

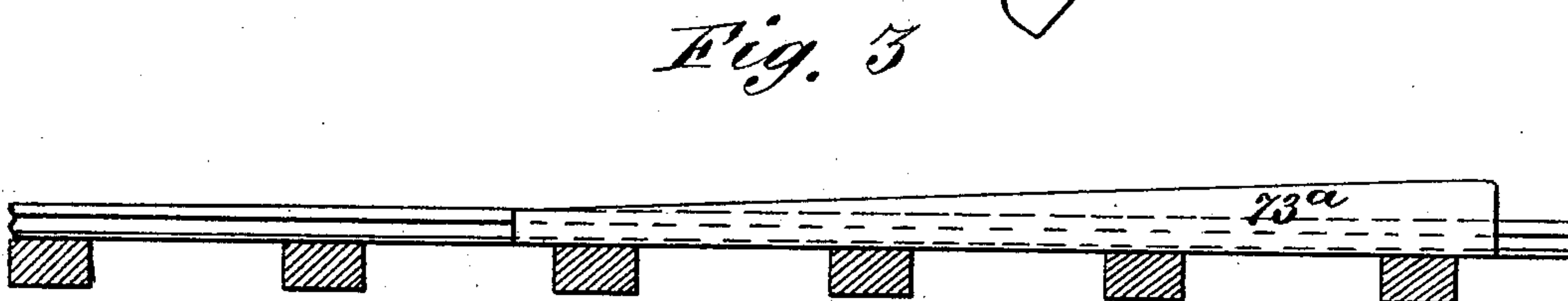
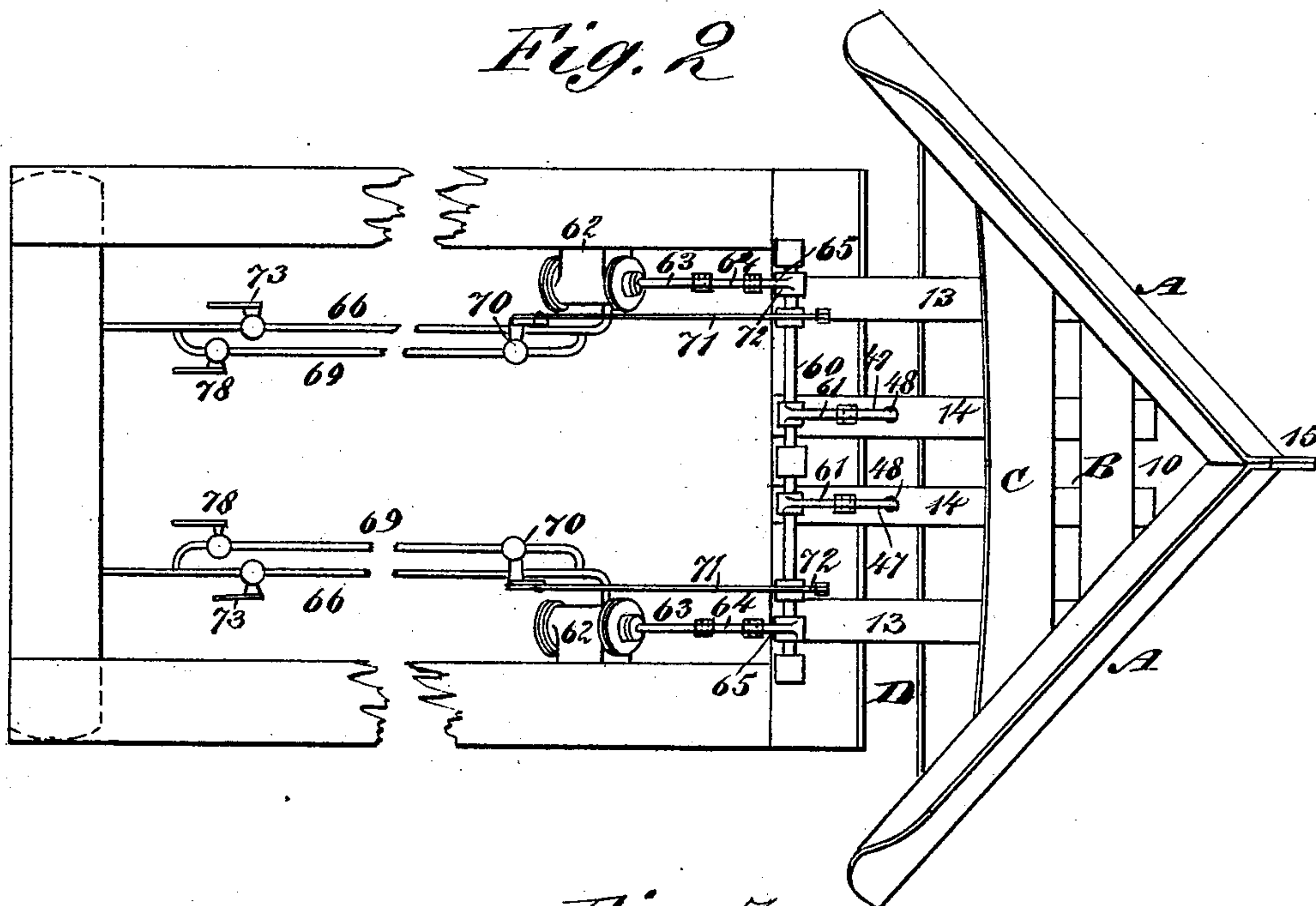
