) simultaneously when the first through hole and the second through hole are aligned and the locking member (locating rod 74) is moved towards the locking position. TTI1035 (Wu), 3:15-20.

[1f] wherein a second end of the operating lever opposite to the first end of the locking member is provided with a friction portion, and when the operating lever is rotated to the locking position the friction portion is frictionally engaged with the outer wall of the base.

89. Wu discloses side lugs 52 as forming part of the outer wall of the base, holder block 5. A POSITA would have understood from the figures that when locking lever 7 is rotated into the locking position, it is rotated such that the

end opposite the pivot (the second end) moves towards holder block 5, and between side lugs 52, resting proximal to the vertical main frame bar 3. TTI1035

Figs. 6, 7, 9 (locked position).



90. A POSITA would have understood that any contact between locking lever 7 and side lugs 52 would constitute a friction portion on locking lever 7 (as well as on side lugs 52). If the side lugs 52 and locking lever 7 are dimensioned such that the lugs cover the length of locking lever 7, the contact at the far end would thus cause frictional engagement between the non-pivot (second) end of locking lever 7 and the portion of the outer wall of the base, holder block 5, formed into side lugs 52. To the extent that Wu does not disclose such contact, a POSITA would have found it obvious to size the locking lever 7 such that it would create

contact with side lugs 52 at the second end of locking lever 7, to gain the benefits of using friction to assist in holding the locking lever 7 in place.

91. A POSITA would have also considered altering Wu's locking lever 7 with the lever of Pronzati. Pronzati discloses a similar clamp style lock as Wu, whereby each operative part of the Pronzati clamp has an analog in the Wu clamp. Pronzati, like Wu, discloses a lever, lever 32, attached to a base, cylindrical body 11, that swings about pivot, pin 25, to affix two telescoping tubes, tubes 2 and 3, when the lever is moved into a locking position. TTI1033 (Pronzati), Figs. 4, 5; 3:1-7; 3:18-37. Pronzati also discloses rounded protrusions it calls "side teeth 40" on the end 39 of the lever 32 opposite the pivot pin 25. *Id.*, 3:56-4:2,

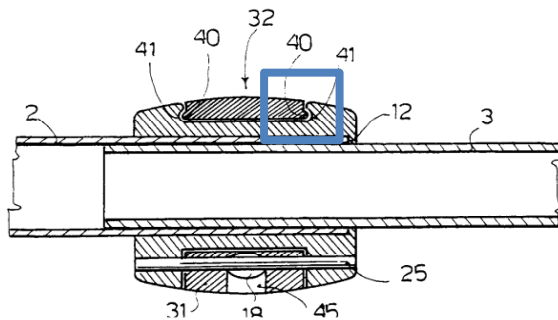


FIG. 4

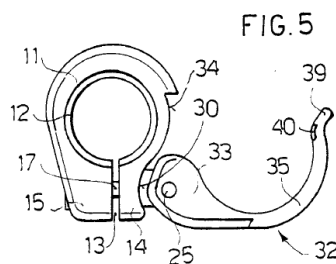
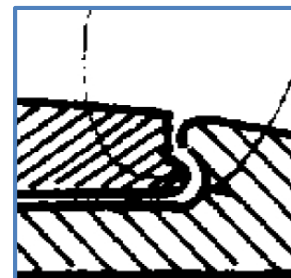


FIG. 5

TTI1033, Pronzati Figs. 4, 5

92. These side teeth 40 “engage in corresponding hollows 41 provided in [the] opposite side walls 37, 38 of the cylindrical body 11, causing a click of the lever [32] during closing.” *Id.* This forms a “weak” coupling between the lever 32 and the cylindrical body 11, that present a “resistance” “to be overcome” when the user desires to open the lever 32. *Id.*, 4:32-36. A POSITA would understand that this “resistance” is friction.

93. The side teeth 40 cause the Pronzati lever 32 to be purposely slightly wider than the gap in the cylindrical body 11 through which the lever passes to transition between the locking and releasing positions. TTI1034, Fig. 4. Therefore, when transitioning between the locking and releasing positions, the side teeth 40 drag across a portion of cylindrical body 11 to reach or escape corresponding hollows 41. This dragging results in a frictional engagement, as frictional force thus holds the side teeth 40 in the hollows 41, or resists their entry into the hollows 41. As such, the side teeth 40 on the locking member, lever 22, comprise a “friction portion frictionally engaged with the outer wall of the base,” cylindrical body 11, in satisfaction of this limitation.

X. GROUND 2: CLAIM 1 IS OBVIOUS UNDER AIA 35 U.S.C. § 103 OVER LANGDON (U.S. 5,209,051) IN VIEW OF IDOTA (JP 2003 130 017).

94. Langdon (TTI1012) was published May 11, 1993, before the earliest foreign priority date of October 10, 2013, before the earliest foreign priority date of October 23, 2013, claimed by the '805 patent. It qualifies as prior art under AIA 35 U.S.C. 102(a)(1) as a “patented [or] printed publication ... before the effective filing date of the claimed invention[.]”

95. Idota (TTI1031, TTI1032) was published May 8, 2003, before the earliest foreign priority date of October 10, 2013, before the earliest foreign priority date of October 23, 2013, claimed by the '805 patent. It qualifies as prior art under AIA 35 U.S.C. 102(a)(1) as a “patented [or] printed publication ... before the effective filing date of the claimed invention[.]”

96. Neither Langdon nor Idota was cited in the '805 patent or its prosecution history.

[1P] 1. A mower, comprising:

[1a] a main body;

[1b] four wheels supporting the main body; and;

[1c] a handle connected to the main body, the handle comprising a telescopic rod, wherein the telescopic rod comprises: an inner tube; an outer tube; and

