

(No Model.)

6 Sheets—Sheet 1.

J. K. GORE.

APPARATUS FOR SORTING CARDS AND COMPILING STATISTICS.

No. 518,240.

Patented Apr. 17, 1894.

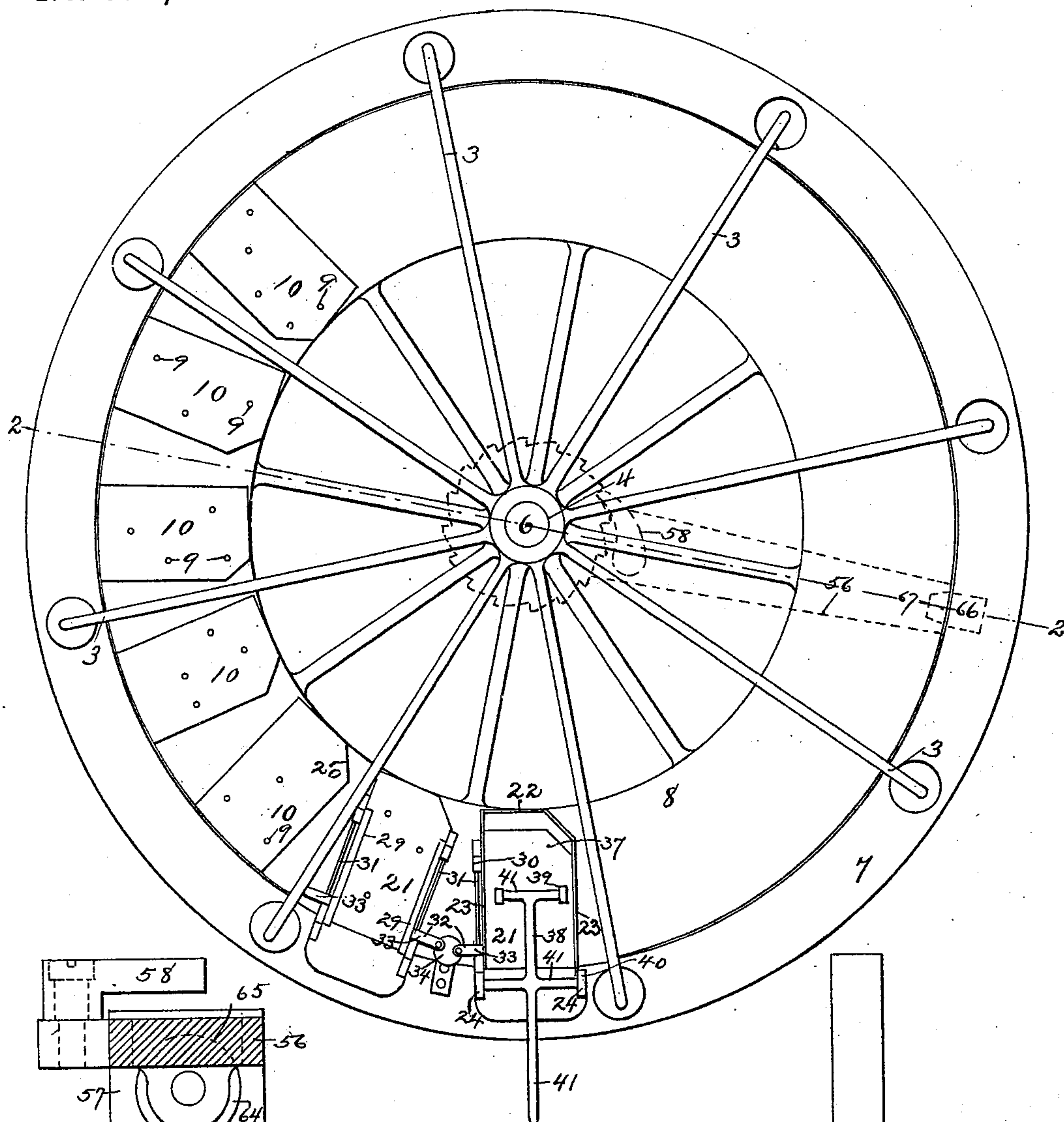


Fig. 1

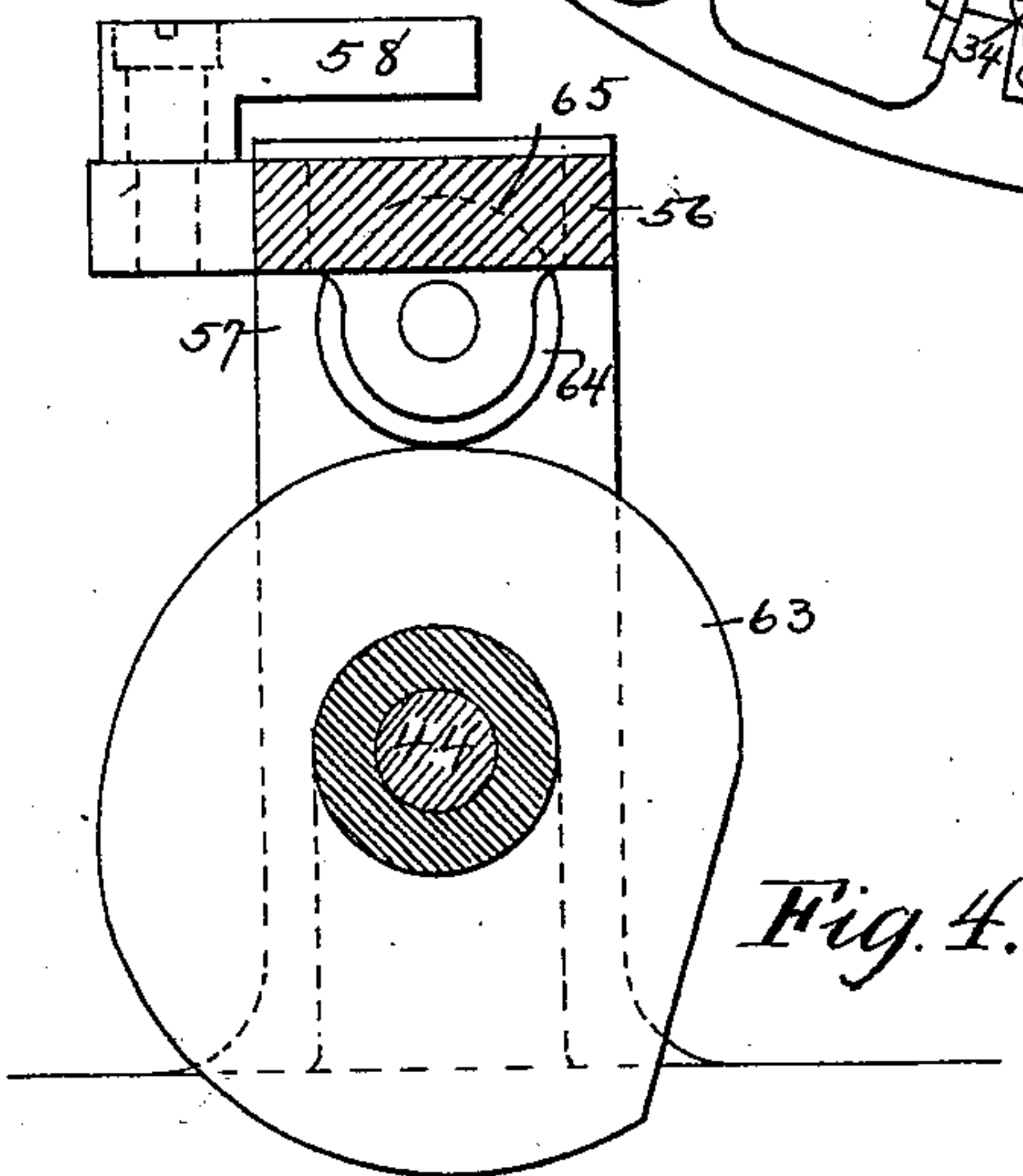


Fig. 4.

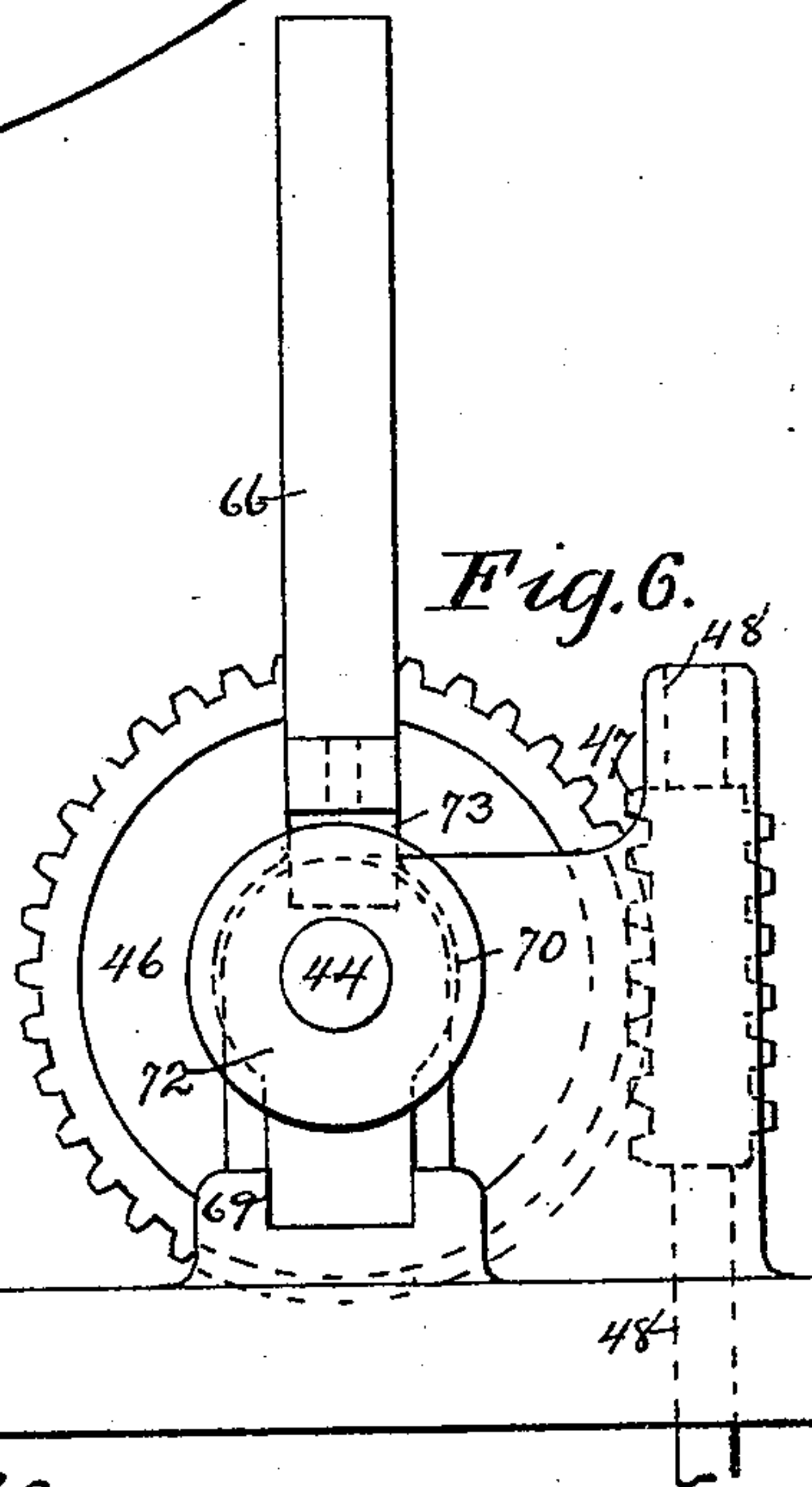


Fig. 6.

