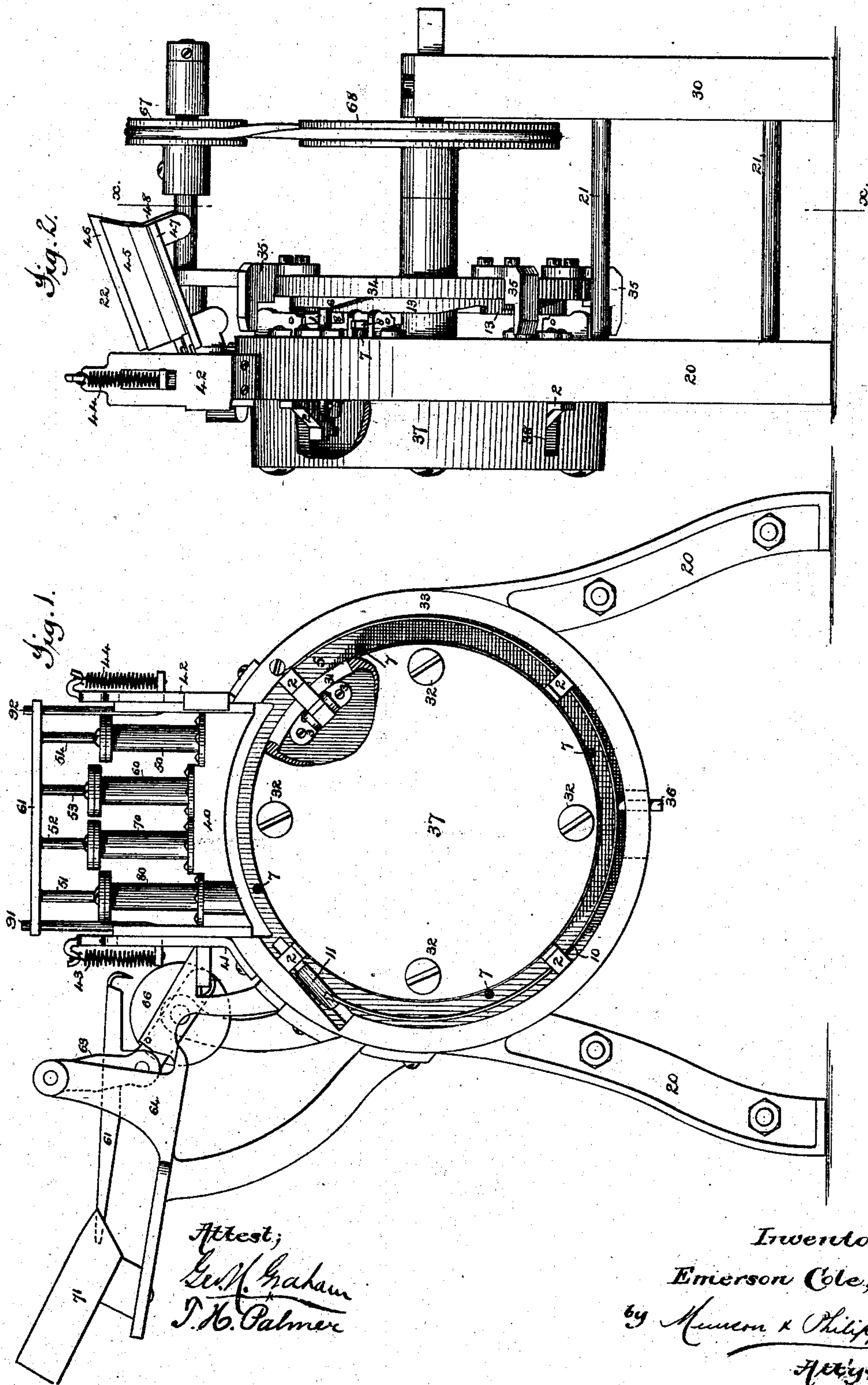


(No Model.)

3 Sheets—Sheet 1.

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Hoop Nailing Machine.  
No. 237,369. Patented Feb. 8, 1881.



