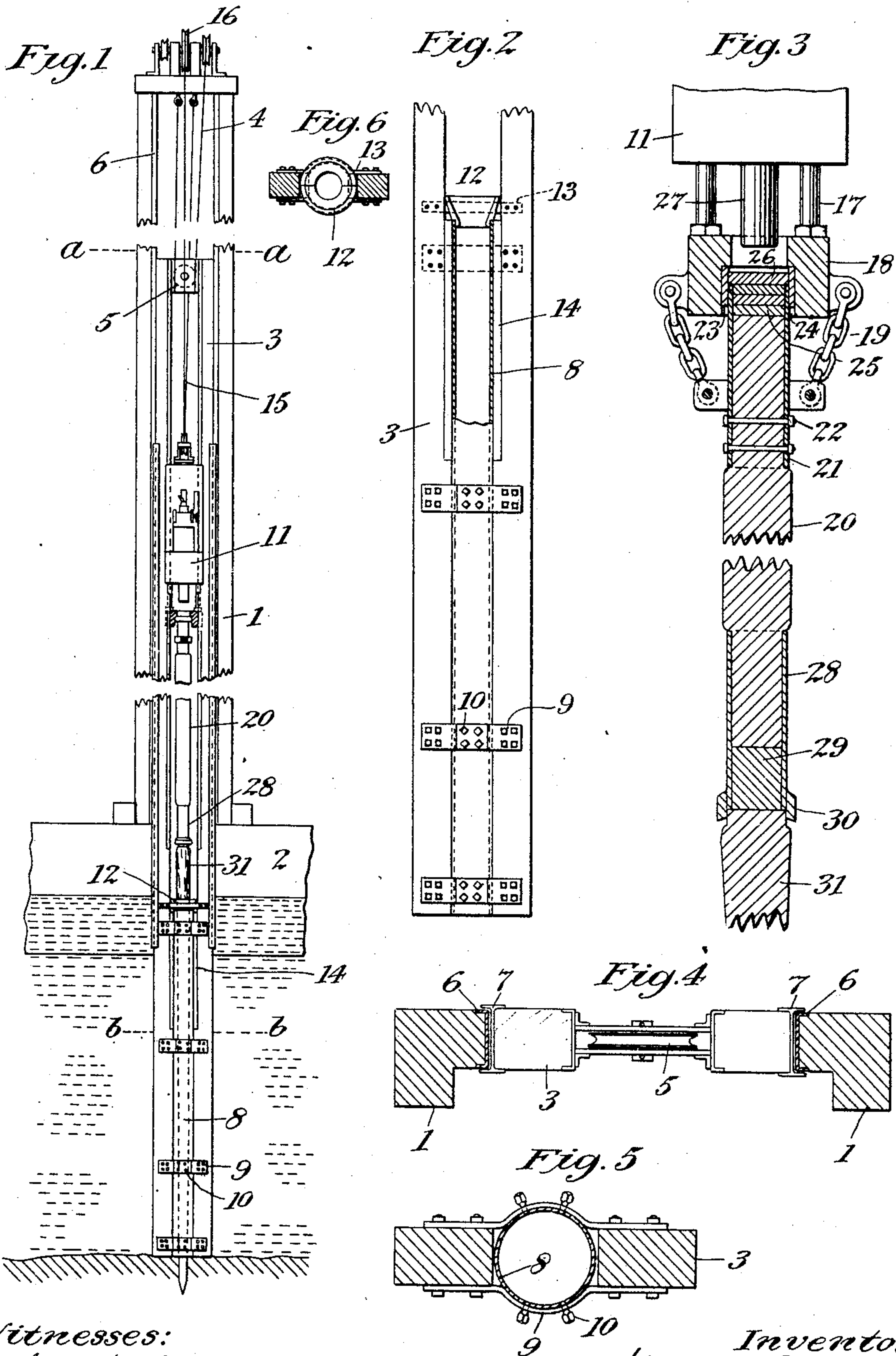


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W. J. LAWLER.
PILE DRIVER.

APPLICATION FILED OCT. 21, 1904.



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UNITED STATES PATENT OFFICE.

WILLIAM J. LAWLER, OF CHARLESTOWN, MASSACHUSETTS.

PILE-DRIVER.

SPECIFICATION forming part of Letters Patent No. 785,899, dated March 28, 1905.