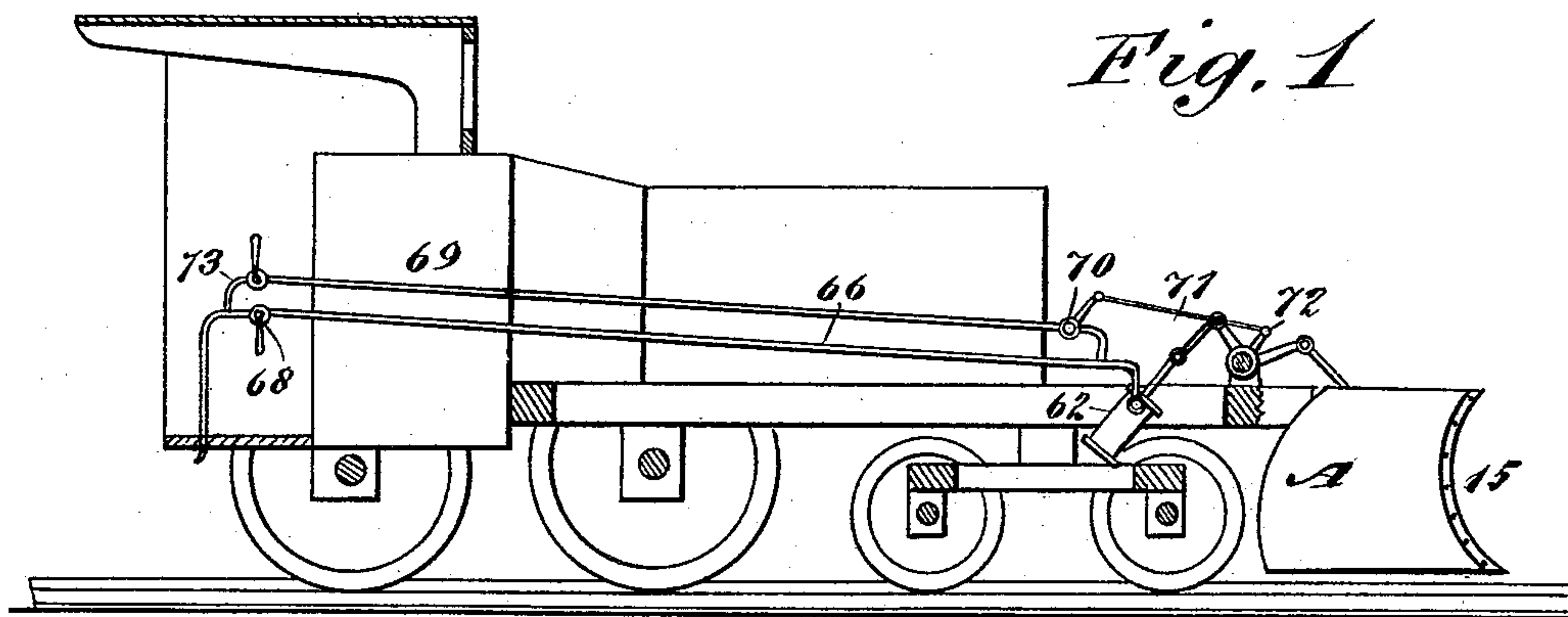
(No Model.)