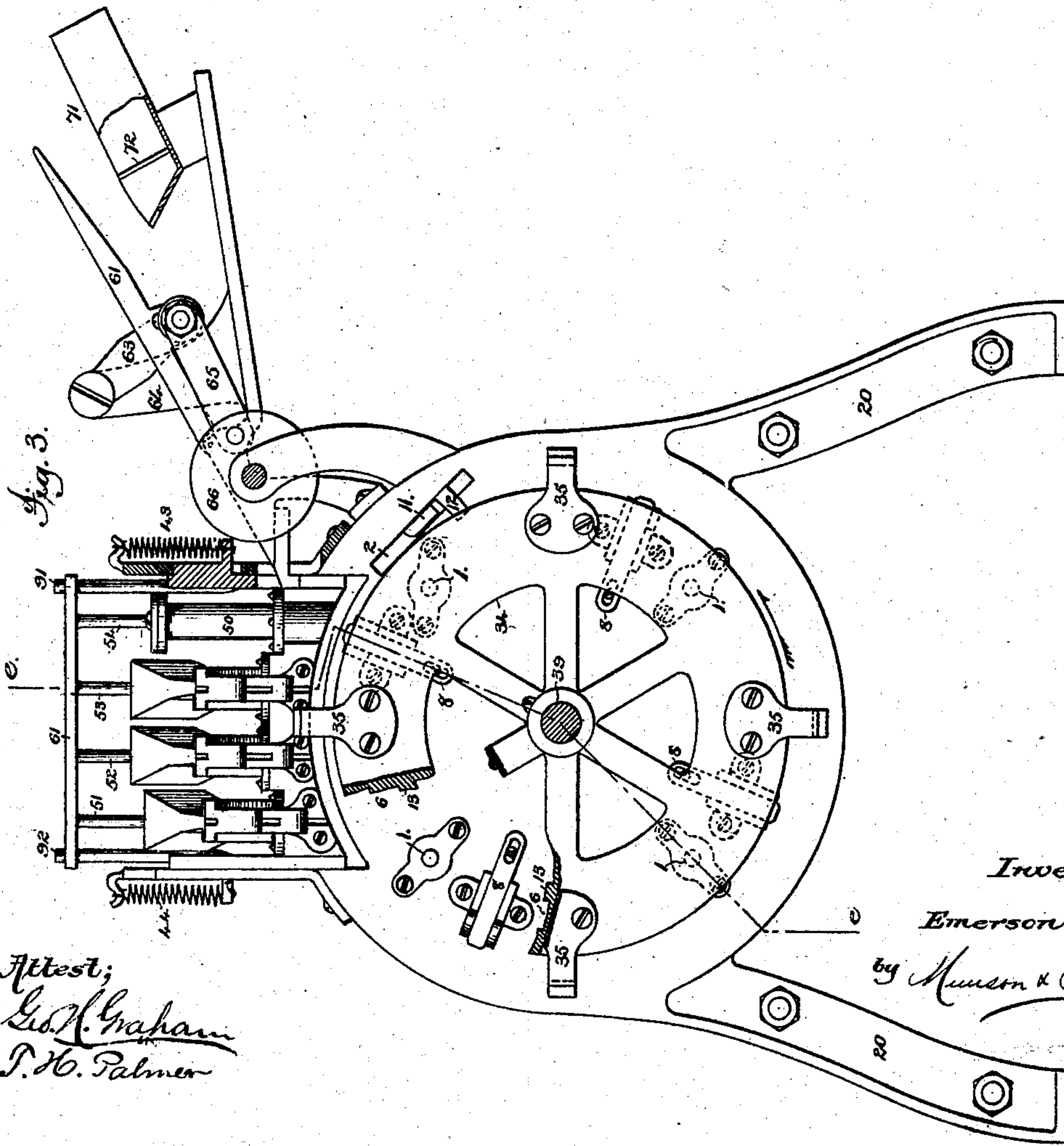
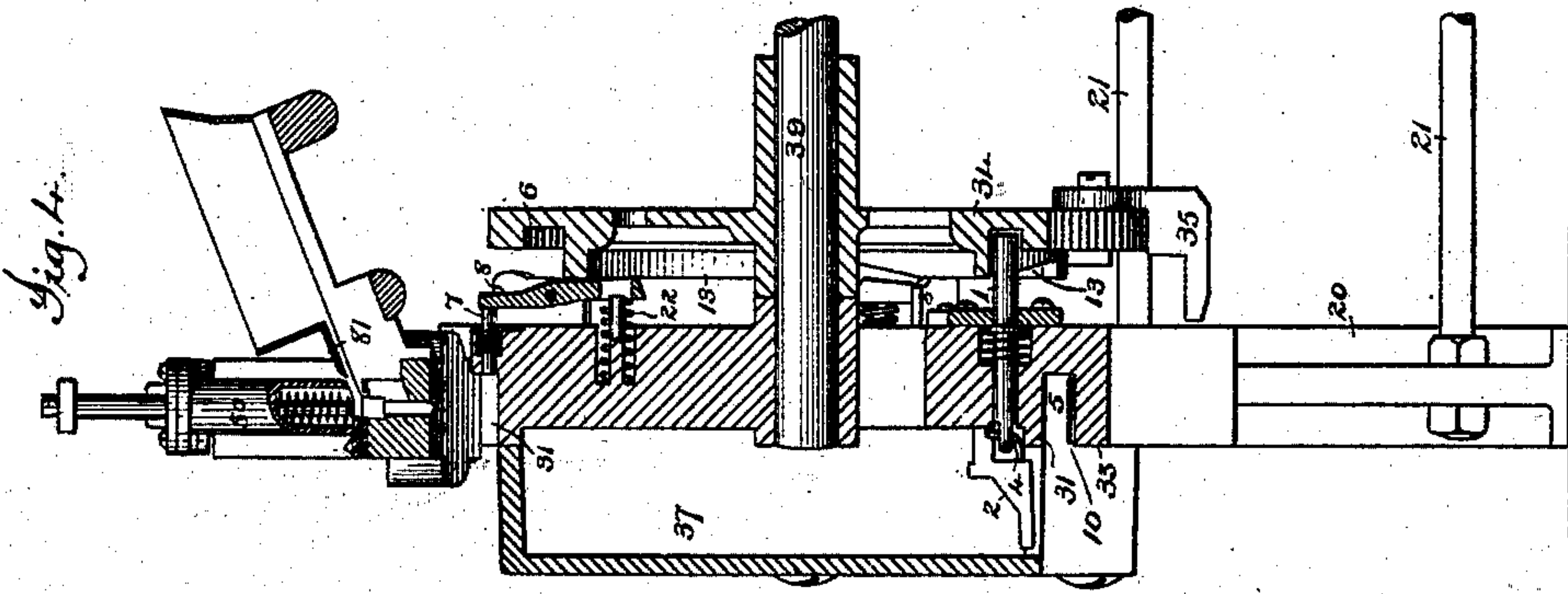
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3 Sheets—Sheet 2.

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No. 237,369.

Patented Feb. 8, 1881.



Attest;  
Geo. H. Graham  
J. H. Palmer

Inventor,  
Emerson Cole,  
by Munson & Philipp  
Attys.



(No Model.)

3 Sheets—Sheet 3.

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Hoop Nailing Machine.

No. 237,369.

Patented Feb. 8, 1881.

Fig. 8.