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To all whom it may concern:

Be it known that I, WILLIAM J. LAWLER, a citizen of the United States, residing in Charlestown, county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Pile-Drivers, of which the following is a full, clear, and exact specification.

My invention relates to pile-drivers employing sliding or extension gins or ways, and has for its object to produce an improved construction whereby piles may expeditiously be driven in water of varying depths and wherein piles of various lengths may be used, including quite short piles the top of which may be below the water at the commencement of the driving, and whereby the efficiency and rapidity of operation of the pile-driver are increased. To effect this, I have equipped the said pile-driver with sliding gins and with a guide which is adjustably secured to them and which serves to guide the pile and likewise a follower. Into this guide when brought into proper position the pile may be placed, and it will be accurately guided to the position at which it is to be driven. This guide, which I have shown as a tube, also receives and guides a follower, which at its lower end contacts with the pile to be driven and at its upper end receives the impact of the hammer.

My invention also has for its object to improve the construction of the follower, whereby the durability and operation of the same are improved in the particulars hereinafter more fully set out.

Other details of my improved construction are hereinafter fully explained and are illustrated in the accompanying drawings, illustrating one embodiment of my invention, in which—

Figure 1 is a front elevation of my improved pile-driver, partly broken. Fig. 2 is a detail view of part of the sliding gins, showing the guiding-tube therein, partly in section. Fig. 3 is a detail view showing the follower and the base of the steam-hammer in cross-section, also a portion of the steam-hammer and connection between the same and the follower. Fig. 4 is a cross-sectional view taken

on the line *a a* of Fig. 1, showing the upper end of the sliding gins. Fig. 5 is a cross-sectional view of the sliding gins and tube, taken on line *b b* of Fig. 1; and Fig. 6 is a cross-sectional view of the sliding gins, showing the separable guide-tube funnel.

The main or stationary gins 1 are shown as resting upon an ordinary scow 2 and are held in place by the usual means, of which no description is necessary. The sliding gins 3 are raised and lowered inside the stationary gins 1 by a fall 4 passing over a sheave on the upper framework of the pile-driver and under sheave 5 at the top of the sliding gins and secured at the cross-head of the stationary gins. The stationary gins 1 are faced at their inner ends, which provide a bearing-surface for the sliding gins, with channel-beams 6. The sliding gins are provided with I-beams 7, which receive the channel-beams 6 and guide the sliding gins as they are raised and lowered. Between the sliding gins and at the lower part thereof I have provided means for guiding the pile and holding the same during the driving operation. As shown, this consists of a tube 8, preferably made of wrought-iron. This tube 8 fits loosely in the space between the sliding gins 3 and is held in place by a series of metal bands 9, which are bolted to the sliding gins 3 and to which the guide-tube 8 is removably secured by a series of set-screws 10, which pass through said bands and engage the guide-tube. Should for any reason, such as an increased depth of water, it be desirable to lower the guide-tube 8 below the sliding gins 3, the set-screws 10 are removed and the guide-tube 8 lowered until the holes in said tube for the accommodation of the set-screws 10 are in line with the lower sets of bands 9, when the set-screws may be replaced and the guide-tubes again secured in position. The band 9, which secures the sliding gins at their lower extremity, will then be left in place to stiffen the gins, although it will not be in proper position to be again attached to the guide-tube.

At the upper end of the guide-tube 8 is shown a guide-tube funnel 12, which is for the purpose of guiding or centering the pile

and follower as they pass into the guide-tube 8. This guide-tube funnel 12 is in two pieces, as shown in Fig. 6, for the purpose of easy removal. It is held in position by bands 13, which are secured by set-screws to the sliding gins. The sliding gins are provided with removable sections 14 a short distance below the top of the guide-tube, which are taken out when the guide-tube is lowered to permit the guide-tube funnel 12 to be applied in the lowered position of the guide-tube. The guide-tube funnel can then be secured in place by the bands 13 and set-screws.

The steam-hammer, which I have designated 11, is of the usual construction and will not be further described here. It is raised and lowered by fall 15 passing over sheave 16 and secured at one end to the cross-head of the stationary gins.