4 Sheets—Sheet 1.

P. H. CRADDOCK.
SNOW PLOW.

No. 486,694.

Patented Nov. 22, 1892.



WITNESSES:

C. Neveu
C. Sedgwick

INVENTOR

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ATTORNEYS.

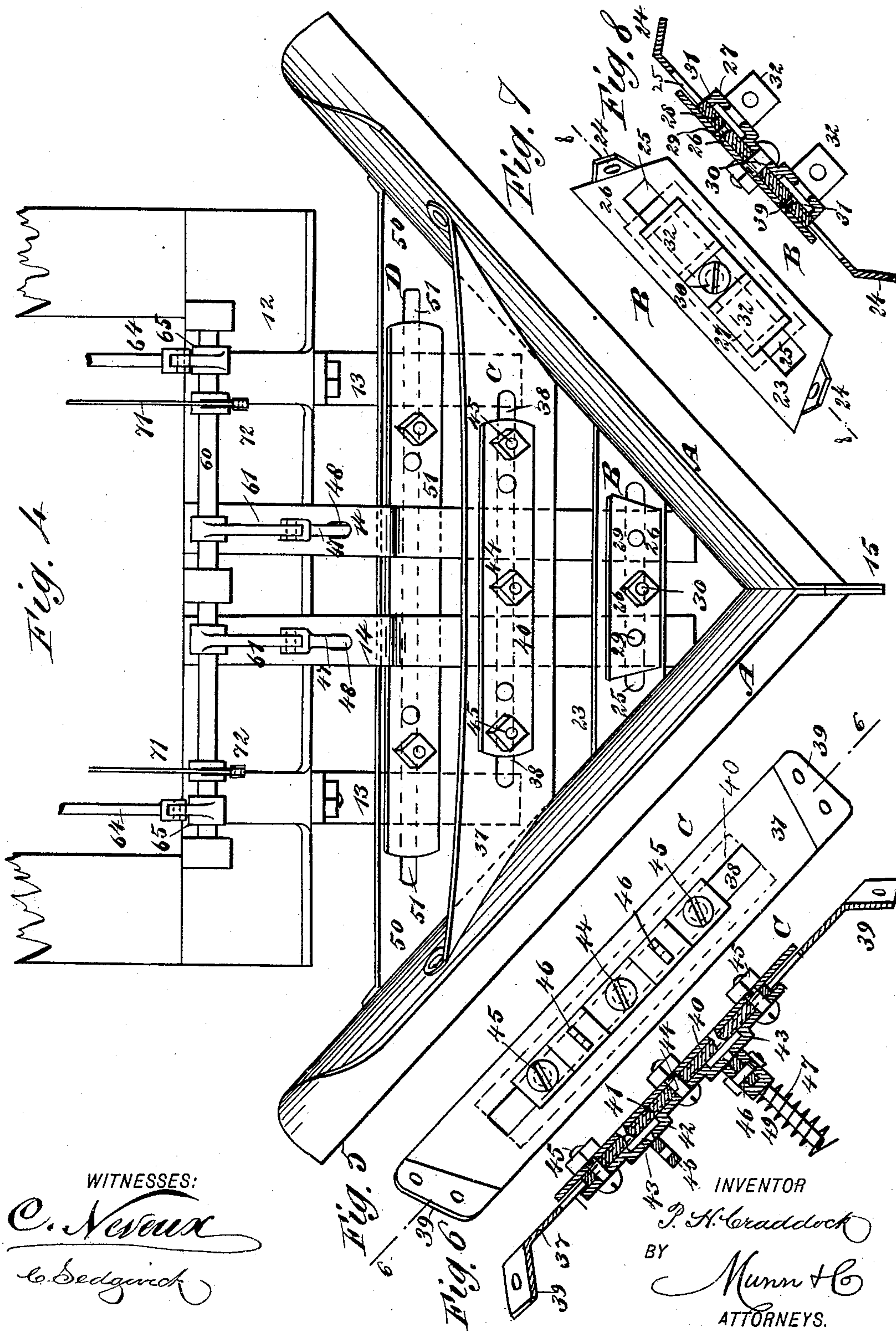
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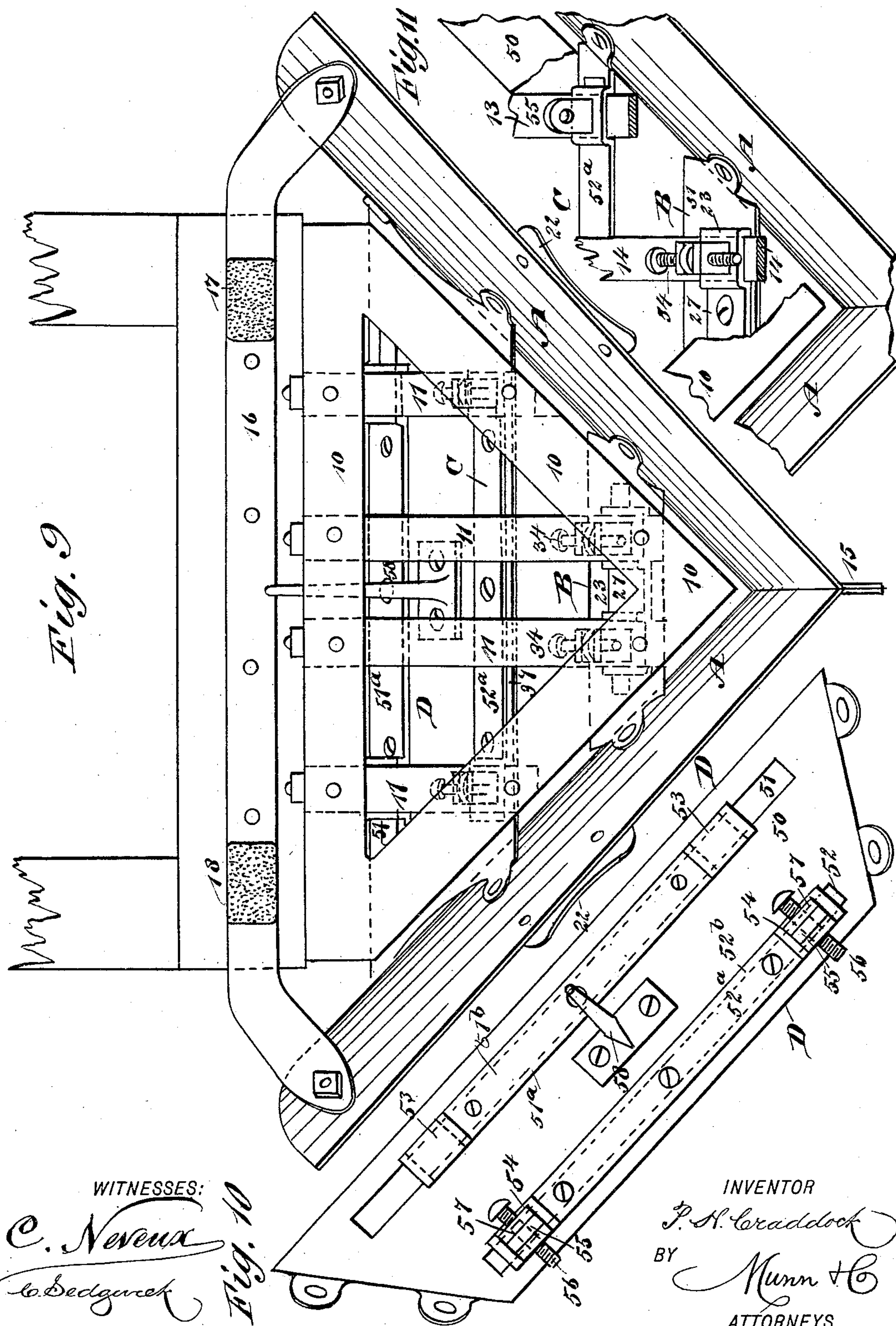
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Fig. 10

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(No Model.)