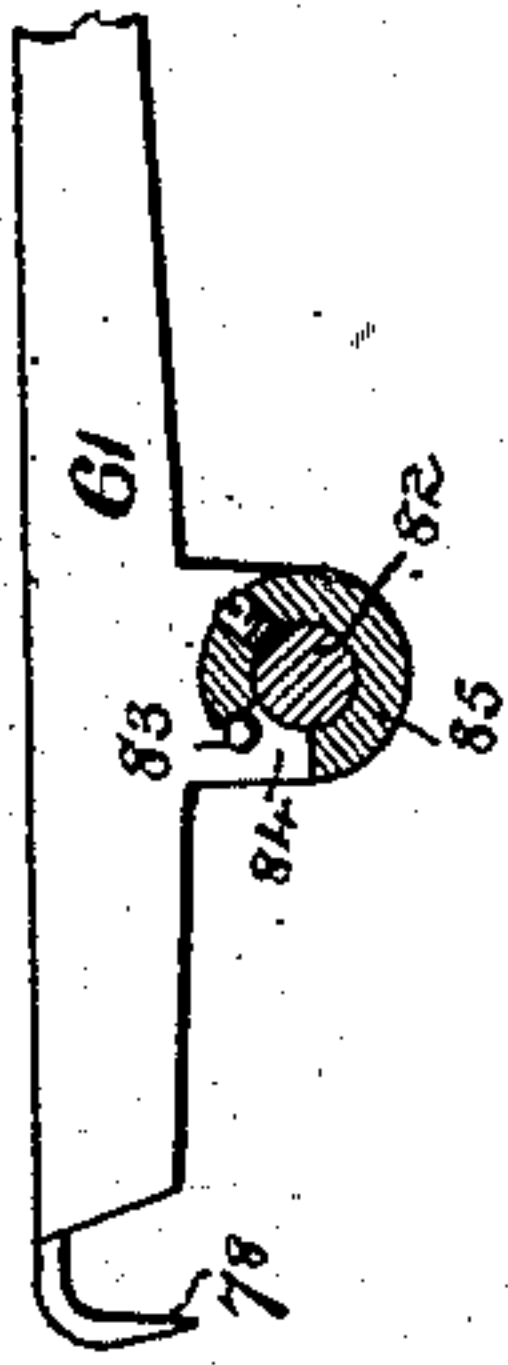


Fig. 5.

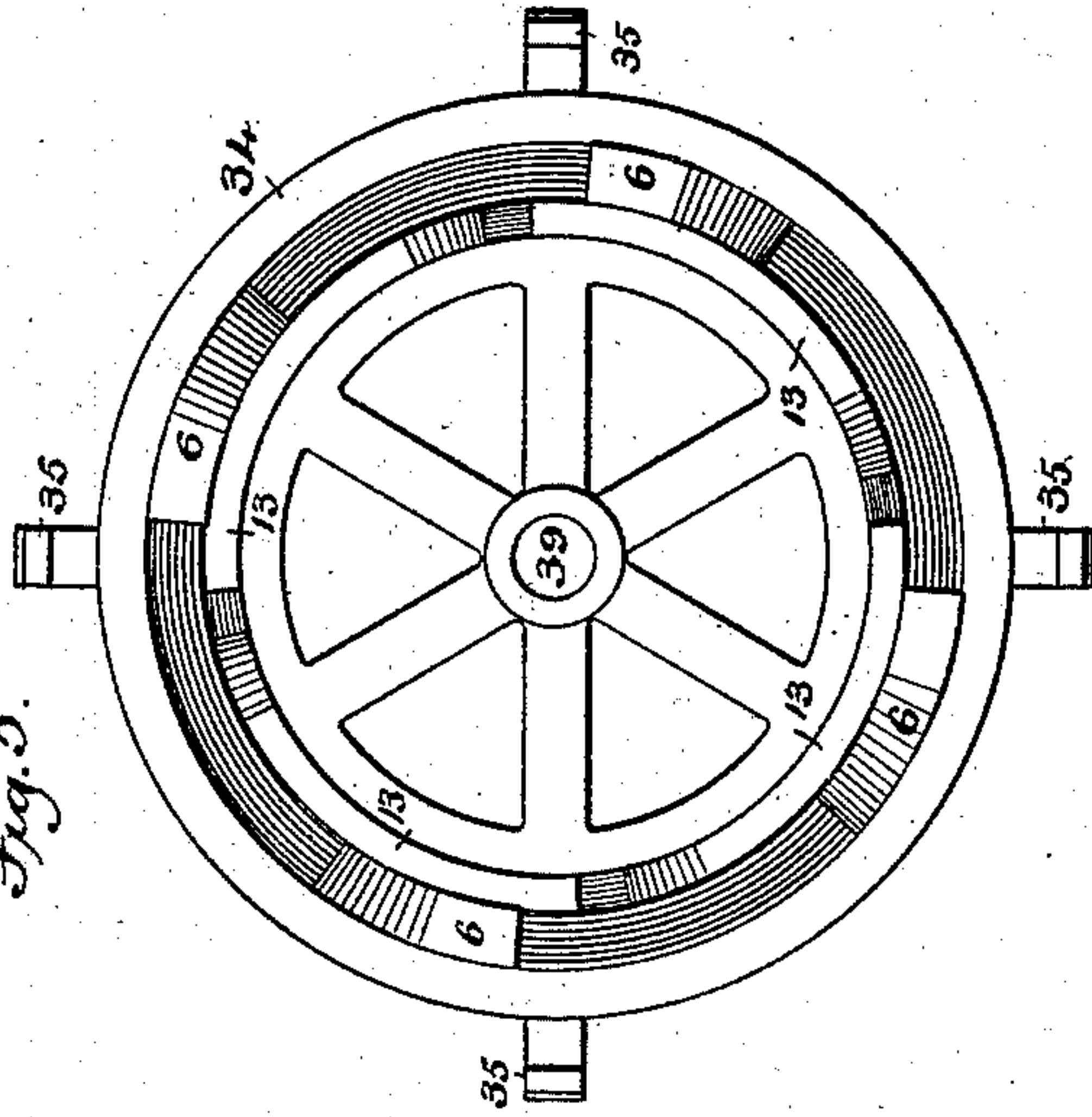


Fig. 6.