Attached to the steam-hammer by side rods 17 is a perforated block 18, through which the piston of the steam-hammer passes. This block is connected by links and shackles to a band firmly attached to the follower 20, Fig. 3. The follower 20 is constructed with the main body portion, preferably, of some hardwood, such as white-oak. It is provided at its upper end with a ferrule 21, preferably of wrought-iron, shrunk into place upon a reduced portion of the follower 20 and secured to the body of the follower by bolts 22. Shrunk upon the upper end of this ferrule is a band or collar 23, which projects to some extent above the top of the ferrule 21 and is received in a shoulder or recess 24 of the block 18.

A series of impact-plates 25 are shown in cross-section in Fig. 3. These are preferably made of hard metal. They rest inside of the ferrule 21 upon the main wooden body portion of the follower. I have shown three of such plates 25 in Fig. 3 of the drawings; but it is obvious that a greater or less number may be used, as required. The wood in the follower will gradually be battered down from repeated blows of the hammer, when an additional plate 25 may be added. The upper surface of the upper plate 25 should always be above the edge of the ferrule 21 to prevent said ferrule from receiving the impact of the hammer. Above the impact-plates 25 is an additional plate 26 of larger diameter and adapted to fit inside of the collar 23. The impact-plate 26 receives the impact from the piston 27 of the steam-hammer and communicates it through impact-plates 25 to the follower.

The lower end of the follower 20 is provided with a ferrule 28, preferably made of wrought-iron and shrunk in place upon a reduced portion of the body of the follower. The said ferrule 28 embraces and firmly holds a metal plug 29, which is seated below and in contact with the wooden portion of the follower and forms the lower impact-surface thereof. Shrunk upon the lower part of the

ferrule 28 is a collar 30, preferably made of cast-iron, which projects slightly below the plug 29 and the lower end of the ferrule 28 and the projecting edge of which forms a flange which receives and incloses the upper end of the pile 31, so as to protect it from battering or spreading out during the blows of the hammer.

The operation of my improved pile-driver is as follows: The scow 2 having been brought to the position at which it is desired the pile should be driven, the sliding gins 3, carrying tube 8, are lowered by fall 4 the proper distance, which should be sufficient to properly support and guide the pile. Although the sliding gins are shown in Fig. 1 as being in contact with the bed of the body of water, it is not necessary in all cases that they should be lowered to such an extent. The pile is then placed over the tube 8 and dropped, the guide-tube funnel 12 causing it to pass into the tube 8. The steam-hammer 11, carrying follower 20, is then lowered by fall 15, the steam is turned on, and the pile driven by the reciprocation of piston 27. When the pile has been driven to the required depth, the steam-hammer and follower and the sliding gins are raised for operation upon a fresh pile.

Heretofore in driving piles under water it has been customary to use a long pile and drive it down the proper distance, after which the pile was sawed off to the requisite height, and it usually happened that the short end of this pile was wasted. By my invention it is perfectly obvious that piles may be driven under water and that it is not necessary that any portion thereof should project above the surface of the water and also that short piles may be as advantageously placed in position and driven as longer piles.

I have shown the means for guiding the pile and follower as consisting of a tube, because in practice I have found this to be satisfactory; but other means might be devised which would not depart from the spirit of my invention—such, for instance, as a series of vertical rods or a series of horizontal rings. It is evident also that although I have shown the said guide and the improved follower which I have devised as used in connection with a steam-hammer it might with advantage be employed in connection with an ordinary gravity-hammer, such alterations as would be required being obvious to all skilled in the art, and many other modifications of the apparatus as shown might be made without departing from the spirit of my invention.

Having now fully described my said invention, what I claim, and desire to secure by Letters Patent, is—

1. In a pile-driver, extension-gins, means for moving the same vertically, and pile-guiding means carried by said extension-gins, substantially as described.

2. In a pile-driver, extension-gins, means

for moving the same vertically and adjustable pile-guiding means carried by said extension-gins, substantially as described.

3. In a pile-driver, extension-gins, means
5 for moving the same vertically, pile-guiding means carried by said extension-gins and a follower, substantially as described.

4. In a pile-driver, extension-gins, means
10 for moving the same vertically, a follower and means carried by said extension-gins, for guiding the pile and follower, substantially as described.

5. In a pile-driver, extension-gins, means
15 for moving the same vertically, and pile-guiding means consisting of a tube, carried by said extension-gins, substantially as described.

6. In a pile-driver, extension-gins and
20 means for moving the same vertically, pile-guiding means carried by said extension-gins, consisting of a tube and adjustable with relation to said extension-gins, substantially as described.