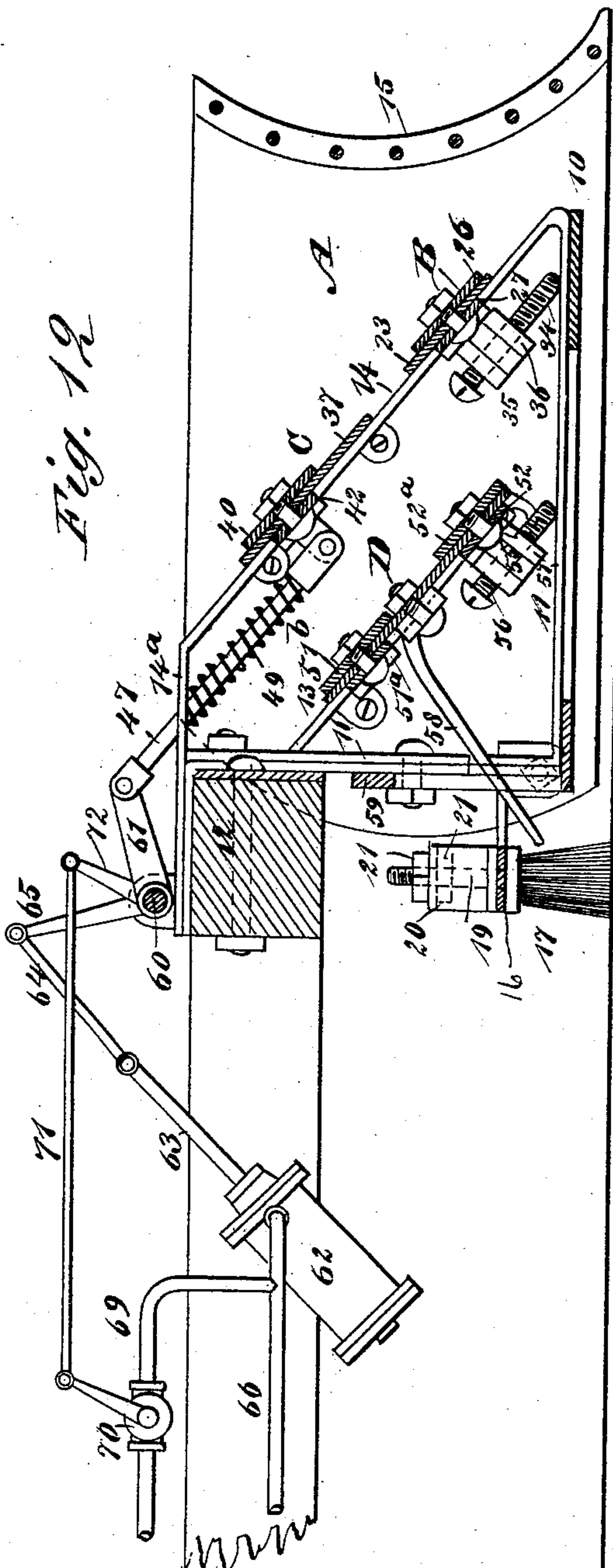
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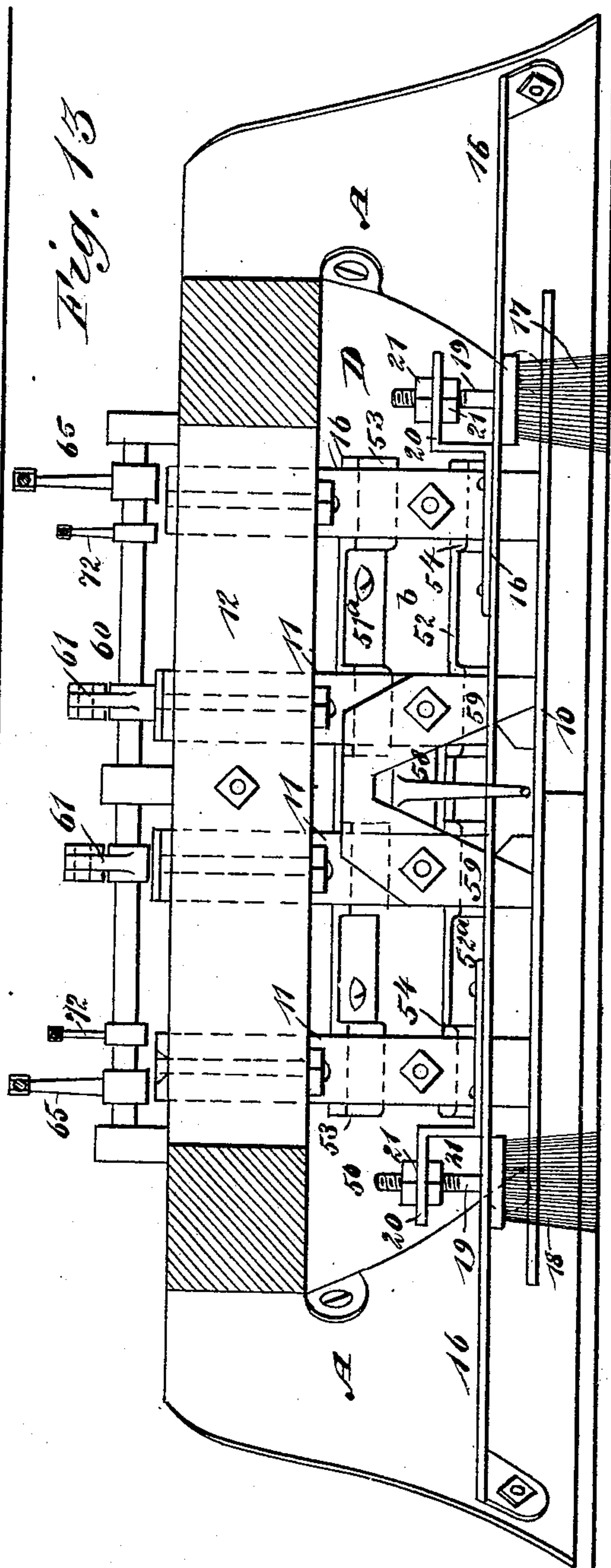
Fig. 12