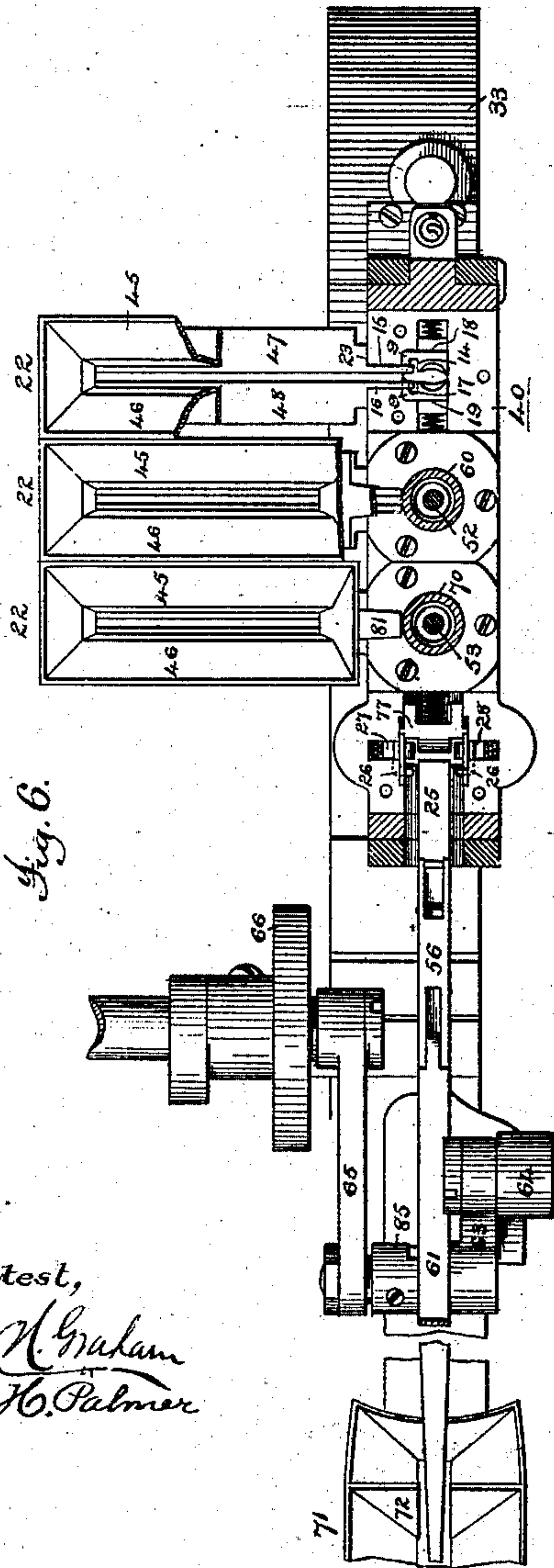
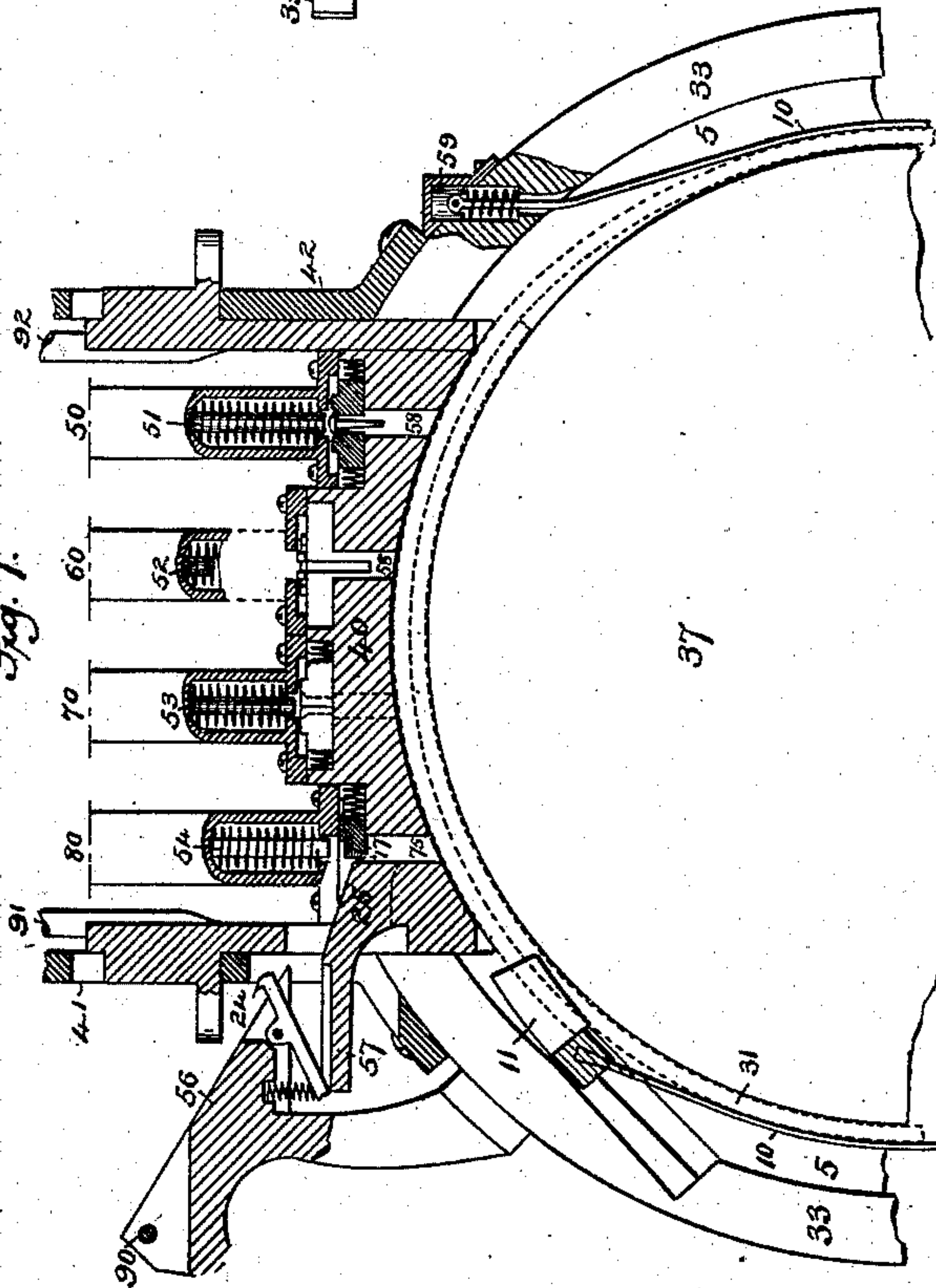