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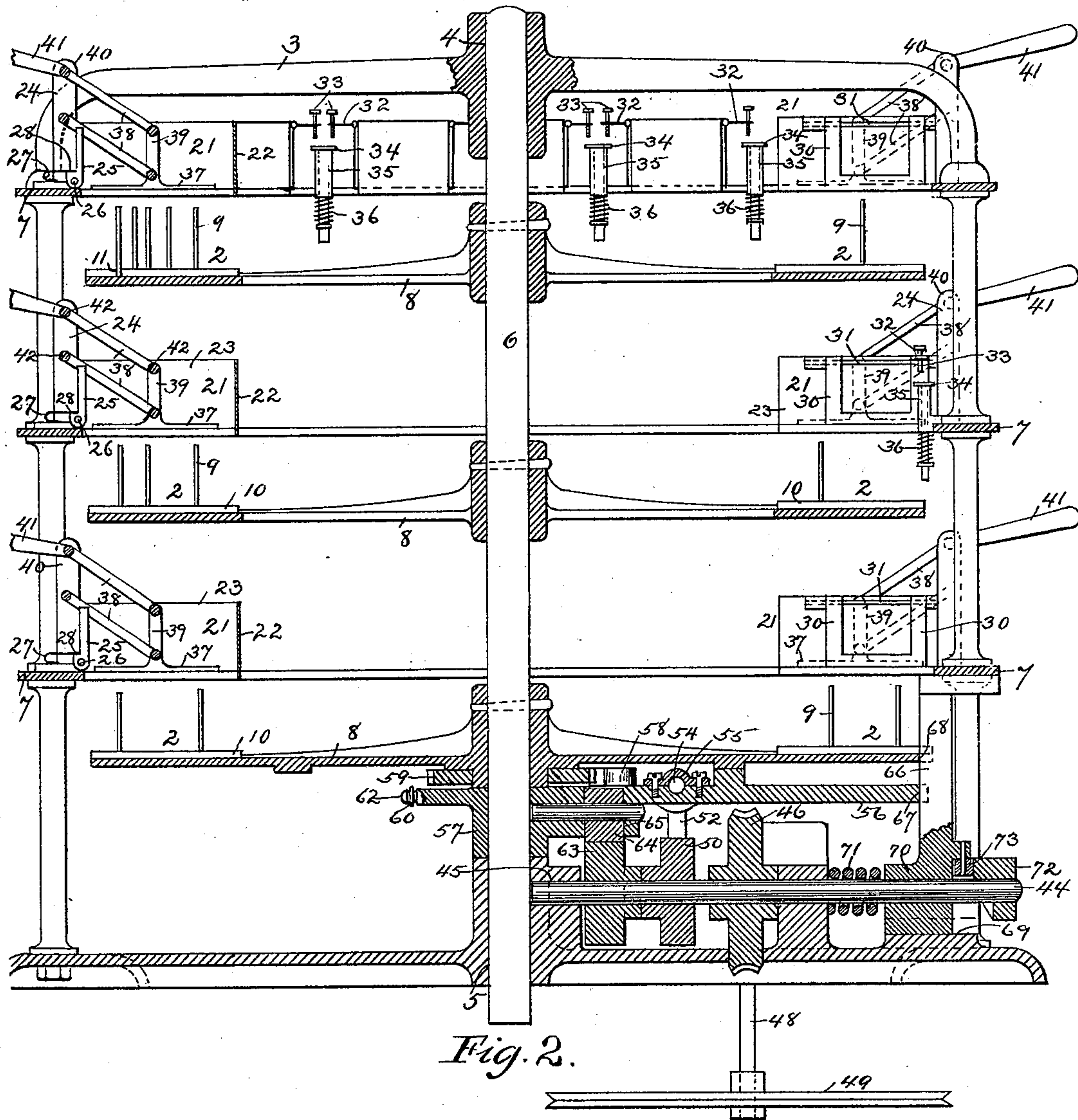


Fig. 2.