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Fig. 13



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UNITED STATES PATENT OFFICE.

PATRICK HENRY CRADDOCK, OF LEADVILLE, COLORADO.

SNOW-PLOW.

SPECIFICATION forming part of Letters Patent No. 486,694, dated November 22, 1892.

Application filed July 19, 1892. Serial No. 440,464. (No model.)

To all whom it may concern:

Be it known that I, PATRICK HENRY CRADDOCK, of Leadville, in the county of Lake and State of Colorado, have invented a new and useful Improvement in Snow-Plows, of which the following is a full, clear, and exact description.

My invention relates to an improvement in snow-plows, and has for its object to provide a plow capable of being secured to the pilot-board of an engine and to construct the plow in such a manner that it will automatically adjust itself laterally or vertically, as may be demanded, in the event that an obstruction is met with upon the track.

It is a further object of the invention to provide a means whereby the engineer from the cab of an engine may elevate or lower the plow, and whereby also, in the event the engineer should not be paying attention to the movements of the plow and in the event the plow should be raised a predetermined height by meeting an obstruction upon the track, the plow will be automatically maintained in its elevated position and even elevated higher than the obstruction, and whereby the plow will remain in this position until the engineer or an attendant in the cab causes the plow to fall.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a general view illustrating the application of the plow to an engine and the means by which the plow is manipulated. Fig. 2 is a plan view of the plow and the mechanism by means of which it is raised and lowered. Fig. 3 is a side view of an attachment to the track which is used at crossings. Fig. 4 is an enlarged plan view of the plow. Fig. 5 is a bottom plan view of one of the connecting or brace plates of the plow. Fig. 6 is a longitudinal section through said plate, taken practically on the line 6 6 of Fig. 5. Fig. 7 is a bottom plan view of a second connecting or brace plate of the plow, adapted to be

located beneath the plate shown in Fig. 5. Fig. 8 is a longitudinal section through the lower plate, said section being taken practically on the line 8 8 of Fig. 7. Fig. 9 is a bottom plan view of the plow. Fig. 10 is a bottom plan view of the rear brace or connecting plate. Fig. 11 is a sectional view of a portion of the plow and the connecting-plates, and illustrates the connection with the connecting plates of guides upon which the plates have vertical movement, and which guides also act to permit lateral movement of the plow. Fig. 12 is a central transverse section through the plow and the pilot-board, and Fig. 13 is a rear elevation of the plow.

Before describing the plow proper I will describe the supports and guides for said plow. The support of the plow consists of a base-plate 10, (shown best in Fig. 9,) which plate is skeleton in form and of triangular shape, the base being adapted as the inward or rearward side. The base-plate is supported in a horizontal position by a series of brackets 11, and these brackets are somewhat L-shaped in general contour, the upper portion of their vertical members being bolted or otherwise rigidly secured to the outer side face of the pilot-board 12 of the engine. The lower or horizontal members of the brackets 11 extend from the rear of the base-plate to the forward edge thereof. Therefore the horizontal members of the intermediate brackets are longer than the corresponding members of the end brackets, and these horizontal members of the brackets are riveted or otherwise securely fastened to the base-plate.

Each bracket carries a guide-bar, and the guide-bars of the end brackets are designated as 13, and the equivalent bars of the central brackets as 14. The guide-bars of the end brackets extend from a point near the upper ends of their vertical members at an inclination downward and forward to a connection with the outer extremities of the horizontal members, while the guide-bars 14 of the central brackets extend from the outer ends of the horizontal members of these brackets at an inclination upward until they are about level with the top of the pilot-board, and then these guide-bars are carried horizontally rearward over the pilot-board and are rigidly attached to it. The upper hori-

zontal extension of the guide-bars 14 is shown clearly in Fig. 12 and is designated as 14^a. If in practice it is found desirable, the guide-bars and the brackets with which they are
5 connected may be made from one piece of metal, and such construction is shown in the drawings. This constitutes the supporting-frame of the plow.