Fig. 7.



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# UNITED STATES PATENT OFFICE.

EMERSON COLE, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO  
LOWELL M. PALMER, OF SAME PLACE.

## HOOP-NAILING MACHINE.

SPECIFICATION forming part of Letters Patent No. 237,369, dated February 8, 1881.

Application filed July 16, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, EMERSON COLE, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Machines for Nailing Hoops, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

Hoops, such as are used for securing the staves or sides of barrels, kegs, well-buckets, cheese-boxes, and like vessels, are now supplied to coopers in nests—that is to say, a quantity properly shaped are bent or curved into circular form, so as to lie or be nested one within another, their ends being unattached. These hoops simply require to have their ends firmly secured together, when they are ready to be driven upon a barrel or similar body. Heretofore it has been the practice to unite their free ends together by a hand process, in which the fastenings, nails, rivets, and the like are separately driven.

It is the object of the present improvements to fasten together the free ends of such hoops by mechanisms so arranged and operating as to clamp the hoop ends in proper relative adjustment, to automatically feed the nails, rivets, staples, or other fastenings into proper position, and then simultaneously drive all of said fastenings, whereby great accuracy in the work is accomplished and finished hoops are produced with great dispatch and cheapness.

The invention consists in a novel arrangement of devices whereby the free ends of the hoops are properly lapped and clamped in position to be united together; in means for feeding nails, rivets, staples, or other fastenings into proper position for insertion in said hoop ends; in means for driving and clinching said fastenings, and in various combinations of parts, all of which is too particularly herein-after set forth to need further preliminary description.

The accompanying drawings illustrate a practical apparatus embodying my said improvements, Figure 1 showing a front elevation; Fig. 2, a side elevation; Fig. 3, a rear sectional elevation on the line *x* of Fig. 2, and Fig. 4 a transverse sectional elevation on line

*e* of Fig. 3. Fig. 5 shows an elevation of the cam-wheel whereby many of the parts are moved. Fig. 6 shows the mechanisms for feeding the fastenings by a sectional plan view, of which Fig. 7 is principally a sectional elevation. Fig. 8 is an elevation of the swinging horn.

The various mechanisms are supported upon a frame-work, as one consisting of legs 20 30, braced by tie-rods 21, and otherwise constructed so as to securely and firmly support the various parts of the machine.

The hoop holder or support consists of a circular former, 31, which is surrounded by a circular fender or guard, 33, that is constituted by a rim projecting from the frame-work, so as to form a space or recess, 5, between it and the periphery of the former 31 for the reception of the hoop. The former 31, fender 33, and the back plate uniting the two may be cast in one piece, so as to provide the recess 5, or be separate parts properly united. This former 31 determines the size of the hoop, and its upper surface, above which the mechanisms for inserting the fastenings are mounted, acts as an anvil or clinching-surface, and it may be made oblong or of other shape, and will be of a size to suit that of the hoop to be made. It may be constructed largely of wood; but in this case it will be provided with a face of metal to afford a proper clinching-surface.

An evening mechanism is provided, whereby various parts of the hoop shall be caused to lie in the same vertical plane while its ends are being fastened together, and thus be kept out of wind. This mechanism consists of four (more or less) arms, 2, which are pivoted in ears 3 3, that are fastened to the face of the former 31 within its periphery. (See Fig. 1.) These arms are of the peculiar shape seen in Fig. 2, whereby their outer ends are adapted to bear against the edges of the hoop and press its opposite or inner edge against a seat formed by the back plate of the fender 33. The inner ends of these arms project beyond their pivots, so as to form bearings, seating them in their open position, as in Fig. 4, and adapt them to be engaged by the toes 4 of rods 1, which latter are spring-seated in bearings in the frame, and are horizontally reciprocally moved.



located to move the arms 2 into the position shown in Fig. 2, by means of a rotating cam-wheel, 34, the several short cams 6 of which are provided, one for each rod 1 and corresponding arm 2. The arms 2 are thus regularly vibrated from one position to the other, moving to one position to permit the introduction of the hoop onto the former and then to the other to even the same, thus playing in recesses 38 in the periphery of a guide, 37, which is a hollow cup-like device held against the former 31 by screws 32 and forming an extension of said former, its periphery being beveled to adapt it to guide the hoop onto said former 31.

A bending mechanism is provided, whereby the hoop introduced into the recess 5 is drawn snugly against the periphery of the former 31, and its free ends thus advanced past each other so as to be properly lapped, and thus bring the hoop to its proper dimensions and hold it there until its said ends are secured. This mechanism consists of a flat band, 10, which may be of leather or similar material, though a flat metal spring is preferred. This band is secured at one end to one side of the fender 33, and although it may be rigidly held, it is preferable to secure it to a block, 59, Fig. 7, that is capable of sliding in a recess in said fender, said block being seated upon a spring, whereby it will be held up in its highest position and yet permit the end of said band to be drawn slightly downward whenever an unusually thick hoop is operated upon. This band has a central guide-pin, 36, and at its opposite end is attached to a shoe, 11, that slides in bearings in a recess of the fender 33 and its back plate. This shoe 11 has a rearward-projecting tappet, 12, that is engaged by one of the arms 35 which are carried by the cam-wheel 34. These arms 35, engaging said tappet 12, advance the shoe 11 and draw up the band 10, and finally pass off said tappet and release the band, which then, either by its resiliency or by gravity of its shoe 11, or its own weight, moves outward to relieve the hoop.