97. See discussion of these limitations with respect to Ground 1, *supra*.

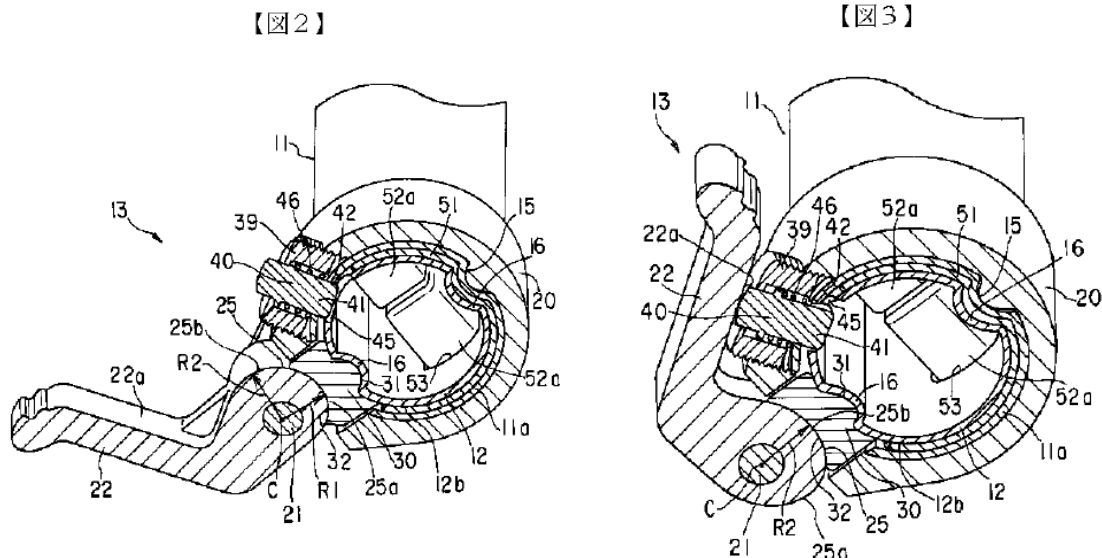
[1d] a locking device, wherein the inner tube is slidably connected to the outer tube, the locking device locking the relative position between the inner tube and the outer tube, wherein the locking device comprises: a pivoting shaft; an operating lever; a base; and a repulsion generating member, the base being sleeved on the outer tube and the pivoting shaft being arranged on the base, a first end of the operating lever being provided with a locking member for rotating around the pivoting shaft relative to the base, the repulsion generating member being arranged between the base and the operating lever and generating a repulsion force for application to the operating lever during the movement of the operating lever from the releasing position to the locking position,

98. Langdon discloses a locking device, as described above with respect to this limitation, *supra*, and a POSITA would be motivated to look to examples of locking telescoping handles to implement Langdon's locking means 69.

99. Again, the art itself suggests using a clamping device to hold two telescoping tubes at the proper length in a lawnmower. For instance, Reichart teaches that “[i]t is particularly advantageous to lock the telescoped tube parts by clamping devices in their length and which are operable by a box nut and fix the

telescoped tube parts in a positive and/or non-positive manner with respect to one another.” *See, e.g.,* TTI1007 (Reichart), 2:20-23.

100. Idota teaches such a lock for a telescoping handle. Idota directly addresses the concern of creating a telescoping handle that will not buckle under a large load. TTI1032, Abstract. Idota addresses the problem by introducing a lock including a base member 20 fixed to a first pipe 11 of a telescoping rod, a locking lever 22 pivoted to the base member 20 for moving a locking member 40 into vertically aligned holes in the first pipe 11 and second pipe 12 of the telescoping rod, and a pushing member 30 to compress the lever 22 against the inner tube. TTI1032 at 1:27-40.



A pivoting shaft.

101. Idota discloses a locking device comprising a pivoting shaft, specifically, a shaft 21. TTI1032, [0012]. According to Idota, the “clamping mechanism 13 comprises a base member 20 that is secured to an end portion 11a of the first pipe 11. A lever 22 is attached to a shaft 21 that is provided on the base member 20, as depicted in FIG. 2. The lever 22 can rotate, on the shaft 21, between the unlocking position depicted in FIG. 2 and the locking position depicted in FIG. 3.” *Id.*

102. The Idota pivot shaft 21 serves the exact same purpose as the '805 pivoting shaft – connecting the operation lever (lever 22) to the base (base member 20).

An operating lever.... a first end of the operating lever being provided with a locking member for rotating around the pivoting shaft relative to the base.

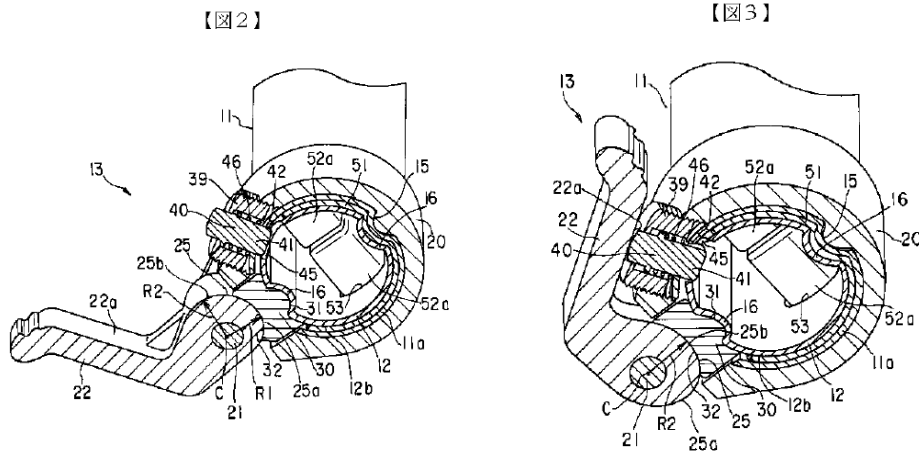
103. Idota discloses a locking device comprising an operating lever, specifically, lever 22.

104. The Idota telescopic pipe comprises “a first pipe 11, a second pipe 12, and a clamping mechanism 13. The clamping mechanism 13 is equipped with a

base member 20 that is provided on the first pipe 11, a lever 22, a pressing member 30, a locking member 40, and a locking hole 45 that is formed in the second pipe 12. The pressing member 30 is able to move in the radial direction of the second pipe 12. When the lever 22 is operated to the locking position, the pressing member 30 is pressed in the direction of the outer peripheral surface 12b of the second pipe 12 by a cam face 25, and a tip end portion 41 of the locking member 40 is inserted into the locking hole 45 through the locking member 40 being pressed by the inner surface 22a of the lever 22.” TTI1032, Abstract.

105. Furthermore, the Idota locking device includes a locking member, cam surface 25, provided at a first end of the operating lever for rotating around the pivoting shaft relative the base. “The lever 22 has a cam face 25 that functions as the cam means. The cam face 25 comprises a first cam face 25a and a second cam face 25b, which are structured from arc-shaped curved surfaces. The distance R1 from the center C of the shaft 21 to the first cam face 25a is less than the distance R2 from the center C of the shaft 21 to the second cam face 25b.” TTI1032, [0013].

106. A POSITA would understand that cam surface 25, being offset from the pivotal axis defined by pivot center C, rotates around the pivoting shaft relative to the base, as required by this limitation.



107. Further, Idota's lever 22 performs the same task in the same way as the '805 patent's operation lever 12. "A pressing member 30 is provided between the cam face 25 and the second pipe 12. The tip end face 31 of the pressing member 30 faces the outer peripheral surface 12b of the second pipe 12. The tip end face 31 fits into the groove portion 16 of the second pipe 12. A recessed portion 32, formed on the outer surface side of the pressing member 30, faces the cam face 25." TTI1032 [0014].

108. Idota's forcing the locking member 40 disposed on lever 22 through hole 42 of the first pipe 11 and locking hole 45 of the second pipe 12 is exactly the same as the '805 patent forcing locking reinforcement member 12b of operation lever 12 through hole 22c of the outer tube 22 and hole 21a of the inner tube 21 to effect locking the two telescoping tubes in place relative to each other.

A base..., the base being sleeved on the outer tube and the pivoting shaft being arranged on the base.