The plow consists of a fender or clearing-
10 board A and connecting or brace plates attached thereto, the plates being three in number and designated, respectively, as B, C, and D, B representing the lower forward and shortest plate, C the upper forward plate,
15 and D the rear plate, as best shown in Fig. 12. The clearing-board or fender is shaped to represent two sides of a triangle, and at the junction of its sides a cutter 15 is formed. The cutter partakes of the cross-sectional
20 shape of the clearing-board or fender, the latter being concaved upon its outer face and convexed upon its inner face. At the rear of the clearing-board or fender, preferably at or near the bottom thereof, a transverse bar 16
25 is rigidly secured. This bar connects the sides of the clearing-board or fender at the rear portion thereof and serves to strengthen it. At the same time the connecting-bar 16 has secured to it two brushes 17 and 18, which
30 extend downwardly therefrom, and these brushes are so placed that when the plow is in position upon the engine said brushes will engage with the treads of the rails of the track and sweep the said rails clean. The
35 brushes may be vertically adjustable, since each brush is provided with an upwardly-extending shank 19, having its upper extremity threaded, and these shanks pass through brackets 20 formed upon the upper
40 face of the connecting-bar, while lock-nuts 21 are secured upon the upper ends of the brush-shanks, one below and the other above the members of the brackets through which the shanks are passed, as best shown in Figs.
45 12 and 13. The clearing-board or fender at each side is provided also with a scraper 22. The scrapers extend down below the lower edges of the clearing-board or fender, as shown in Fig. 9, and the lower edges of the
50 scrapers are somewhat concaved in order that such scrapers may conform to the upper surface of the rails of the track, as the scrapers are so located upon the clearing-board or fender that as the plow advances they will
55 travel along the top of the rails.

With reference to the construction of the connecting or brace plates B, C, and D they are somewhat similar in general construction, but different in detail. I will first describe
60 the lower connecting or brace plate B and its attachments, and I desire it to be understood that the reference-letters B, C, and D are designed to represent the plates with their attachments applied thereto, while the plates
65 themselves will be designated by reference-numerals.

The lower connecting or brace plate B is

shown in detail in Figs. 7 and 8, and comprises a body-plate 23, the ends of which are beveled in a manner to cause its upper side to be
70 longer than its lower side. Each end of the plate is provided with a rearwardly-curved and apertured ear 24, and the plate is further provided with a longitudinal central slot 25. This plate is located slightly below the cen-
75 ter of the clearing-board or fender at the front of the same, crossing the meeting-point of the sides, and extending from one side of the fender to the other. The plate is secured in position by bolts carrying suitable nuts passed
80 through the aperture in the ears 24 and through openings made in the clearing-board or fender to receive said bolts; or if in practice it is found desirable the plate may be riveted at its ends to the fender.
85

The attachments of the plate consist of a front slide 26 and a rear slide 27. The front slide consists of a small plate having a rib 28, riveted or otherwise secured to its under side, as shown in Fig. 8, in which the rivet is des-
90 ignated as 29. This rib is shorter than the slide and is adapted to move freely in the slot 25 of the body-plate 23. The rib, and likewise the body of the slide at its center, is provided with an opening, and the rear slide 27 is in
95 like manner provided with an opening, and these openings are adapted to receive a connecting-bolt 30, (also best shown in Fig. 8,) which bolt is passed through the openings in the two slides and is provided at one of its
100 ends with a head and at the other end with a nut. Thus it will be observed that both of the slides 26 and 27 move together. The rear slide 27 is so shaped as to form two sockets 31, these sockets being located one at each
105 side of the center, as shown best in Fig. 8. A lug 32 is attached to the rear slide upon its outer face, one opposite each socket, and through each of these lugs a bolt 34 is passed, as shown in Fig. 12, which bolts pass through
110 apertures in the lugs, the walls of which are threaded, and also through nuts 35 and 36, located one above and the other below each lug, the nuts being adapted to prevent the bolts from slipping when once they are ad-
115 justed.

When the fender or clearing-board is connected with the supporting-frame heretofore described, it extends slightly below the base-plate 10 of said frame, and before the front
120 and rear slides are connected with the connecting or brace plate 23 the fender or clearing-board is placed in position, and the rear slide, before being secured to the plate 23, receives the central guide-bars 14, connected
125 with the central brackets of the supporting-frame. These guide-bars pass loosely through the sockets 31 in the complete connecting-plate B. Therefore the connecting-plate may be moved vertically upon the guide-bars 14,
130 or the clearing-board may be moved laterally a given distance, as the guide-bars will hold the slides stationary, while the body-plate 23, owing to its capability of lateral movement

upon the slides, may move laterally and carry with it the fender. The adjusting-screws 34, forming a portion of the complete connecting or brace plate B, are adapted to limit the downward movement of the plate, as shown in Fig. 12, as when the plate has been carried down as far as desired the lower ends of the screws will engage with the horizontal members of the central brackets of the supporting-frame.