A hoop-ejecting device is employed, whereby the finished hoop is forced out of the recess 5 and delivered from the machine. This consists of push-rods 7, that are spring-seated in bearings formed in the frame-work and reciprocated by means of pivoted levers 8, the ends of which bear upon the cams 13 provided upon the cam-wheel 34; said levers being also seated upon springs 22, that are sustained upon pins so as to bear upon the levers and hold them in contact with the cams 13. These cams 13 are provided with extended portions, whereby the ends of the levers 8 are held in such position as to permit the push-rods 7 to remain retracted by their springs for a considerable period, during which the various operations are performed upon the hoop, and with short depressions which allow the springs 22 to quickly vibrate said levers to actuate the

rods 7 and eject the finished hoop. The cam-wheel 34 is mounted upon a shaft, 39, properly journaled in the frame-work, which shaft is driven in any common manner and rotated at an appropriate speed.

The mechanisms for clamping the hoop ends and for feeding and inserting the fasteners in the same are arranged above the former 31, the principal parts of the same being carried by a head, 40, that is capable of vertical reciprocation in end guides, 41 42, it being held in a raised position by means of springs 43 44, that connect side arms of the head 40 with the guides 41 42. The under surface of this head is made concave, that form being given to adapt it to conform to the convex clinching-surface presented by the former 31, so that the overlapping hoop ends may be properly clamped between said surfaces when the head 40 is depressed and the operation of fastening said hoop ends together is to be accomplished.

The fastener-inserting mechanisms consist of three (more or less) nail-setters, 50 60 70, and with one or more staple-setters, 80, all of which are provided with plungers, as 51 52 53 54, so disposed as to carry the nails or staples to the lapped portions of each hoop through guiding-channels, as 58 75, extending through the head 40, with which guiding-channels lateral nail-directing recesses communicate. Staples alone or nails alone might be used; but it is preferable to use nails for the principal fastenings, and to use but one staple for each hoop, as will be explained, said staple being preferably so set near the end of the overlapped portions of the hoop that its head or crown will bear upon or bridge the outerlapped part of the hoop transversely. Each nail-setter is provided with a feeding mechanism that consists of a hopper, 22, into which the nails may be promiscuously thrown, and from which they may gravitate by reason of the inclination or position of the hopper. This hopper is composed of inclined end plates and inclined side plates, 45 46, the latter terminating, respectively, in a guide-rail, 47 and 48, which rails are set apart a distance sufficient to permit the legs of the nails to depend through the longitudinal slot formed between them, while the said plates 47 48 are set far enough away from said slot so that the heads of the nails will be supported upon the upper faces of said rails 47 48. The rails 47 48 extend forward to communicate with a nail-directing recess, 23, cut in the rear wall of the head 40, and terminate in points 15 16, that rest in lateral slots 14 17, formed in spring-seated vertical guides 18 19, (see Fig. 6,) so that said guides may move laterally in bearings formed in the head 40 without disturbing the position of the ends of the points 15 16 of the guide-rails. These guides 18 19 project from the opposite walls of the nail-guiding channel, and are spring-seated, so as to normally protrude inwardly over the nail-guiding channel 58, their faces, which are inclined rearward and upward, then standing



apart and in alignment with the rails 47 48, thus forming a continuous guideway for the nails from the hopper to the guide-channel 58. The inclined faces of these guides form a seat for the head of the nail directed between them, so that as each nail is fed to them its shank depends in the channel 58, while its head rests in said seat, the nail thus being supported directly beneath a spring-seated plunger, which, descending upon the nail, will cause the spring-seated guides to spread apart and admit the nail-head to pass them in its vertical descent through the channel 58. The spring-seated plungers 51 52 53, carried within the stock of each nail-setter, terminate at their upper ends in a cross bar or head, 161, to which they are attached, and each is provided with a hopper, guide-rails, and spring-seated guides 18 19, for conducting nails to their nail-guiding channel. As the nails slide forward upon the guide-rails and their points 15 16, they are held down in proper position and prevented from jumping by a top guide-plate, 81, extending from the hopper end nearly to the guides 18 19, the nails resting against each other and the forward one against a stop or stops, 9, that protrude from the vertical guide 18, or the guides 18 19, to close the guideway, and thus suspend the forward movement of the row of nails descending toward the setting instrumentalities. As the plunger descends its end bears upon the inclined faces of the guides 18 19, and forces or spreads said guides laterally, thus withdrawing the stops from the guideway between the rails 47 48 and permitting the forward nail to move onward past the stops into the nail-directing recess, and to rest against the face of the plunger. As each plunger is spring-seated it automatically ascends when pressure upon it is removed to clear the way for the feeding movement of a nail forward beneath the plunger. Thus as the plunger end reaches the inclined faces of the guides 18 19 they move inward and permit a like movement of the stops 9 9, which so moving again close the guideway, while the nail which has moved past them descends far enough to enter the nail-guiding channel in which it stands, directly beneath the plunger, with its flanged head resting upon the seat formed by the inclined faces of the guides 18 19, which prevent its gravitating through them and support it directly beneath the plunger. As the plunger again descends it carries this nail before it, the guides moving rearward, and forcibly inserts the nail through the hoop, during which operation the movement of the stops 9 9 again takes place to permit the onward passage or forward movement of the next nail.