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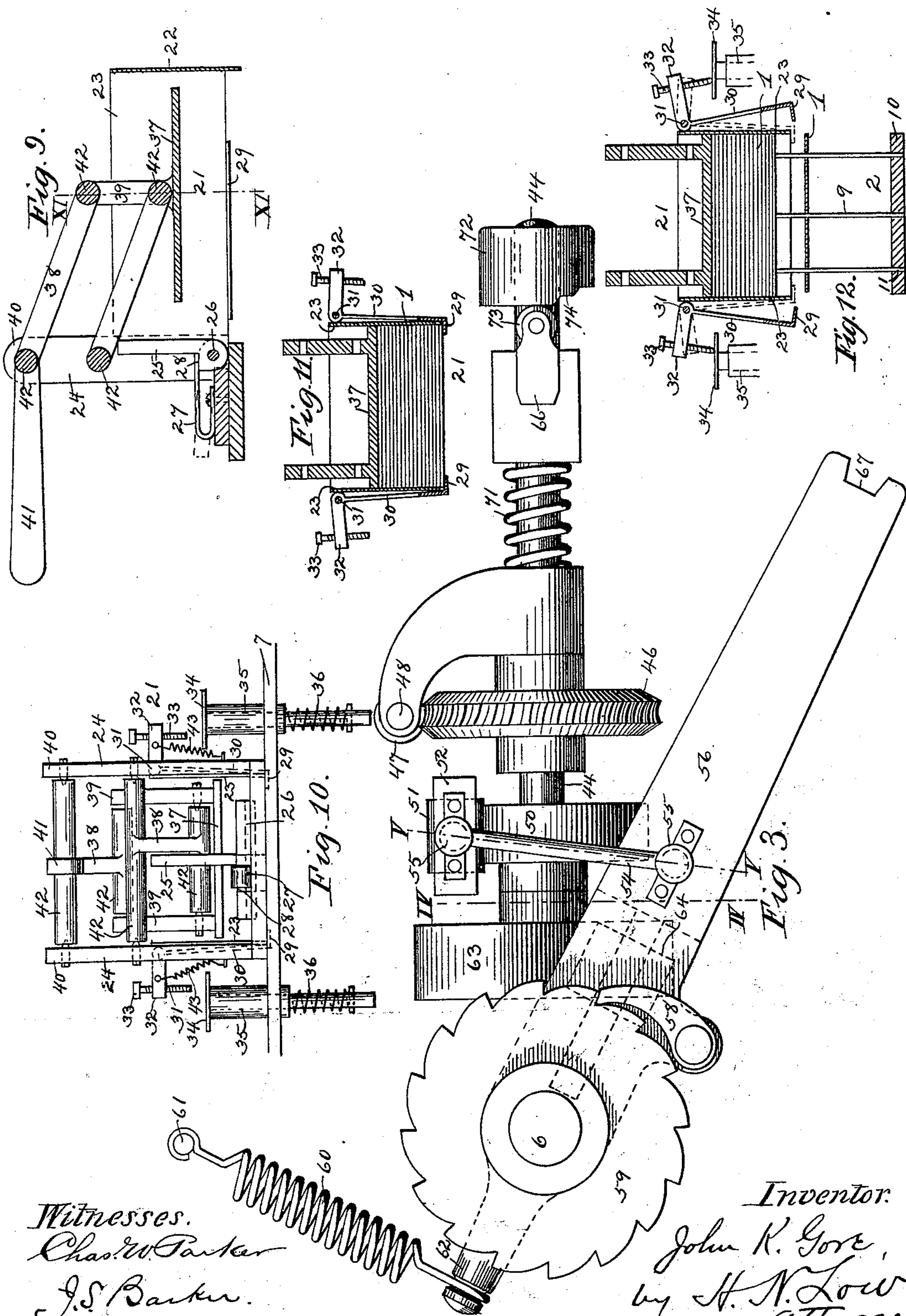
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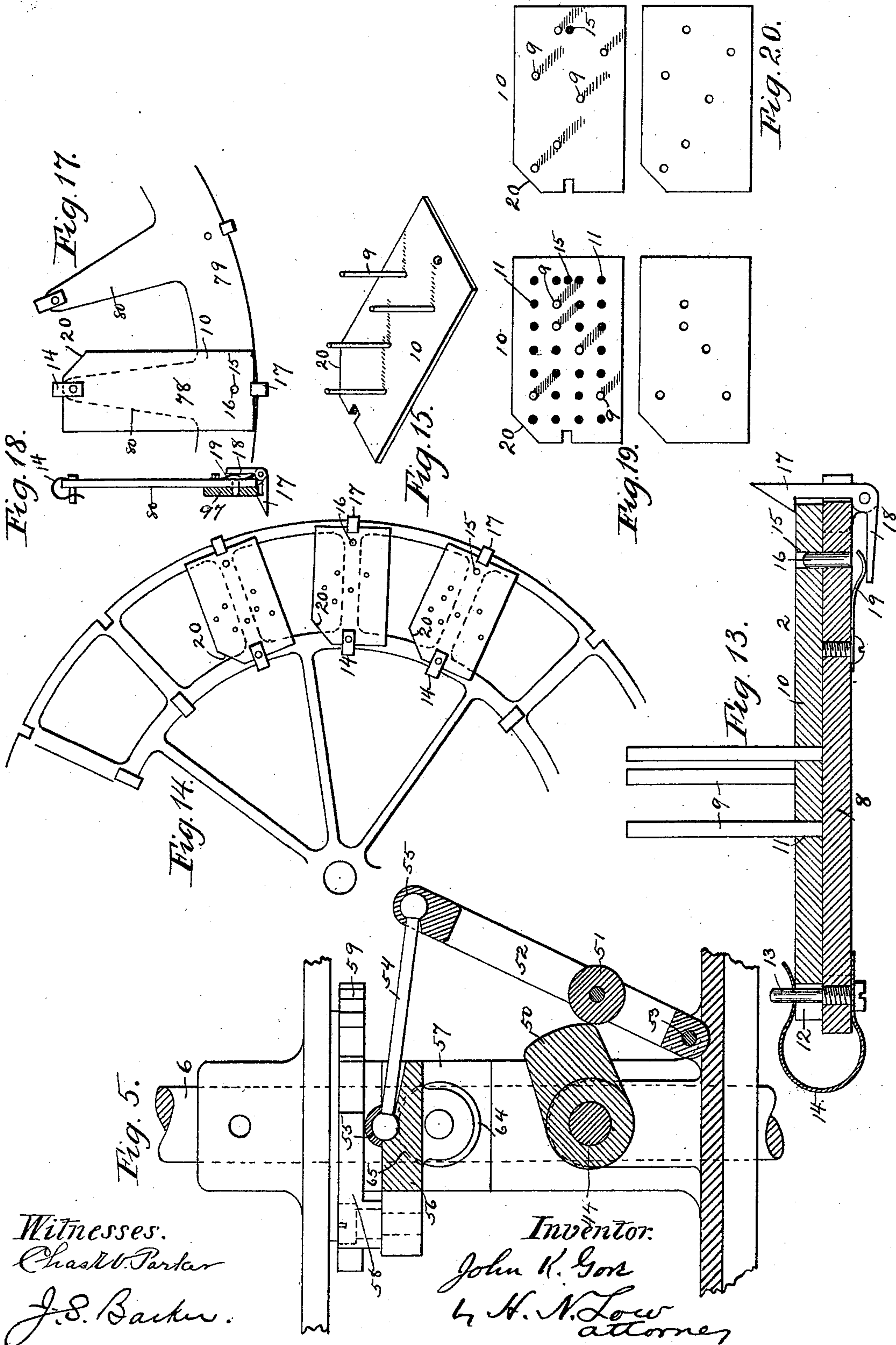
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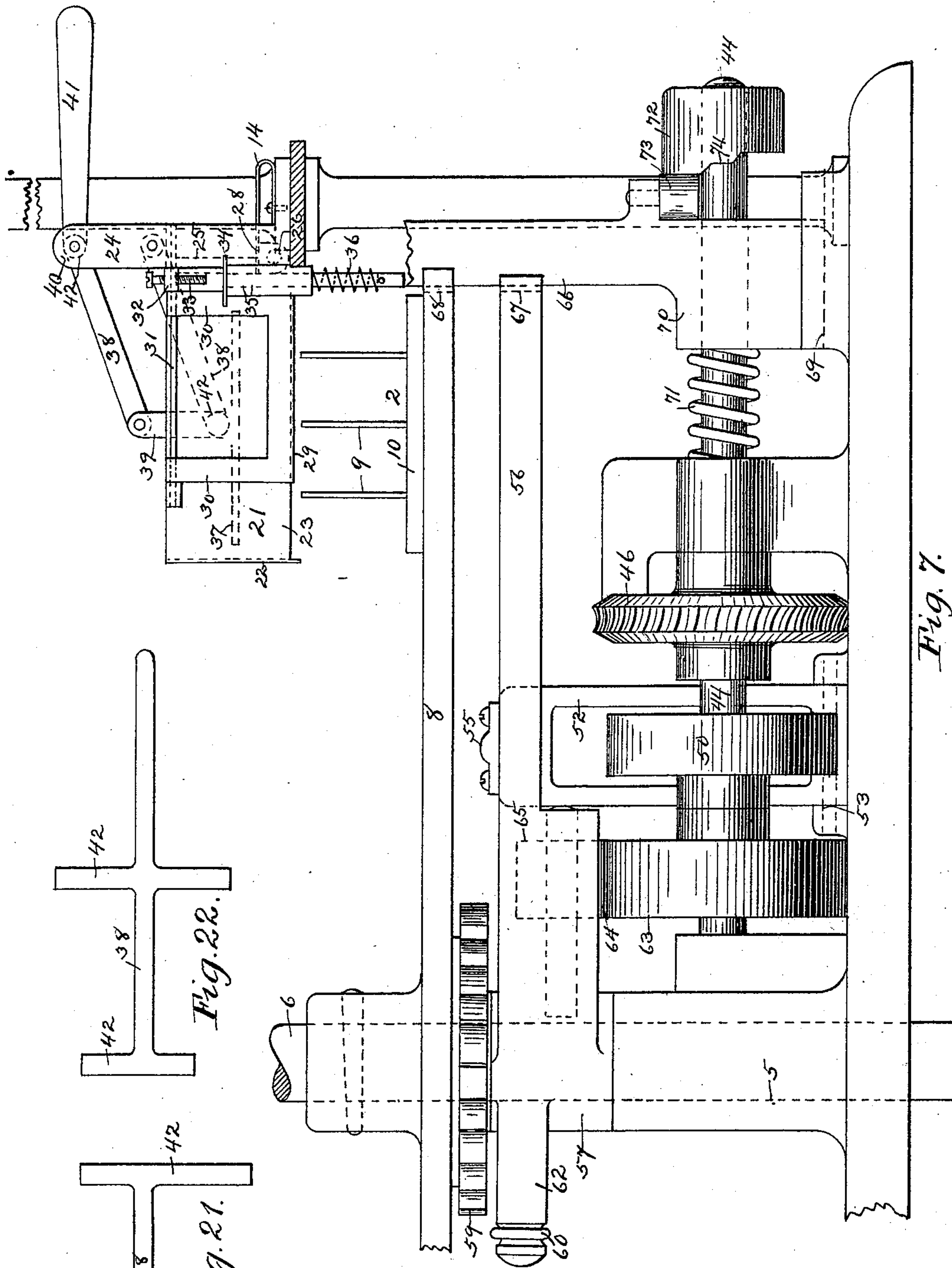