The connecting or brace plate C is shown in Figs. 5 and 6, and is of substantially the same construction as the lower brace-plate B. The upper connecting or brace plate C comprises a body-plate 37, containing a central longitudinal slot 38 and end lugs 39, whereby it is attached to the inner face of the fender above and rearward of the lower completed plate B, as shown in Fig. 12. This body-plate has connected with it a front slide 40, carrying a rib 41, which rib has movement in the slot 38 of the body-plate, as shown in Fig. 6, and a rear slide 42 is provided, having sockets 43 formed therein near its ends, through which sockets the central guide-bars 14 loosely pass, so that this connecting or brace plate may also have vertical movement upon the guide-bars, and the guide-bars also serve to hold the slides so that the body-bar 37 may be given lateral movement, as the two slides 41 and 42 are connected by a bolt 44 at their centers, and as the slides in the connecting or brace plate C are much longer than those in the corresponding and lower plate B connecting-screws 45 are provided for the slides in the plate C—one near each end. The back slide 42 of the plate C is provided at each side of its center with a lug 46, and to each lug 46 the lower end of a draw-bar 47 is attached, the upper ends of the draw-bars being made to extend upward and outward through openings 48, produced in the upper horizontal portions 14^a of the central guides 14, as best shown in Figs. 4 and 12. Each draw-bar is surrounded by a spring 49, the springs at their lower ends resting against shoulders formed near the lower extremities of the draw-bars, and at their upper ends the springs have bearing against the under faces of the guide-bars 14, as shown in Fig. 12. Thus the tendency of the springs 49 is to force the clearing-board or fender to its lower position and maintain it in that position. The draw-bars 47 are adapted for use in elevating the clearing-board or fender, and this is accomplished in a manner to be hereinafter set forth.

The interior construction of the plow is completed when the rear connecting or brace plate D is added to it. This plate comprises a body-plate 50, which is secured at its ends to the sides of the clearing-board or fender at the central portion thereof back of the front plates B and C and over the end guide-bars 13 of the supporting-frame, as shown in Fig. 12. The body-plate 50 is provided with two longitudinal slots 51 and 52, and at each slot a front and rear slide are provided. The rear

slide of the upper slot 51 is designated as 51^a, and the front slide, which is shown in dotted lines in Fig. 10, is designated as 51^b. These slides are identical in construction with the slides described in connection with the other connecting or brace plates, with the exception that the rear slides are not provided with lugs. The rear slide, however, is provided with a socket 53 at each end, through which the guide-bars 13 pass. The slides located at the slot 52 are designated, respectively, the rear slide as 52^a and the front slide as 52^b. The rear slide 52^a is provided with sockets 54, through which the guide-bars 13 pass, and with lugs 55, carrying adjusting-bolts 56 and nuts 57, through which the adjusting-bolts pass, and these adjusting-bolts are adapted to limit the downward movement of the rear connecting or brace plate in like manner as the adjusting-screws 34 limit the downward movement of the forward and lower connecting or brace plate.

At the central portion of the back of the body-plate 50 of the brace-plate D a rearwardly-extending finger 58 is secured, and this finger is adapted to move between the members of an inverted-U-shaped plate 59, secured to the back of the two central brackets of the supporting-frame, as shown in Fig. 13, and the object of this finger is, when the plow is elevated by manipulating the draw-bars 47, to find its way up to the contracted portion of the V-guide-plate 59 and center the plow with respect to the track over which it is being carried.

The manner in which the plow is elevated from the cab of an engine is as follows: Upon the upper face of the pilot-board a rock-shaft 60 is journaled, and to this rock-shaft, by means of attached crank-arms 61, the draw-bars 47 of the plow are secured near the pilot-board at any desired point. In the frame of the engine at each side an air-cylinder 62 is located, and the piston-rods 63 of these cylinders are connected by links 64 or otherwise with crank-arms 65, which arms are also secured to the rock-shaft 60. A pipe 66 is led from a compressed-air reservoir located beneath the cab or tender to each of the air-cylinders 62 and connects with these cylinders above its piston-head. Within the cab the pipes 66 are provided with a three-way cock 68, and a second pipe 69 connects the pipe 66 between the reservoir and the three-way cock 68, and this second pipe 69 connects, also, with the lower pipe 66 near the connection of the latter with the air-cylinders, as shown in Figs. 1 and 12. At the forward end of the lower pipe 69 a valve 70 is located, and this valve is connected by a link 71 with a crank-arm 72, secured upon the rock-shaft. It will be understood that this construction is duplicated at each side of the engine; but in practice it is found desirable the pipes 66 and 69 may be placed at one side of the engine only, in which event the pipes are connected, preferably, over the pilot-platform with the

cylinder at the opposite side. The upper pipe 69 is also provided with a valve 73, located within the engine-cab. It will thus be observed that the upper pipe is constantly charged with air while the valve 73 remains open, and while the valve 70 remains closed, which is the normal position of that valve, the pressure of the air is contained within the upper pipe 69 between the outer valve 70 and the inner extremities of those pipes.

In operation, when it is desired to raise the plow, the valve 68 is turned in a manner to admit the compressed air into the lower pipe 66, and the air passing into the cylinders 62 over the piston-heads therein forces the heads downward, and thereby rocks the shaft 60 in such manner as to elevate the crank-arms 61, with which the draw-bars of the plow are connected, and the plow is raised against the tension of the springs on the said bars. The plow will remain in its raised or elevated position as long as the pressure of air remains upon the piston-head of the cylinder. To lower the plow, the valve 68 is turned to shut off the supply of air to the pipes 66 and exhaust the air from the cylinders, at which time the springs around the draw-bars will act, together with the weight of the plow itself, to drop the plow to its normal position.