109. Idota discloses a locking device comprising a base, namely base member 20. Like in the '805 patent, base member 20 is sleeved on the outer tube (first pipe 11), and the operation lever (lever 22) is arranged on the base via a pivoting shaft (shaft 21). The clamping mechanism 13 comprises a base member 20 arranged on the first pipe 11, a lever 22, a pushing member 30, a locking member 40, and a locking hole 45 formed on the second pipe 12. The pushing member 30 is capable of moving to a radial direction of the second pipe 12. When the lever 22 is handled to a locked position, the pushing member 30 is pushed toward an outer peripheral surface 12b of the second pipe 12 by a cam surface 25, and a pointed head portion 41 of the locking member 40 is inserted into the hole 42 so that the locking member 40 is pushed by an inner surface 22a of the lever 22.

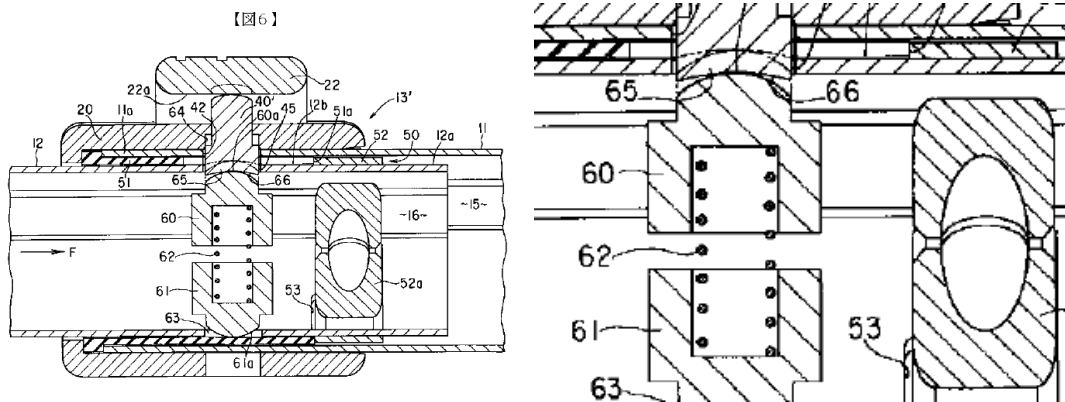
TTI1032 [Abstract].

110. Idota also discloses that clamp mechanism 13 “a base member 20 that is secured to an end portion 11a of the first pipe 11. A lever 22 is attached to a shaft 21 that is provided on the base member 20, as depicted in FIG. 2. The lever 22 can rotate, on the shaft 21, between the unlocking position depicted in FIG. 2 and the locking position depicted in FIG. 3.” TTI1032, [0012].

A repulsion generating member... the repulsion generating member being arranged between the base and the operating lever and generating a repulsion force for application to the operating lever during the movement of the operating lever from the releasing position to the locking position.

111. Idota discloses a repulsion generating member, spring 46, which is arranged between the base (base member 20) and the operating lever (lever 22) and generating a repulsion force for application to the operating lever (lever 22) during the movement of the operating lever from the releasing position to the locking position.

112. “The locking member 40 is biased, by a spring 46, in the direction for removal from the locking hole 45, and when the lever 22 is operated to the locking position, depicted in FIG. 3, the locking member 40 is pressed toward the pipe 12 by the inner surface 22a of the lever 22, so that the tip end portion 41 of the locking member 40 will enter into the locking hole 45.” TTI1032, [0018].



113. A POSITA would understand that spring 46 pushing the lock member 40 away from (“coming out of”) lock hole 45 also applies its force upon the lever 22 as it is in contact with lock member 40 when in the locking position.

114. To the extent that it is argued that the spring 62 is not between the base and the operating lever, a POSITA would have understood that placement inside or outside the base would have performed in the same manner by choosing the appropriate spring, such as a compression spring or an extension spring.

[1e] wherein the inner tube has a first through hole and the outer tube has a cooperating second through hole, the operating lever further comprises a locking reinforcement member for engagement with the first through hole and the second through hole simultaneously when the first through hole and the second through hole are aligned and the locking member is moved towards the locking position, and

115. A POSITA would understand that the inner tube in Langdon’s telescopic handle, upper push handle portion 82, has a first through hole, and the

outer tube, lower tubular portion 62, has a second through hole, because the specification discloses that the two parts can be fixed relative to each other by “[s]uitable locking means 69 such as a spring biased pin to lock the handles in [an] operative push position.” TTI1012, 4:6-8; Figure 5. A POSITA would understand that the “pin” fits through holes in both tubes to lock them together, as is ubiquitous in the art. The first through hole in the upper push handle portion 82 analogizes to locking hole 45 of the second pipe 12 in *Idota*, while the second through hole in the lower tubular portion 62 analogizes to the hole 42 of the first pipe 11 in *Idota*.

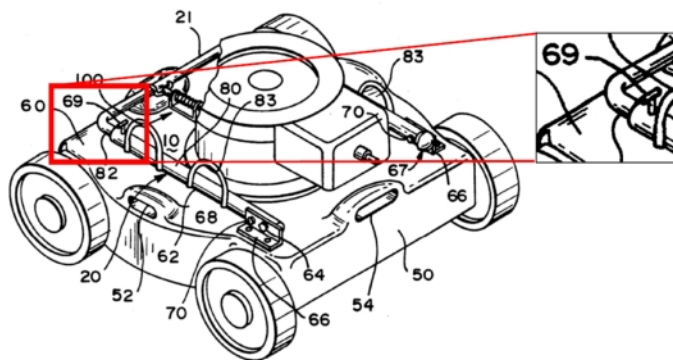
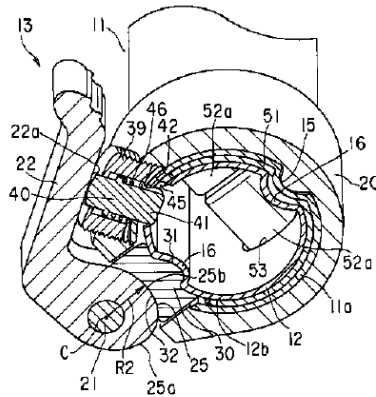


FIG. 5

【図3】



116. When combined with Idota, the combined locking means exhibits an operating lever (lever 22) that further comprises a locking reinforcement member (locking member 40) for engagement with the first through hole (hole 42) and second through hole (locking hole 45) simultaneously when the first through hole and the second through hole are aligned and the locking member (locking member 40) is moved towards the locking position. TTI1032 (Idota) [0018].

117. “When the lever 22 is in the unlocking position, as depicted in FIG. 2 and FIG. 4, the cam face 25 will substantially not press on the pressing member 30. Moreover, because the tip end portion 41 of the locking member 40 is withdrawn from the locking hole 45, the second pipe 12 is able to move in the axial direction in respect to the first pipe 11.” TTI1032 [0021].

118. “When the second pipe 12 is maximally extended from the first pipe 11, further extension of the second pipe 12 is prevented through the retaining member 52 contacting the end face 51a of the intermediate ring 51, as depicted in FIG. 5. In this case, the tip end portion 41 of the locking member 40 will face the locking hole 45.” TTI1032 [0023].