Fig. 7.

Fig. 22.

Fig. 21.

Witnesses.
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(No Model.)

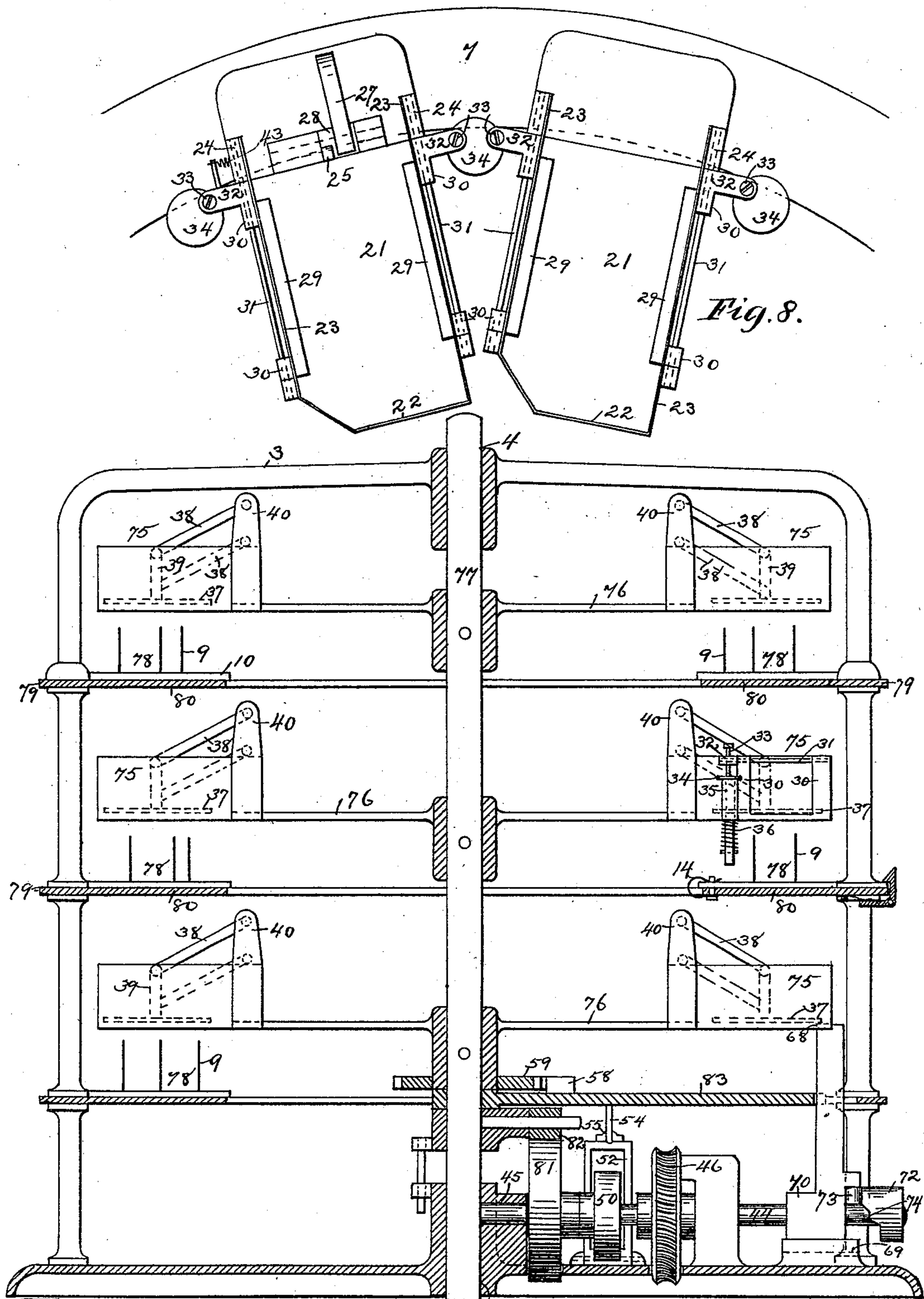
6 Sheets—Sheet 6.

J. K. GORE.

APPARATUS FOR SORTING CARDS AND COMPILING STATISTICS.

No. 518,240.

Patented Apr. 17, 1894.



Witnesses.
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Fig. 16.

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UNITED STATES PATENT OFFICE.

JOHN K. GORE, OF NEWARK, NEW JERSEY.

APPARATUS FOR SORTING CARDS AND COMPILING STATISTICS.

SPECIFICATION forming part of Letters Patent No. 518,240, dated April 17, 1894.

Application filed May 19, 1893. Serial No. 474,806. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. GORE, a citizen of the United States, residing at Newark, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Apparatus for Sorting Cards and Compiling Statistics; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention is directed to the selection, separation and classification of thin and flat objects such as plates, sheets or cards. It is especially adapted and designed for the classification of cards containing or indicating statistical facts, and is highly useful in census and life insurance tabulation.