The staple-feeding mechanism consists of several devices, as follows: A hopper, 71, having inclined sides and a transverse partition, 72, provided with a vertical central slot, in which hopper a mass of staples are promiscuously thrown. A swinging horn, 61, is hung on a shaft, 82, and rocked by means

of a lever, 63, fixed to said shaft and pivoted to a bracket, 64, the lower end of said shaft being connected by a rod, 65, to a crank-wheel, 66, that is suitably rotated, as by a pulley, 67, on its shaft belted to a pulley, 68, on the main shaft 39. The tail end of this horn is fitted to enter the slot in the division-plate 72, and its forward end is provided with a hook or extension, 78, that is adapted to play in a central slot formed in the stationary horn 56. The swinging horn 61 is provided with a pin, 83, that plays in a slot, 84, in the side of a collar, 85, that is fixed upon the shaft 82, so as to limit the up and down vibration of said horn upon the shaft. As the lever 63 is swung rearward the horn 61 will drop, by reason of the superincumbent weight of its tail end, and will thus be pointed downward, so that it will enter, through the slot in the plate 72, into the hopper and pass through the mass of staples therein. When it reaches the limit of its rearward movement the pin 83, engaging with the wall of the slot 84, will cause the horn to rise until it reaches the position shown in Fig. 3, whereupon one or more staples which it has caught right side up will straddle it and be sustained thereon in such an inclined position as to slide down upon it and pass from its surface onto that of a stationary horn, 56. The stationary horn 56 is fixed to the frame-work, so that its inclined guiding-face projects downward toward the staple-setting mechanism. Its rear end is bifurcated, to provide a recess within which the hook 78 of the swinging horn 61 may engage and overlie a cross-pin, 90, and its forward end is bifurcated to carry a hook, 24, that is at the end of a lever-arm which plays up and down, said hook being raised by a spring acting to press the lever downwardly. When raised, as in Fig. 6, said hook suspends the movement of the staples upon the horn 56.

A fixed guide, 25, is attached to the sliding head 40, with its forward end terminating beneath the plunger of the staple-setter, and so that when the head rises said guide will be brought into a position to form a continuation of the horn 56. This guide 25 has a projection, 57, that underlies the lever-arm of the hook 24, and which is channeled out to receive the same, so that as the head 40 rises to cause the guide 25 to join the horn 56, said lever-arm will be raised and its hook 24 withdrawn, to allow the staples to pass onto the guide 25.

The staple-setter 80 is provided with a spring-seated plunger, 54, connected with the cross-bar 61, the construction being the same as that of the nail-setters already described, except that the plunger 54 has a broad face adapted to engage the entire crown of a staple.

The staples fed onto the guide 25 will slide over the same and rest against each other, the forward one being lightly pressed against stops 26 carried by arms 27 28, that are seated in recesses in the head 40, and constantly pressed forward by springs. These arms 27



28 have inclined front faces that project slightly within the delivery-recesses that connect with the guiding-channel 75 in the head 40, through which the plunger 54 passes in setting the staple, and said channel is provided, at a point 5 opposite to the guide 25, with a broad-faced spring-seated guide, 77, which plays in a recess in the head 40. This guide 77 has an inclined face, which, like those of the arms 27 10 28, extends within the guiding-channel 75, and so as to be beneath the plunger 54, and it so closely approaches the guide 25, which is aligned with it, that the foremost staple will pass directly from the guide 25 to said guide 15 77. When this plunger 54 descends it engages the inclined faces of the guide 77 and arms 27 28 and forces said devices rearward, thus withdrawing the stops 26 and admitting the forward or feeding movement of the staples 20 supported upon the guide 25, whereby the foremost of the staples thus fed forward will be caused to rest against the face of the plunger 54. As this plunger rises it will clear the inclined faces of the guide 77 and arms 27 28, 25 allowing the same to move inwardly. The stops 26 will thus again protrude in front of the row of staples upon the guide 25, and being constructed so as to enter behind the forward staple, will thus have permitted but one 30 staple to move beyond them. This staple will, as the plunger clears the space, rest with its crown against the inclined face of the guide 77, and there remain supported with its legs in the channel 75 and its crown directly beneath the plunger 54. As this plunger again 35 descends it engages the staple and forces it down through the channel 75 to set it in the material, the guide 77 and stops 26 being operated, as before, to cause the forward feed of 40 a new staple.

The sliding head 40 may be depressed in proper time to clamp the hoop ends upon the former and bring the feeding, setting, and 45 clinching instrumentalities into operative positions by any common means, as a foot-treadle, and the nail and staple inserting, setting, and clinching mechanisms may be operated by similar means, as by a mallet striking the bar 61.

50 In practically fitting up the machine it will be provided with cams properly shaped, mounted and driven to first cause the descent of the head 40 and then the depression of the bar 161, and with it the simultaneous movement 55 of the plungers of the nail and staple setters, these movements having proper relation to each other and to the action of the hoop holding, evening, and discharging mechanisms, which, it will be observed, are, as illustrated 60 here, arranged to act four times to each revolution of the shaft 39. These cams will be two in number, acting concertedly upon the rods 91 92, that rise from the frame 40, while a central cam will act upon the cross-bar 161.