119. “When, in this state, the lever 22 is operated to the locking position, as depicted in FIG. 3, the pressing member 30 will be pressed by the second cam face 25b of the lever 22 toward the second pipe 12, and the tip end portion 41 of the locking member 40 will move into the locking hole 45 through the locking member 40 being pressed toward the second pipe 12 by the inner surface 22a of the lever 22.” TTI1032 [0024].

120. By fitting the lock member 40 and the lock hole 45 in this manner, the first pipe 11 and the second pipe 12 are axially fixed. TTI1032 [0025].

[1f] wherein a second end of the operating lever opposite to the first end of the locking member is provided with a friction portion, and when the operating lever is rotated to the locking position the friction portion is frictionally engaged with the outer wall of the base.

121. A POSITA would have understood, as disclosed by Idota, that “[g]enerally, this type of clamp mechanism incorporates a friction member...”

Idota [0003]. Particularly, Idota discloses inner surface 22a of lever 22 being pushed towards the second pipe 12 when operated to the lock position. Because second pipe 12 is behind base member 20, a POSITA would understand that inner surface 22a of lever 22 would thus come into frictional contact with base member 20 when the clamp is duly locked.

122. To the extent it is argued that Idota does not disclose a second end of the operating lever being provided with a friction portion frictionally engaged with the outer wall of the base, a POSITA would have been motivated to alter Idota to place the friction portion as claimed, such as disclosed in Pronzati.

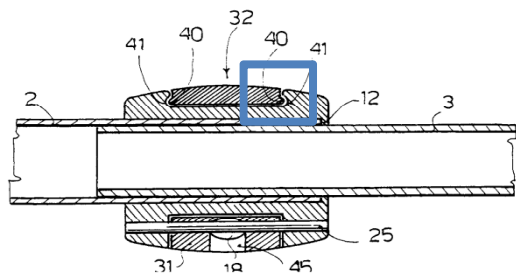


FIG. 4

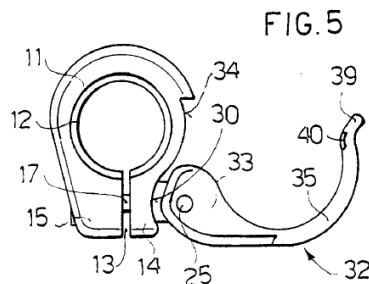


FIG. 5

TTI1033, Pronzati Figs. 4, 5

123. Pronzati discloses a similar clamp style lock as Idota, whereby each operative part of the Pronzati clamp has an analog in the Idota clamp. Pronzati, like Idota, discloses a lever, lever 32, attached to a base, cylindrical body 11, that swings about pivot, pin 25, to affix two telescoping tubes, tubes 2 and 3, when the lever is moved into a locking position. TTI1033 (Pronzati), Figs. 4, 5; 3:1-7; 3:18-37. Pronzati also discloses side teeth 40 on the end 39 of the lever 32 opposite the pivot pin 25. *Id.*, 3:56-4:2. These side teeth 40 “engage in corresponding hollows 41 provided in [the] opposite side walls 37, 38 of the cylindrical body 11, causing a click of the lever [32] during closing.” *Id.* This forms a “weak” coupling between the lever 32 and the cylindrical body 11, that presence a “resistance” “to be overcome” when the user desires to open the lever 32. *Id.*, 4:32-36. A POSITA would understand that this “resistance” as friction.

124. The side teeth 40 cause the Pronzati lever 32 to be purposely slightly wider than the gap in the cylindrical body 11 through which the lever passes when transitioning between the locking and releasing positions. TTI1034, Fig. 4. Therefore, when transitioning between the locking and releasing positions, the side teeth 40 drag across a portion of cylindrical body 11 to reach or escape corresponding hollows 41. This dragging results in a frictional engagement, as

Declaration of E. Smith Reed – '805 Patent

frictional force thus holds the side teeth 40 in the hollows 41, or resists their entry into the hollows 41. As such, the side teeth 40 on the locking member, lever 22, comprise a “friction portion frictionally engaged with the outer wall of the base,” cylindrical body 11, in satisfaction of this limitation.

XI. CONCLUSION

125. For the reasons set forth above, Claim 1 of the '805 patent should be found unpatentable and should be canceled.

I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both. *See* 18 U.S.C. § 1004.

Date: 4/30/2020

By: 
E. Smith Reed, P.E.

EXHIBIT A

E. Smith Reed, P.E., PLLC

1330 LAKE MOREY ROAD
FAIRLEE, VERMONT
05045
(802) 331-1551
CELL (603) 727-8465

E. Smith Reed, P.E.

Product Design / Machine Design Engineer

Experience:

1990 **REED ENGINEERING CONSULTANTS, INC.** and **E. SMITH REED, P.E., PLLC** Consultation
to in machine and product design, manufacture, service and operation, based on over 30 years of consumer
Present and industrial product design and production experience. Mr. Reed is a Board Certified Diplomat in
Forensic Engineering, certified through the National Academy of Forensic Engineers (NAFE) in
accordance with the requirements and guidelines set forth by and accredited by the Council of
Engineering and Scientific Specialty Board (CESB).

Typical issues evaluated:

- * Adequacy of Design and the Design Processes
- * Control of Quality and Manufacturing Processes
- * Reliability and Durability
- * Guards, Shields and Interlocks
- * Human Factors, Layouts, Instructions, Warnings
- * Accidents (non-highway) and their Reconstruction
- * Patent Disputes

Typical products and machines investigated:

- * Lawn & Garden and Turf Care Equipment
- * Agricultural Equipment
- * Industrial and Off-Road Vehicles
- * Institutional Equipment
- * Industrial and Production Machinery
- * Wheeled Equipment
- * Specialty Machinery

Industrial Experience:

1968 **HONEYWELL, INC.**, Minneapolis, MN
to *Production Engineer*

1970 Responsible for high volume mechanical assembly line incorporating various automatic electro-
mechanical machines to assemble mechanical products utilizing some 20 components per unit.

- * Developed, installed, tested, de-bugged, wrote operator & service manuals for and set into
production automatic multi-work-station assembly machinery.
- * Supervised placement of machinery into assembly line and managed the machines' and production
line's routine operation.
- * Safety engineered reciprocating and rotational nip-point barrier guards. Identified needs, selected
placement, size, shape and materials and evaluated effectiveness and production influence.
- * Developed and placed hazard notification and operator warning signs. Formulated wording and
general design and managed procurement and placement on machines.
- * Authored operator & maintenance manuals for three different types of production machines.
- * Conducted fail-safe analyses. Examined numerous potentially dangerous machine conditions and
initiated design revisions and redesigns to incorporate more "operator-safe" features.