Heretofore cards have been selected and classified by an operator with the aid of a machine, the operation of the machine depending upon the arrangement of perforations in the cards to be classified. In such apparatus as I am aware of however the work has been comparatively slow and tedious, depending entirely upon the skill and rapidity of the operator.

It is the object of my invention hereinafter set forth to enable such selection and classification of cards, or other objects for which the invention is adapted, to be performed with far greater rapidity than heretofore, at much less cost of labor and time and with greater accuracy.

With such object in view my invention consists in new mechanical means for such purpose by which the sorting and classification is a purely mechanical act not dependent for rapidity upon the knowledge or skill of the operator.

The machine embodying the mechanical part of my invention, when set in operation, will select, sort and classify cards automatically, requiring only general supervision by an operator. A single person may run and supervise several different machines, resulting in a great saving of labor, with greater accuracy in the result on account of the elimination of the human tendency to error.

In order to make my invention more clearly understood I have shown in the accompanying

drawings means for carrying the same into practical effect, without thereby limiting the improvement in its useful applications, to the particular constructions which, for the sake of illustration, I have delineated.

In said drawings:—Figure 1 is a plan view of a sorting machine embodying the mechanical portion of my invention, certain of the parts being removed. Fig. 2 is a vertical sectional view of the same on the line 2—2 of Fig. 1. Fig. 3 is a plan view of a portion of the actuating mechanism. Figs. 4, 5 and 6 are vertical sectional views respectively on lines IV—IV, V—V and VI—VI, of Fig. 3. Fig. 7 is an elevation on a larger scale of a portion of the machine shown in Fig. 2. Fig. 8 is a plan view showing two of the card holding boxes or receptacles. Fig. 9 is a sectional view of one of said receptacles. Fig. 10 is an end view of the same. Fig. 11 is a sectional view on line XI—XI of Fig. 9. Fig. 12 is a similar view illustrating the operation of one of the selecting devices in connection with said card receptacle. Fig. 13 is a sectional view illustrating the construction of one of the selecting devices, and the mode of detachably mounting it in the machine. Fig. 14 is a plan view of a portion of the carrier, with several of the selecting devices in place thereon. Fig. 15 is a perspective view of one of the selecting devices or card collectors detached. Fig. 16 is a sectional view illustrating a card sorting machine in which the selecting devices are stationary and the card receptacles are movable, the same illustrating an inversion of the relations of the parts indicated in Fig. 2. Fig. 17 is a plan view of a portion of the stationary frame which supports the stationary selecting devices. Fig. 18 is a sectional view of the same. Fig. 19 shows a plan view of a selecting device, and of a card corresponding therewith. Fig. 20 is a similar view of a selecting device, and corresponding card, of a class different from that shown in Fig. 19. Figs. 21 and 22 are plan views of the parallel links or levers by which the follower of the card holder is kept in proper position.

In carrying out my invention I first provide the articles to be sorted, which are preferably made of paste-board, with differently situated

perforations or notches, according to the class of each card; for instance the cards of one class will be provided with perforations arranged as shown in Fig. 19, while the cards of another class will have their perforations arranged differently—for instance as shown in Fig. 20.

In tabulating census and other statistics the card representing a person, or other idea, is perforated in a suitable machine so as to indicate the characteristics and conditions of such person; for instance a perforation at one place in the card indicates that the person is white, at another place that the person is colored, at another place that the person is male, at another place that the person is female; another series of perforations will indicate different ages, and the proper perforation of this series will be made in the card at the proper place; another perforation in the proper position will indicate the occupation of the person. These perforated cards are produced as a list of individuals is followed and will be in a mass from which the individual cards must be selected and all the similar cards grouped together, making as many classes or groups as there are kinds of cards.

The cards being suitably perforated the next step of my method is to collect them into one or more bundles without any attempt at sorting, care being simply taken that the cards shall all face one way and all have their tops at the same end of the bundle. For convenience in thus arranging the cards one corner of each card is preferably cut off as indicated in Figs. 19 and 20. I then bring the bottom of the said bundle or bundles, and a mechanical selecting device having suitable upward projections arranged to correspond with the perforations of one class of cards, into contact and permit the bottommost card, if it corresponds in the arrangement of its perforations with the arrangement of the pins or projections of the selecting device, to fall down upon the latter with the said projections extending up through the perforations of the card. If the bottommost card does not correspond with the selecting device no card will leave the said bundle. I then bring the bottom of said bundle and another differently arranged selecting device into contact, and so on until the said bundle and as many different selecting devices have been brought into contact as there are classes of cards. When the operation is complete the cards will be found classified, all of the cards of each class being collected upon their appropriate selecting device. The procedure is very much hastened by separating the unclassified cards, as soon as they have been perforated, into as many different bundles or bunches as there are selecting devices, and then bringing all of said selecting devices simultaneously into contact with the bottoms of the said bundles (or the bottoms of the bundles into contact with stationary selecting devices); the selecting de-

vices are then moved one step (or the bundles are moved if the selecting devices be stationary) and simultaneously a new contact is effected between the bottom of each bundle and a different selecting device from that which first came in contact with it, this procedure being continued until the bundles are exhausted and the cards collected upon their appropriate selecting devices. If the cards are to be separated and sorted into more classes than I can conveniently supply selecting devices for, I first sort the cards or other articles into as many general classes as convenient, each of which classes will comprise several of the specific classes into which cards are to be finally sorted. I then put the cards of each general class through another sorting operation in which they will be finally divided into their ultimate specific classes. On the other hand if it is convenient to employ more selecting devices than there are classes to be formed I employ two or more selecting devices of the same kind, which doubles or trebles the rapidity of the sorting operation.

In carrying out my invention, various suitable instrumentalities besides that which I have illustrated and hereinafter more particularly described, may be employed.

Referring now to the accompanying drawings 1 indicates the cards or other flat objects which are to be sorted. These are collected into bundles or bunches as shown in Figs. 11 and 12, and suitably held in place.

2 indicates one of the selecting devices of which a series is employed, each selecting device being adapted by the arrangement of its upward projections to receive the cards of a certain class, and to reject all others. The series of selecting devices is preferably endless, being arranged in a circular or other equivalent order so that one device is succeeded by another without interruption. In the construction shown the selecting devices are arranged in a circle, as best seen in Fig. 1, but such precise arrangement is not necessary to the carrying out of my invention.