65 The operation is as follows: When the mechanisms have moved so that the frame 40 is in

its upper position and the eveners 2 are retracted, as in Figs. 3 and 4, the nails from the hoppers 22 will descend in rows, the forward nail of each row standing against a plunger, 70 as 51 52 53, and the horn 61 (having swung rearward, entered the hopper 71, risen with staples astride its supporting-surface, tipped forward to connect with the horn 56) will stand so that the staples will slide from it, 75 follow the horn 56 and enter upon the guide 25, where a row of them will be formed, the forward one standing against the plunger 54. The operator then places a hoop over the guide 37 and into the recess 5, so that the outer- 80 most free end of the hoop lies near the shoe 11 and overlies the opposite end, and the whole hoop thus embraces the former 31. This done, the cams 6 engage the rods 1 and vibrate the arms 2, which quickly assume the position 85 shown in Figs. 1 2, moving into which they press against the outer edge of the hoop and force it into the recess 5 until it is pressed against the rear wall thereof, thus holding all parts of said hoop in a common vertical plane. 90 While the hoop is thus held one of the arms 35 engages the tappet 12 of the shoe 11 and moves the same forward. This shoe engages the end of the overlapping part of the hoop, and carries it into a correct position under- 95 neath the stapling and nailing mechanisms, and moves the band 10 upward to cause it to draw the hoop snugly against the former 31, upon which it binds it securely and fixes the size of the circle it is to form. While thus 100 held the head 40 is caused to be depressed to clamp the overlapping ends of the hoop, as in Fig. 7, following which the plungers of the nailing and clinching mechanisms are depressed to insert or drive the fastening nails and staple through the hoop end, and cause the ends of said nails and staple which pro- 105 trude through the hoop to meet the hard surface of the former, and be upset or turned into the hoop and there clinched. This done the 110 head 40 rises, the band 10 and the arms 2 are simultaneously released by the action of the cam-wheel 34, and the cams 13 permit the rods 7 to be quickly moved to engage with the edge of the hoop and eject the same from 115 the recess 5.

Any other staple or nail feeding mechanism may be employed, and the stops 9 and 26 may, instead of being spring-seated, be moved by means acting positively in both directions. 120

The fender 33 may be omitted without detriment to the machine, in which case the plate forming the abutment for one edge of the hoop will be attached to the former 31.

In some cases, where cheap work not requiring great accuracy is to be produced, the shoe 11 may be omitted. 125

What is claimed is—

1. A hoop-making apparatus consisting, essentially, of a curved anvil or bed for supporting the lapped ends of the hoop, and a moving clamping-head carrying nail or staple setters, 130



provided with means for supplying them with nails or staples and driving or inserting the same through the hoop, all substantially as described.

5 2. The combination, with a moving clamping-head provided with nail or staple setters having means for feeding nails or staples and driving the same into a hoop, of a former for determining the dimensions of the hoop, and a  
10 band for pressing said hoop upon the former, all substantially as described.

3. The combination, with a moving clamping-head carrying nail or staple setters, of a former coacting with said head to properly support the lapped ends of a hoop, a back plate  
15 projecting from said former to sustain the inner edge of the hoop, and moving arms that operate against the outer edge of the hoop to even the same, all substantially as described.

20 4. The combination, with a moving clamping-head carrying nail or staple setters, of a former coacting with said head to properly support the lapped ends of a hoop, a band for holding the hoop upon the former during the  
25 operation of fastening the ends of the hoop, and ejectors for removing the finished hoop, all substantially as described.

5. The combination of a moving clamping-head carrying nail or staple setters, a former,  
30 holding-band, and eveners coacting therewith to adjust and support the hoop during the operations of fastening its ends, and ejectors to remove the finished hoop, all substantially as described.

35 6. The combination, with the former 31, of the guide 37, all substantially as described.

7. The combination, with the former 31, of the ejectors 7, all substantially as described.

40 8. The combination of the former 31, band 10, and the ejectors 7, all substantially as described.

9. The combination of the former 31, band 10, eveners 2, and ejectors 7, all substantially as described.

45 10. The combination, with the former 31, of the elastically-hung band 10, all substantially as described.

11. The combination, with the former 31 and head 40, of the band 10 and its carrying-shoe  
50 11, all substantially as described.

12. The combination, with the former 31 and the band 10, of the tappet 12 and one or more arms, 35, all substantially as described.

13. The combination, with the former 31 and the ejectors 7, of the spring-seated levers 8 and the cams 6, all substantially as described.

14. The combination, with the former 31 and arms 2, of the rods 1 and cams 13, all substantially as described.

60 15. The combination, with a spring-seated plunger and a nail-guiding channel in which

said plunger reciprocates, of a nail-directing recess and spring-seated guides protruding into said channel and constituting a guide-way in continuation of that formed by the recess or the rails 47 48, all substantially as described. 65

16. The combination of a spring-seated plunger, as 51, guiding-channel, as 58, spring-seated guides, as 18 19, and guide-rails, as 47 48, that communicate directly with said channel and guides, substantially as described. 70

17. The combination, with a hopper, as 22, of a spring-seated plunger, as 51, guiding-channel, as 58, spring-seated jaws, as 18 19, guiding-rails 47 48, and a head, as 40, having a nail-directing recess, as 23, of stops 9, whereby nails promiscuously received are fed forward in a row, separated, and set singly, substantially as described. 75 80

18. The combination, with the guide-rails, as 47 48, spring-seated guides, as 18 19, spring-seated plunger, as 51, guiding-channel, as 58, and head, as 40, provided with a nail-directing recess, as 23, of stops, as 9, whereby nails fed forward in a row are separated and set singly, all substantially as described. 85

19. The combination, with a moving head, as 40, furnished with a staple-setting mechanism and carrying a guide, as 25, of a swinging horn, as 61, and a stationary horn, as 56, the swinging horn operating to pick up the staples from a hopper and direct them to the stationary horn for delivery to the guide 25, substantially as described. 90 95

20. The combination, with the moving head 40 and the guide 25 it carries, of the stationary horn 56 and its spring-seated hook 24, substantially as described.

21. The combination, with the stationary horn 56 and the hopper 71, of the interposed swinging-horn 61, operating to pick up the staples from the hopper and transfer them to the horn 56, substantially as described. 100

22. The combination, with the plunger 54, the guiding-channel 75 in the head 40, and the delivery-recesses connecting therewith, of the spring-seated guide 77 and the inclined guide 25, substantially as described. 105

23. The combination, with the plunger 54, guiding-channel 75, and the delivery-recesses connected therewith, of the inclined guide 25, spring-seated guide 77, and stops 26, substantially as described. 110

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses. 115

EMERSON COLE.

Witnesses:

H. T. MUNSON,  
T. H. PALMER.