1970 **THE TORO COMPANY**, Minneapolis, MN
to *Design Engineer / Sr. Design Engineer / Chief Product Engineer*

1979 Responsible for organizing and executing product design projects with coordination between marketing,
production and customer service groups. Responsible for engineering of industrial gang mowers,
tractors, three-wheeled triplex power mowers (both mechanical and hydraulic drive), three-wheeled

utility vehicles and trailer type turf sweepers. In addition, was involved with design reviews of consumer mowers, garden tillers, tractors and snow throwers.

- * Designed industrial turf sweepers, engine driven as well as agricultural P.T.O. version.
- * Initiated and helped direct product recall on turf verti-cutter/thatcher machine. Redesigned cutting head to eliminate hazard and helped implement field replacement program.
- * Designed industrial gang type pull-behind reel mowers. Recipient of J. F. Lincoln Foundation award for designs.
- * Redesigned hydraulic driven three-wheeled triplex mower for improved reliability, easier operation and more ergonomic operator controls. Introduced reliable operator presence safety interlock system (OPC) as well as other hydraulic and mechanical safety features.
- * Conducted study and determined passenger capacities and cargo load limits on three-wheeled utility vehicle.
- * Directed design changes on a mechanical driven three-wheeled mower for improved stability, brakes, operator controls and operation instructions.
- * Directed testing, evaluation and design improvements for turf tractor brakes.
- * Investigated and evaluated several severed finger and lacerated hand mower accidents. Determined mower design contribution to these and other accidents. Conducted study to identify design improvements and completed redesign for reduction of such accidents.
- * Investigated and evaluated three-wheeled utility vehicle tip-over accidents, industrial tractor brake failures and unattended Diesel tractor "start-ups". Initiated or influenced appropriate design changes or literature changes as a result.
- * Designed and composed warning labels and operating and service manuals for all assigned products.

1979 **TENNANT COMPANY, Minneapolis, MN**
to *Engineering Manager / Chief Engineer, Test & Reliability*

1985 Responsible for or intimately involved with design or testing of three- and four-wheeled walk-behind and ride-on automotive type powered sweepers and scrubbers used in warehouses, manufacturing plants, shopping centers, parking ramps, and other hard surface areas (machines such as those described in SAE Standard J2130-2, Figures 2 and 3).

As Engineering Manager, responsible for engineering of self-propelled riding and walk-behind floor sweepers, assuring development of new products and designs. Managed design group as well as electrical and hydraulic engineering groups. As Chief Engineer, Test & Reliability, responsible for engineering testing and evaluation of all motorized industrial sweepers, scrubbers and scarifiers.

- * Directed the design projects of two new sweepers (\$7,000 and \$13,000 price ranges (1984 dollars)).
- * Tested machines to assure that their performance, reliability and safety met requirements and expectations for the duration of the product's life.
- * Responsible for creating / assuring that all labels and manuals met safety requirements.
- * Developed and executed companywide "Product Reliability Plan".
- * Was instrumental in reorganizing company's Product Safety Review Council and co-authored its policies, practices and procedures.
- * Helped re-write philosophy of Engineering Test Department, reaffirming and strengthening requirements for approving products prior to manufacturing and sales.

- * Directed activities to obtain independent testing lab (UL & FM) approvals for manufacture and shipment of company's products.
- * Was Engineering Department's representative on corporate Quality Team.
- * Evaluated operator injury claim of hearing loss due to operating excessively noisy equipment. Evaluated gasoline and LP gas powered machine fires and resulting damage.

1985
to
1987

VERMONT CASTINGS, INC., Randolph, VT
Vice President, Engineering

Managed Engineering, Tooling and Quality Control Departments for design, development, testing, emissions and safety certification, tooling, production and quality control of wood and coal burning parlor stoves and room heating appliances.

- * Directed fire safety tests on Vt. Cstgs. and competition heating appliances in various room installation situations. Directed and coordinated safety testing conducted by UL labs.
- * Directed testing and evaluation of creosote build-up in both metal and masonry chimneys used in conjunction with fireplaces and parlor stoves. Tested heat effects and building structural degradation of overheated stove & chimney pipes and chimney fires.
- * Evaluated home fire accident claims related to stoves, chimneys and other heat sources.
- * Established and implemented Quality Assurance plan. Established philosophy assuring that all products, including warning labels and manuals, met all safety and quality requirements.
- * Managed the creation of the Jigs & Fixtures Tooling Department for metal fabrication.
- * Established formal corporate management product review process to assure products met marketing, manufacturing and safety objectives prior to first production and first shipments.
- * Directed several product development programs resulting in the successful release and production of two major and several other new products.
- * Managed the joint venture development of a "Zero Clearance" pre-fabricated fireplace product. Assured that all safety requirements, including clearances and venting, were met.

1987
to
1989

LOZEAU & SON, INC., Lebanon, NH
Owner, General Manager

Owned and managed building materials distributorship and construction work crews with 8 to 14 employees.

1990
to
1993

CENTRICUT, INC., Lebanon, NH
Vice President, Engineering / Quality Control

Responsible for Engineering and Quality Assurance Departments for this metal cutting tool component company. Responsible for product design, tooling, assembly processes, control of quality and coordination and match-up with mating machines with which products were used.

- * Determined the objective of and managed the re-engineering of over 200 products.
- * Using Reverse Engineering techniques, designed, developed and released an additional seven new product lines encompassing over 85 new products.
- * Created and managed Quality Assurance Department. Guided the establishment of quality and performance standards.
- * Created and guided the functions of manufacturing engineering. Managed the assurance of safety with regard to production equipment and facilities.