It is next necessary to provide means whereby a relative movement may take place between the series of bunches of cards to be sorted and the series of selecting devices. This may be effected by causing the selecting devices, or the series thereof, to move while the series of bunches of cards to be sorted is stationary, or by causing the selecting devices to remain stationary while the bunches of cards are moved. Obviously this relative movement may take place partly in one and partly in the other of the two series, it being simply necessary to bring the individuals of the two series successively in contact with each other, without regard to which series is moved to effect this purpose. The first arrangement referred to is best seen in Figs. 1 and 2 in which 3 indicates a stationary frame provided at or near its top and bottom with bearings 4 and 5, in which is mounted and adapted to rotate a vertical shaft 6. The

frame 3 is provided at suitable intervals with one or more horizontal plates, frame pieces, or rings 7 on which are supported in a suitable series, by means hereinafter more particularly described, the bunches of cards to be sorted. The selecting devices 2 are supported from and moved by the shaft 6 in any preferred manner. In the construction shown the said shaft is provided with horizontal plates or disks, 8, at or near the periphery of which are attached the selecting devices 2 at such uniform distance from the center of rotation as to pass around the machine exactly beneath the series of bunches of cards to be sorted, so that when the shaft 6 is stationary at the proper point each bunch of cards will have below it a selecting device. The frames or plates, 7, being provided with a series of bunches of cards, and the shaft, 6, being brought into proper position with its selecting devices beneath the said bunches, the shaft, 6, is moved vertically in its bearings 4 and 5, and the upward projections, 9, of each selecting device are brought to bear against the bottom surface of the bunch of cards above it, this upward movement of the shaft being sufficient to raise all of the said bunches slightly. At this instant any card which belongs upon the selecting device which is in contact with it, or two or more of said cards if they happen to lie together beneath the bunch, will drop down over the projections or pins, 9, so as to be securely engaged by and held upon the selecting device. The shaft, 6, is then lowered to its original position, and is rotated one step so as to bring each selecting device beneath a new bunch of cards, whereupon the vertical movement of the shaft and selecting devices is repeated, with the result of again collecting upon the selecting devices any appropriate card with which the device may come in contact.

In the construction shown the machine contains in each range or story, of which there are three, one above the other, sixteen selecting devices and bunches of cards. At each complete rotation of the shaft 6 therefore at least forty-eight cards, under the most unfavorable circumstances of their arrangement, will be collected, each upon its appropriate selecting device. As a matter of practice many more than this number of cards will fall at each revolution of the machine.

Having now given the general description of the operation of my invention I will proceed to describe in detail first the preferred construction and arrangement of the selecting devices, second, the means for holding the bunches of cards in place, and third, the mechanism for imparting the above described rotary and vertical movements to the central shaft and to the selecting devices carried thereby, having especial reference to the construction shown in Figs. 1 and 2, and in the detail Figs. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13.

10 is a plate constituting the base of the selecting device (Figs. 18, 19 and 20), to which

are secured the upward projections 9. As already described the peculiarity of each selecting device consists in the arrangement of these projections or pins, and I have found it convenient to enable the plate 10 to be adapted for the collection at one time of cards of one class and at another time of cards of another class, according to the exigencies of the work which is being performed, by having its pins 9 removable and capable of being mounted in or attached to the plate in different positions. A very desirable means of removably mounting these pins consists in providing the selecting device with a series of holes or bearings 11 in which the bases of the pins 9 fit tightly, but so that they can be pulled out, as indicated in Fig. 13. One or more of the pins 9, which indicates a condition or characteristic very generally existing, and which pin therefore will be employed in its certain position on a considerable proportion of otherwise different selecting devices, may be rigidly secured to the plate so as not to be removable. For instance a pin which indicates the fact that an individual who is represented by a card is white may be rigidly secured to the plate in its proper position. In this case such selecting devices will only be adapted for the collection of cards representing white persons, while the remaining selecting devices will have their pins which indicate that the persons are colored will be rigidly secured in place in their other distinctive position. On the other hand the plates 10 may be universally adaptable, so that any plate may be used to collect cards of any class, by being provided with a complete set of holes 11, one for every possible position of the pins 9. Such a plate is indicated in Fig. 19, and it will be readily understood that, by having a set of pins arranged in the proper perforations or holes 11, it may be used for the selection of cards of any desired class. Such plates may be thus modified in the arrangement of their projections according to the requirements of the tabulating or other work which is to be done. When a selecting device is full of cards of its class, that is to say when the pile of collected cards extends to the top of the pins or projections 9, it is necessary to remove it from the machine and replace it with an empty selecting device. To this end the plate 10, while held firmly in position, is so secured upon its support 8 as to be readily removable. This result may be obtained by various forms of catches or clamping devices. I prefer for this purpose the construction best seen in Fig. 13 in which the plate 10 has at one end a slot 12 which receives a pin 13 fixed in the support 8, that end of the plate being at the same time held down by a spring 14 which is fixed to the said support. The other end of the plate 10 has a hole 15 which receives a projection 16 on the support 8, and the latter end of the plate is held down by a pivoted catch 17 having an arm 18 controlled by a spring 19. In putting the selecting de-

vice in place the end having the slot 12 is thrust under the spring 14 so that the said slot incloses the pin 13, and the other end is permitted to fall upon the support 8 so that the aperture 15 will inclose the pin or projection 16. As this is done the catch 17 may be drawn back, or forced back by the edge of the plate, and after the plate is in place the catch will be forced into engagement with the top of the plate 10 by the spring 19, as best seen in Fig. 13. In order to correspond with the cards and facilitate the proper arrangement of the selecting devices, and of the projections 9 therein, I prefer to bevel one corner of each plate 10 as indicated at 20.