In the event that the plow should strike an obstruction which would elevate it to a predetermined degree, the rock-shaft will be again rocked, and by reason of the crank connection 72 with the valve 70 in the upper pipe 69 these valves will be opened and the air will be admitted to the cylinders and will keep the plow in an elevated position, in addition to raising it as high as possible. The plow can then be dropped only by the engineer exhausting the air through the medium of the three-way valve 68.

It is obvious that the plow can move both laterally and vertically—vertically upon the guide-bars 13 and 14 and laterally by reason of the construction of the connecting or brace plates. Therefore the plow can of itself clear small obstructions which may be in its track, and will adjust itself to the contour of curves wherever they may occur in the road.

It is desirable that when crossings are reached the plow should be automatically elevated, and therefore at the crossings a lift-bar 73^a is located at each side of the track, as shown in Fig. 3, the said bar having an inclined upper edge, so that as the plow rides up the incline of the lift-bars the valve 70 will be opened sufficiently to admit air to the cylinders and cause the plow to be held elevated, it being dropped through the medium of an attendant in the engine-cab after the crossing has been passed.

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

1. In a snow or like plow, the combination, with a supporting-frame having inclined guide-bars connected therewith, of a plow

consisting of a clearing-board or fender and connecting or brace plates uniting the sides of the fender, the said connecting or brace plates consisting of body-plates, and slides having movement laterally in the body-plates, one of the slides being provided with sockets for the reception of the guide-bars, substantially as shown and described, whereby the plow may have horizontal movement or lateral movement upon its support, as and for the purpose set forth.

2. In a plow adapted for attachment to an engine, the combination, with a supporting-frame having inclined guides located thereon, of a plow consisting of a clearing-board or fender approximately V-shaped, connecting or brace plates uniting the sides of the clearing-board or fender, said plates consisting of a slotted body-plate, slides having lateral movement upon the body-plates and provided with sockets loosely receiving the guide-bars, and draw-bars connected with one of the brace-plates, whereby the plow is capable of both vertical and lateral movement, substantially as shown and described.

3. In a plow adapted for connection with an engine, the combination, with a supporting-frame having inclined guide-bars located thereon, of a plow consisting of an essentially-V-shaped clearing-board or fender having a concaved outer face, connecting or brace plates uniting the sides of the fender, each of said brace-plates comprising a slotted body-plate, slides having lateral movement upon the body-plates, sockets formed upon the slides and loosely receiving the guide-bars, spring-pressed draw-bars connected with one of the brace-plates, and a stop mechanism carried by the brace-plates, as and for the purpose set forth.

4. In a plow of the character described, the combination, with a supporting-frame adapted for attachment to an engine, the said supporting-frame being provided with inclined guide-bars, of a plow comprising an essentially-V-shaped clearing-board or fender, adjustable brushes located at the rear of the clearing-board, connecting or brace plates uniting the members of the clearing-board or fender, each brace-plate comprising a slotted body-plate and slides having longitudinal movement in the body-plates and carrying sockets to receive the guide-bars of the frame, spring-pressed draw-bars connected with one of the brace-plates, and a lifting mechanism, substantially as shown and described, connected with the draw-bars, as and for the purpose specified.

5. In a plow of the character described, the combination, with a supporting-frame adapted for attachment to the pilot-board of an engine, the said frame consisting of a base, brackets projected upward from the base, and inclined guide-bars extending upward and rearward from the margins of the base, of a plow consisting of a clearing-board or fender of essentially-V shape, having a concaved

outer face and provided with track-scrapers at its lower edge, brushes carried by the fender at its rear, connecting or brace plates uniting the sides of the fender, each comprising a slotted body-plate, slides having longitudinal and lateral movement upon the body-plates, and slides carrying sockets receiving the guide-bars of the frame, draw-bars connecting with one of the brace-plates, and a pneumatic lifting apparatus connected with the draw-bars, as and for the purpose specified.

6. In a plow of the character described, the combination, with a supporting-frame consisting of a horizontal triangular base-plate, brackets projected upward therefrom and adapted for engagement with the pilot-board of an engine, and inclined brace-bars extending from the front margin of the base-plate to the pilot-board, of a plow consisting of a fender having a concaved forward face, connecting or brace plates uniting the inner side faces of the fender, said brace-plates comprising a slotted body-plate, slides having longitudinal and lateral movement in the body-plate, the slides carrying sockets loosely receiving the guide-bars, and adjusting-stop mechanism carried by the lower brace-plates, draw-bars connected with one of the upper

brace-plates, a finger projected from the rear lower brace-plate, entering the V-shaped opening in the supporting-frame, and a pneumatically-operated lifting mechanism connected with the draw-bars, as and for the purpose specified.

7. The combination, with a plow adapted for attachment to the pilot of an engine, the plow being capable of vertical movement, of a rock-shaft, draw-bars connected with the plow and with the rock-shaft, air-receiving cylinders the piston-rods of which are connected with the rock-shaft, an air-storage reservoir, a main pipe leading from the storage-reservoir into the cylinders, said main pipe being provided with a supply and exhaust valve and a storage-pipe connected with the main pipe between the storage-receptacle and its valve and also adjacent to the connection of the main pipe with the cylinders, the storage-pipe being provided with a valve, the said valve having connection with the rock-shaft and being operated therefrom, as and for the purpose specified.

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Witnesses:

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JOHN BRODIE.