- Education & Honors:**
- * BSME, University of Arkansas, 1968 (Dean's List)
 - * Recipient of four U.S. Patents
 - * Award winner, Lincoln Arc Welding Foundation, 1976
- Registrations:**
- * Licensed Registered Professional Engineer (Minnesota, New Hampshire, Vermont)
- Professional Organizations:**
- * American Society of Mechanical Engineers
 - * National Society of Professional Engineers
 - * National Academy of Forensic Engineers (past President)
 - * American Society of Agricultural and Biological Engineers
 - * (past member) Human Factors and Ergonomics Society
 - * (past member) Society of Automotive Engineers
 - * (past member) American Society of Quality
 - * (past member) Society of Manufacturing Engineers
 - * (past member) American Society of Safety Engineers
- Recent Professional Courses & Seminars:**
- * "Forensic Engineering" (presented to Dartmouth College / ASME)
 - * "Fundamentals of Automotive All-Wheel Drive Systems" (Society of Automotive Engineers)
 - * "Analyses of Riding Mower Child Backover Blade Contact Accidents" (presented to the NAFE)
 - * "Introduction to Finite Element Analysis" (American Society of Mechanical Engineers)
 - * "Uses and Misapplications of Standards" (presented to the National Academy of Forensic Engineers)
 - * "Job Safety Analysis" (National Safety Council)
 - * "Product Liability - from an Engineer's Perspective" (presented to Dartmouth College / ASME)
 - * "Codes, Standards and Government Regulations" (National Academy of Forensic Engineers (NAFE))
 - * "Design, Construction and Use of Mechanical Human Surrogates" (presented to the NAFE)
 - * "Integrating Safety into the Design of Agricultural Equipment" (Am. Socty. of Agricultural Engrs.)
 - * "Introduction to Off-Road Vehicle Dynamics" (American Society of Agricultural Engineers)
 - * "Human Factors Engineering" (University of Michigan)
 - * "Machine Safeguarding" (Allied Resources Corporation)
 - * "Photogrammetry in Accident Reconstruction" (Society of Automotive Engineers)
 - * "Perception, Reaction, Conspicuity" (University of Iowa)
 - * "A Human Factors Approach to Accident Investigation" (Human Fctrs. & Ergnmcs. Socty.)
 - * "Consumer Prod. Safety: Perceptions of Risk & Responsibility" (Human Fctrs. & Ergnmcs Socty.)
 - * "Product Safety Management" (National Safety Council)
 - * "Vehicle Rollover Accidents" (Society of Automotive Engineers)
 - * "Motor Vehicle Accident Reconstruction" (Society of Automotive Engineers)
 - * "The Dsgn. & Development of Product Warning Systms" (Rice Univ./Human Fctrs. & Ergnmcs. Socty.)
 - * "Warnings" (Rice University / Human Factors and Ergonomics Society)
- Recent Publications Authored:**
- * Book Chapter: Reed, E. S. "Ergonomics and Machine Safety", in *Machine Designers Reference*, J. Marrs (Ed.), (pp 35-92) Industrial Press, Inc. (ISBN-10: 0831134321) (2011),
 - * Article: Reed, E. S. "Forensic Engineering Analysis of Riding Lawnmower Child Backover Blade Contact Accidents", *Journal of the National Academy of Forensic Engineers*, Vol. XXIV, No.1: 101-119 (2007),
 - * Article: Reed, E. S. "Design, Construction and Use of Economical Mechanical Human Surrogates", *Journal of the National Academy of Forensic Engineers*, Vol. XVIII, No.2: 59-76 (2001).

EXHIBIT B

E. Smith Reed, P.E., PLLC

April 30, 2020

The following is a list of all cases in which I have testified at trial or in deposition in the past 10 years:

<u>Janowski v Deere</u> (as a fact witness) deposition testimony of 7/27/17 Circuit Court of Genesee County, Michigan	Chelsea, VT 14-103771-NI
<u>Fraser v Boething Nursery</u> deposition testimony of 6/24/15 Superior Court, California, L.A.-Central-Civil-West	Richmond, VA JCCP4674
<u>McCoy v Snapper</u> deposition testimony of 7/11/13 State Court of Fulton County, Georgia	Atlanta, GA 12-EV-014653J
<u>Marks v Briggs & Stratton</u> deposition testimony of 6/12/12 State Court of Fulton County, Georgia	Atlanta, GA 2009-EV20078138B
<u>Moore v Jupiter Lanes</u> deposition testimony of 5/15/12 Crct. Ct., 15th Jud. Dist., Palm Beach Co., FL	Hanover, NH 502010CA018769XXXXMB
<u>Vitale v RD Olson and CEC</u> deposition testimony of 6/1/11 Superior Ct., State of Rhode Island, Providence,	Manchester, NH SS PC 06-1407
<u>Nationwide v JD Eq., et al</u> deposition testimony of 4/15/11 Court of Common Pleas, Fayette Co., Ohio	Hanover, NH 09 CHV 00354
<u>Lichtman v Blanchard Eq.</u> deposition testimony of 4/6/11 State Court of Bulloch County, Georgia	Savannah, GA 2B IOCV397
<u>Mitchell v Textron</u> trial testimony of 9/22/10 Worcester Superior Ct., Commonwealth of Massachusetts	Worcester, MA 2005-113A
<u>Peabody v ABF</u> deposition testimony of 8/23/10 State of Maine Superior Court, Washington,	Portland, ME SS. CV-09-51
<u>Mavity v MTD</u> deposition testimony of 5/27/10 U.S. District Court, Western District of Virginia	Boston, MA 1:09cv27
<u>Follett v Sears</u> deposition testimony of 3/4/10 Circuit Court of Cook County, Illinois	Manchester, NH 06 L 4703

EXHIBIT C

LAWN MOWER ELECTRICAL INTERLOCK CIRCUIT

BACKGROUND:

IT HAS BEEN CITED IN MANY STUDIES THAT MANY ACCIDENTS RESULTING IN PERSONAL INJURY ARE THE RESULT OF SOMEONE MISTAKINGLY OR CARELESSLY INSERTING SOME PART OF THEIR BODY (FINGERS, HANDS, TOES, FEET, ETC.) INTO THE CUTTING BLADE(S) AREA OF LAWNMOWERS WHILE THE BLADES WERE MOVING. GREAT EFFORTS HAVE BEEN MADE TO WARN OPERATORS AND BYSTANDERS OF THE DANGERS ASSOCIATED WITH LAWNMOWERS AND THEIR CUTTING BLADES, AND AS MUCH PROTECTION SHIELDING AS FUNCTIONALLY POSSIBLE HAVE OFTEN BEEN USED TO PROTECT FROM SUCH ACCIDENTS.

ON MANY MOWERS, PERSONAL INJURY COULD OCCURE, ALSO, IF AN OPERATOR UNKNOWINGLY STARTED THE MOWER'S ENGINE WHILE THE MOWER WAS IN "GEAR" CAUSING THE MOWER TO START MOVING UNEXPECTEDLY INTO A BYSTANDER. WARNINGS HAVE BEEN PUBLISHED FOR THE OPERATOR TO START MOWER ONLY WHEN THE TRANSMISSION IS IN "NEUTRAL" TO PREVENT SUCH ACCIDENTS.

ANOTHER POTENTIAL SOURCE OF PERSONAL INJURY OR PROPERTY DAMAGE IS THE SITUATION WHERE THE OPERATOR HAS LEFT THE OPERATOR'S POSITION (PERHAPS THE OPERATOR SEAT) AND THE MOWER IS ACCIDENTALLY KNOCKED INTO "GEAR" WHILE THE ENGINE IS RUNNING, CAUSING THE MOWER TO PROCEED MOVING AHEAD WITHOUT AN OPERATOR TO CONTROL WHERE IT IS GOING. THE SAME TYPE OF INJURY COULD OCCURE, ALSO, IF WHILE THE OPERATOR ~~WAS~~ MOVING AHEAD ON THE MOWER, WHETHER MOWING OR SIMPLY TRANSPORTING, FOR SOME

The subject matter of this page:

has been described by

F. D. Smith Reeder - April 4, 76

on the date(s) above

indicated, and has been read and understood by

O. David Edmonson

on

4 5 76

(month, day, year)

REASON OR ANOTHER THE OPERATOR FELL OR JUMPED OR LEFT THE OPERATOR POSITION WITHOUT TAKING THE MOWER OUT OF "GEAR" OR STOPPING THE BLADE(S), AND THE MOWER PROCEEDED MOVING AHEAD UNATTENDED. OPERATORS HAVE ALWAYS BEEN WARNED TO BE CAREFUL AROUND MOWING EQUIPMENT, BUT WARNINGS DO NOT PREVENT OCCASIONAL OPERATORS FROM BECOMMING SUDDENLY VIOLENTLY ILL WHILE MOWING.