7. In a pile-driver, extension-gins and
25 means for moving the same vertically, pile-guiding means consisting of a tube, secured to said extension-gins and adjustable with relation thereto, substantially as described.

8. In a pile-driver, extension-gins, means
30 for moving the same vertically, pile-guiding means carried by said extension-gins consisting of a tube, and a guide-tube funnel, substantially as described.

9. In a pile-driver, extension-gins, means
35 for moving the same vertically, pile-guiding means carried by said extension-gins, consisting of a tube and a separable guide-tube funnel, substantially as described.

10. In a pile-driver, extension-gins, means
40 for moving the same vertically, pile-guiding means carried by said extension-gins and a follower with a reinforcing-ferrule at its upper end, substantially as described.

11. In a pile-driver, extension-gins, means
45 for moving the same vertically, pile-guiding means carried by said extension-gins and a follower with reinforcing-ferrules at its upper and lower ends, substantially as described.

12. In a pile-driver, a follower with a main
50 body portion, a reinforcing-ferrule at its upper end and impact-plates therein, substantially as described.

13. In a pile-driver, a follower with a main
55 body portion, a reinforcing-ferrule at its upper end and impact-plates therein and a further impact-plate outside of said ferrule, substantially as described.

14. In a pile-driver, a follower with a main
60 body portion, a reinforcing-ferrule surrounding the lower end thereof, a collar embracing said ferrule and adapted to receive the end of the pile, substantially as described.

15. In a pile-driver, a follower with a main
65 body portion, a reinforcing-ferrule at the lower end of said follower, a collar embracing said ferrule and adapted to receive the upper

end of the pile, a plug in said ferrule adapted to bear upon the pile, substantially as described.

16. In a pile-driver, a follower with a main
70 body portion, a reinforcing-ferrule at its upper end and a collar on said ferrule projecting above the same and a series of impact-plates, the upper plate lying within said collar and out of contact with said ferrule, substantially as described. 75

17. In a pile-driver, extension-gins, means
for moving the same vertically, pile-guiding means carried by said extension-gins, consisting of a tube and adjustable relatively thereto, and means upon said sliding gins for
80 holding said tube in place, substantially as described.

18. In a pile-driver, extension-gins, means
for moving the same vertically, pile-guiding means carried by said extension-gins, consisting of a tube adjustable with relation to said
85 extension-gins, and means upon said extension-gins for holding said tube in place, and removable means for securing said tube to said holding means, substantially as described. 90

19. In a pile-driver, extension-gins, means
for guiding the same vertically, pile-guiding means carried by said extension-gins, consisting of a tube, a separable guide-tube funnel, and means for holding said funnel, substan-
95 tially as described.

20. In a pile-driver, a follower with a reinforcing-ferrule at its upper end, a steam-hammer, and connections between said hammer and said ferrule, substantially as described. 100

21. In a pile-driver, a follower with a reinforcing-ferrule at its upper end, a steam-hammer, and connections between said hammer and said ferrule, a collar on said ferrule projecting above the same, and a perforated
105 base upon said steam-hammer recessed to receive said collar, substantially as described.

22. In a pile-driver, stationary gins provided with metal channel-beams on their bearing-faces, sliding gins provided with metal
110 I-beams on their bearing-faces and means for imparting vertical movement to said sliding gins, substantially as described.

23. In a pile-driver, the combination with a hammer, of stationary gins, extension-gins, a
115 follower and means for guiding the pile and follower, substantially as described.

24. In a pile-driver, the combination with a hammer, of stationary gins, a follower and adjustable means for guiding the pile and fol-
120 lower, substantially as described.

25. In a pile-driver, a follower with a main body portion, reinforcing-ferrules at the upper and lower ends, a series of impact-plates partly within the upper ferrule and a metal
125 plug within the lower ferrule, substantially as described.

26. In a pile-driver, a follower with a main body portion, reinforcing-ferrules at the upper and lower ends, collars on said ferrules
130

and projecting beyond the same, a series of impact-plates at the upper end partly inclosed by said ferrules and partly inclosed by said collar, a metal plug within said lower ferrule,
5 substantially as described.

27. In a pile-driyer, extension-gins, a follower, and means for guiding said follower and the pile, substantially as described.

28. In a pile-driver, extensions-gins, a fol-
10 lower and adjustable means for guiding said

follower and the pile, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM J. LAWLER.

Witnesses:

ADOLPH F. DINSE,
A. C. FISCHER.