FOR MAINTENANCE AND CONVENIENCE OF CHECKING OUT THE MACHINE, IT IS DESIRABLE TO ALLOW THE MOWER TO BE STARTED WHEN ALL CONTROLS ARE IN "NEUTRAL" POSITION BUT WITHOUT HAVING TO SIT ON THE OPERATOR'S POSITION (IN THE SEAT). ALSO, FOR CONVENIENCE, IT IS DESIRABLE TO ALLOW THE MACHINE TO BE RUN WHEN ALL CONTROLS ARE IN "NEUTRAL" EVEN WITH NO OPERATOR IN THE OPERATOR'S POSITION (SEAT).

INVENTION
DISCUSSION:

THE DEVICE DESCRIBED HERE, (ELECTRICAL CIRCUIT DESCRIBED), WILL LIMIT A PIECE OF INDUSTRIAL EQUIPMENT, INCLUDING LAWNMOWERS, TO OPERATING AS SAFELY AS ABOVE DESCRIBED WHEN THE EQUIPMENT IS POWERED WITH AN ELECTRICAL STARTER FOR ITS GASOLINE ENGINE, AND THE ENGINE'S IGNITION IS DESIGNED TO SHUT OFF IF THE WIRE BETWEEN THE COIL AND THE BATTERY IS DISCONNECTED.

THE CIRCUIT CONSISTS OF A NUMBER OF COMPONENTS AND A WIRING SCHEMATIC TIEING THEM ALL TOGETHER TO GIVE THE DESIRED RESULTS. IN SHORT, THE DESIRED RESULTS, FUNCTION WISE, ARE AS FOLLOWS (ON THE NEXT PAGE):

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E. Ruth Reed April 4, 76

on the date(s) above

indicated, and has been read and understood by

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DESIRED RESULTS ARE:

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1. MACHINE CANNOT BE STARTED IN ANY WAY WHEN CONTROLS ARE NOT IN "NEUTRAL", OR TRANSMISSION IS IN "GEAR", REGARDLESS IF THERE IS AN OPERATOR IN THE SEAT OR NOT
2. If CONTROLS (MOWING CONTROLS) ARE IN "NEUTRAL" AND TRANSMISSION IS IN "NEUTRAL" POSITION, THE ENGINE STARTER MAY BE CAPABLE OF BEING ENERGIZED TO START THE ENGINE, REGARDLESS IF THERE IS A PERSON IN THE OPERATOR'S SEAT OR NOT, AND THE ENGINE ELECTRICALLY MAY BE CAPABLE OF RUNNING.
3. ONCE THE ENGINE IS RUNNING, IT SHALL BE CAPABLE OF CONTINUING TO RUN EVEN IF THE OPERATOR SHOULD LEAVE THE OPERATOR'S SEAT SO LONG AS AND ONLY IF THE TRANSMISSION IS IN "NEUTRAL" POSITION, AND THE "MOWING" CONTROL IS IN "NEUTRAL" POSITION.
4. If THE OPERATOR LEAVES THE OPERATOR POSITION (SEAT) WHILE EITHER THE TRANSMISSION IS IN "GEAR", OR THE MOWER CONTROLS ARE "ENGAGED", OR BOTH "ENGAGED" AND IN "GEAR", ^{AND} THE ENGINE ~~IS~~ IS RUNNING, THEN UPON THE OPERATOR'S DEPARTURE, THE ENGINE SHALL CEASE TO RUN AND COME TO A STOP.
5. If THE MACHINE ~~SETS~~ ^{SETS} BOTH ITS ENGINE RUNNING WITH ITS TRANSMISSION IN "NEUTRAL" AND MOWER CONTROLS IN "NEUTRAL" AND NO OPERATOR IN THE OPERATOR'S SEAT, AND EITHER THE TRANSMISSION IS PLACED INTO "GEAR", OR THE MOWER CONTROLS ARE "ENGAGED" OR BOTH, THEN THE ENGINE SHALL CEASE TO RUN AND COME TO A STOP.
6. ONCE THE ENGINE IS RUNNING, IT SHALL BE CAPABLE

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of CONTINUING TO RUN SO LONG AS THE OPERATOR IS IN THE OPERATOR POSITION (IN THE SEAT) REGARDLESS OF WHAT POSITION THE TRANSMISSION IS IN (IN OR OUT OF "GEAR") AND REGARDLESS OF WHAT POSITION THE MOWER CONTROLS ARE IN ("ENGAGED" OR "NEUTRAL").

THE COMPONENTS PRESENT IN THE INTERLOCK CIRCUIT SYSTEM ARE AS FOLLOWS:

1. ENGINE: ELECTRIC STARTER TYPE. TO SHUT ENGINE off, WIRE BETWEEN ENGINE COIL AND BATTERY CAN BE DISCONNECTED.
2. BATTERY: TO PROVIDE CURRENT TO THE ELECTRIC STARTER ON ENGINE AND CURRENT TO ENGINE'S COIL
3. RECTIFIER: TO REGULATE THE AMOUNT OF CURRENT SUPPLIED TO THE BATTERY FOR CHARGING
4. KEY SWITCH - MULTIPLE POSITION: AT THE DISCRETION OF THE OPERATOR, TO DIRECT THE ENGINE TO EITHER "START", OR "RUN", OR "TURN OFF - STOP".
5. SEAT SWITCH: TO DETECT IF SOMEONE IS IN THE OPERATOR'S SEAT (CIRCUIT "CLOSED" IF THERE IS AN OPERATOR, "OPEN" IF NOT).
6. MOW SWITCH: TO DETECT IF MOWER(S) IS (ARE) "ENGAGED" OR IN "NEUTRAL" (CIRCUIT "OPEN" IF "ENGAGED", "CLOSED" IF IN "NEUTRAL").
7. TRACTION SWITCH: TO DETECT IF MACHINE IS IN "GEAR" OR NOT (CIRCUIT "OPEN" IF IN "GEARS", "CLOSED" IF IN "NEUTRAL").
- (OPTIONAL) 8. HOURMETER: TO REGISTER TIME OPERATED ON MACHINE
- (OPTIONAL) 9. AMMETER: TO INDICATE RELATIVE CHARGE OR DISCHARGE TO THE BATTERY.
- (OPTIONAL) 10. FUSE: TO PROTECT ELECTRICAL CIRCUIT AGAINST ^{SHORTS} ETC.

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(OPTIONAL) II. STARTER RELAY SOLENOIDS TO LESSEN ELECTRICAL FATIGUE DUE TO HIGH CURRENTS ON THE "KEY SWITCH".

IN ORDER TO MAKE THIS SYSTEM WORK, A KEY SWITCH HAS BEEN DEVELOPED TO GIVE A SPECIFIC CIRCUITRY. THE KEY SWITCH MUST HAVE AT LEAST THREE POSITIONS ~~AND~~ OF OPERATION, AND SIX TERMINALS FOR ELECTRICAL CONNECTION. PREVIOUS STATE OF THE ART KEY SWITCHES HAVE NOT HAD SUCH A CIRCUIT AS IS DESCRIBED HERE BELOW.

KEY SWITCH CIRCUIT:

KEY POSITION	B, I, A, + S CIRCUIT	X + Y CIRCUIT
off	OPEN	OPEN
RUN	B + I + A	X + Y
START	B + I + S	OPEN

NOTE: B+I+A MEANS TERMINALS B AND I AND A ARE ALL CONNECTED TOGETHER.

B+I+S MEANS TERMINALS B AND I AND S ARE ALL CONNECTED TOGETHER.

X+Y MEANS TERMINALS X AND Y ARE CONNECTED TOGETHER.

OPEN MEANS NONE OF THE RESPECTIVE TERMINALS ARE CONNECTED TOGETHER.

WITHOUT THIS PARTICULAR KEY SWITCH CIRCUITRY, THE CIRCUIT FURTHER DESCRIBED WOULD HAVE TO REQUIRE THREE ADDITIONAL SWITCHES. THE IDEA DESCRIBED HERE, HOWEVER, ~~NEEDS NO~~ ~~NEEDS NO~~ ~~NEEDS NO~~ SUCH DISCUSSION.

KEEPING THIS KEY SWITCH CIRCUITRY IN MIND, THE INTERLOCK CIRCUIT IN ITS COMPLETE STAGE IS AS FOLLOWS ON THE NEXT PAGE -:

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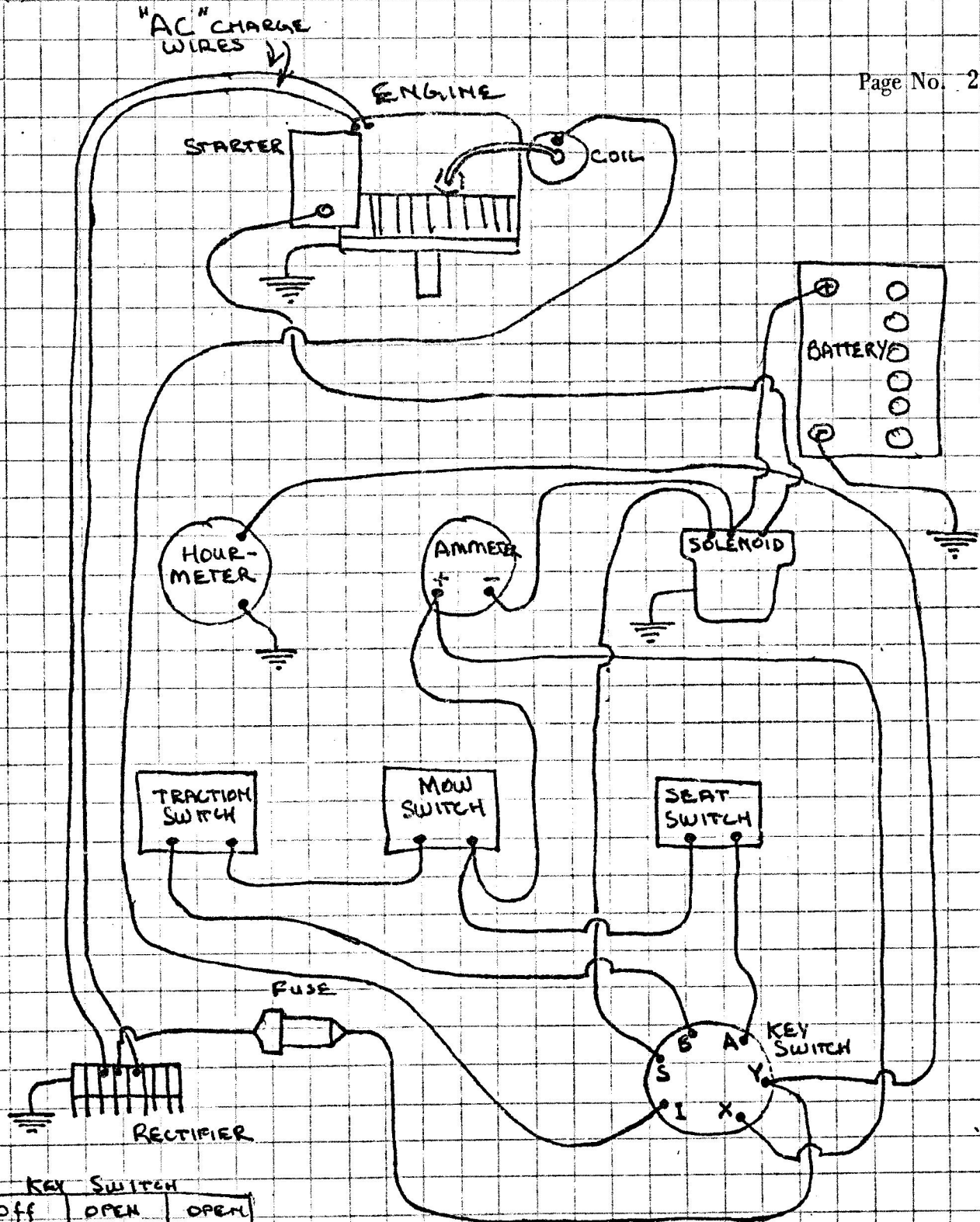
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KEY SWITCH		
off	OPEN	OPEN
RUN	B+I+A	X+Y
START	B+I+S	OPEN

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THE FIRST MACHINE WITH THIS CIRCUIT WAS BUILT AND TESTED IN SEPT., OCTOBER, 1975 WITH TOTAL SUCCESS. SINCE THAT TIME, IN NOVEMBER AND DECEMBER, TWO MORE MACHINES WERE BUILT WITH THIS CIRCUIT, AGAIN WITH TOTAL SUCCESS. AGAIN, IN LATE MARCH, TWO MORE MACHINES WERE BUILT AND TESTED, AGAIN SUCCESSFULLY.

THIS INVENTION GIVES THE ADVANTAGE OF PROVIDING A SAFER MOWER LESS LIKELY TO BE INVOLVED IN ACCIDENTS CAUSING PERSONAL INJURY OR PROPERTY DAMAGE. ALSO, WITH THE SPECIAL SWITCH, IF THE CIRCUIT IS NOT SATISFIED WITH CONTROLS IN "NEUTRAL", NOT ONLY WILL THE ENGINE NOT RUN, BUT IT WILL FAIL TO EVEN TURN OVER, THUS TELLING OPERATOR EVERYTHING IS NOT RIGHT RATHER THAN TURNING OVER BUT FAILING TO START (LEAVING THE OPERATOR WITH QUESTIONS OF IF THE SYSTEM IS SATISFIED, OR IF THE ENGINE SIMPLY IS DIFFICULT TO START).

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