The bunches of cards to be sorted are kept in place in holders 21 mounted upon the frame 3 at such distance from the center and from each other as to correspond with the series of selecting devices and be over one or the other of the latter in each position of the shaft 6 and support 8. The said holders comprise each an inner end plate 22, two side plates 23 which are secured to the end plate and to a bracket 24, a retaining stop 25 in the form of a hinge lever pivoted at 26 upon the said bracket 24, and held in position, except when it is intentionally turned, by a spring 27 secured to the said bracket and bearing upon a shoulder 28 of the lever; and horizontally movable supports or shelves 29, which latter lie normally beneath the bunch of unsorted cards and are only withdrawn after the selecting device has its upward projections in contact with the bottommost card. Such withdrawal then permits the proper card or cards, if it or they are at the bottom of the bunch, to fall upon the selecting device and be removed thereby. The shelves 29 are preferably carried by arms 30 which are hinged at the sides of the holder upon rods 31, and are provided with outwardly extending stop arms 32. I prefer to make the stops in effect adjustable by mounting in each arm 32 a stop screw 33 which may be turned up or down so as to cause the shelves 29 to be moved out a sufficient distance to release the bottommost card whenever the said stop screws are acted upon by a moving part of the machine. For this latter purpose I employ vertically movable plungers 34 which are mounted in bearings 35 on the frame plates 7 and are normally held down by springs 36 (Fig. 10). The said plungers are situated in line with the outer portion of the rotary and vertically movable support 8 (Fig. 7) and are engaged and lifted thereby at the same time that the selecting devices are raised. The latter move up sufficiently far so that each one slightly raises in the holder 21 the bunch of unsorted cards above it, and at this instance the plungers 34 will have come in contact with the screws 33 and oscillated shelves 29 outward (Fig. 12) sufficiently far to release any card or cards through whose perforations all of the pins 9 of the selecting device have passed,

and permit it or them to drop, as is indicated in the case of one card in the said Fig. 12.

In order to keep the bunch of unsorted cards in each holder horizontal I provide the holder with a vertically movable plate or follower 37 the downward pressure of which will hold the cards firmly upon the pins 9 and prevent the cards from dropping out of the holder in case the pins of any selecting device are so arranged as to unevenly support the cards. In order to give the follower a parallel motion as it rises and falls with the cards, and to keep its bottom face horizontal, I provide it with two or more controlling links 38 which are pivotally connected with posts 39 situated on the top of the follower and which are also pivotally attached to posts 40 which extend up from and form portions of the bracket 24. One of the said links may be provided with an outwardly or upwardly extending handle 41 by depressing which the follower may be readily elevated so as to introduce a bunch of unsorted cards. The said pivotal connections are formed by screws 42 which screw through the parts 39 and 40 and engage conical or cylindrical recesses in the ends of lateral extensions 42 which are formed upon the said links 38. When the bunch of cards in any holder has become exhausted the movement of the shaft 6 is arrested, the retaining stop 25 is turned outward and downward into the position indicated by dotted lines in Fig. 9, the follower 37 is raised by depressing the handle 41 and the bunch of unsorted cards, say as many as two hundred cards, is introduced into the holder and deposited upon the shelves 29, which will at such time be in the position indicated in Fig. 11.

43 indicates springs which are connected with the stop arms 32 and with the posts 40, as seen in Fig. 10, for the purpose of keeping the said shells 29 in their normal position so as to support the bunch of cards.

Various means may be employed for intermittently rotating the shaft 6 so as to move it at each step through an arc equal to the distance between two contiguous holders, and, during each instant when the shaft with its selecting devices is stationary, for elevating the said shaft with its selecting devices.

Referring especially to Figs. 3 to 7, 44 indicates a shaft mounted in a position which is radial with reference to the shaft 6 and which is supported in bearings 45 formed in or attached to the lower portion of the base 3. 46 is a worm wheel secured upon the shaft 44 and engaged by a worm 47. The latter is carried by a vertical shaft 48 upon the lower end of which is attached a power pulley 49 which may be driven by a belt from any suitable motor, at such speed as to rotate the shaft 44 once for each step of the intermittent rotation of the vertical shaft 6. 50 is a cam rigidly secured upon the shaft 44 and adapted to operate at each rotation upon the friction roller

51 of a lever 52 which is mounted upon a pivot 53, parallel with the shaft 44, and adapted to oscillate toward and from the latter (see Fig. 5). The lever 52 is connected by a link 54, provided at each end with a suitable ball and socket or other joint 55, with a horizontal and radial arm 56 which is mounted by a hub or bearing 57 upon the vertical shaft 6. 58 is a pawl mounted upon the arm 56 and adapted to engage a toothed ratchet wheel 59 which is securely attached to the shaft 6, or to the bottommost support or plate 8. This ratchet wheel is provided with as many teeth as there are selecting devices in each horizontal story or range of the machine, so that at each rotation of the shaft 44, and movement of the arm 52, arm 56, and pawl 58, the shaft 6 with the selecting devices carried thereby will be moved through an arc equal to the distance between two contiguous selecting devices. In the construction shown each movement of the arm 56 will rotate the shaft 6 and parts carried thereby through one-sixteenth part of a whole revolution. 60 is a spring attached to a fixed pin 61 and at its other end to an extension 62 of the arm 56, and operating to move said arm in a direction opposite to that in which it is moved by the cam 50, so that the said spring returns the arms 52 and 56 and tends to keep the arm 56 normally in the position indicated in Fig. 3. 63 is a cam secured to the shaft 44 (Fig. 5) and engaging a roller 64 which is journaled above it and connected with the shaft 6. I prefer to mount this roller in the arm 56, in which latter a recess 65 is formed for this purpose. The cams 50 and 63 are so timed relative to each other that when the cam 50 has moved the arm 56 into the position shown in Fig. 5 the cam 63 will lift upward the roller 64 and with it the arm 56, sleeve 57, plate 8, and shaft 6. During such vertical movement the arm 56, and the shaft 6 with its supported parts, are kept in proper position and held from turning horizontally by a catch 66 which engages a notch 67 formed in the outer end of the arm 56, and also one of a series of notches 68 formed in the periphery of the lowermost plate or support 8. The catch 66 is at the appropriate times moved inward and outward by any suitable mechanism. In the construction illustrated it is mounted at its lower end in guides 69 formed upon the base of the frame 3, and is provided with a sleeve or bearing 70 by which it surrounds and slides upon the shaft 44. The said catch is normally pressed outward by a spring 71 upon the shaft 44, and is forced inward at the proper time to engage the notches 67 and 68 by a cam 72 the swell or operating surface of which is formed upon its inner side, and which swell operates upon a roller 73 which is carried by the catch 66 upon a vertical axis. The arm 56 should be released by the catch 66 before the plate 8 is released in order that the backward movement of the ratchet mechanism may not turn backward the selecting devices, and to this

end I form the notch 67 somewhat shallower than the notches 68, and provide the cam 72 with a supporting surface 74. This surface will hold the catch 66 in engagement with the notch 68 after it has passed outward from the notch 67, and the catch 66 will only be completely released by the further movement of the cam 72, after the arm 56 has resumed its normal position indicated at Fig. 3. The operation of the machine as thus organized is sufficiently set forth in the foregoing description without necessity of recapitulation.

Referring now to Figs. 16, 17, and 18 it will be observed that I have also illustrated one modification of my invention in which the parts of the machine have been inverted to the extent of making the holders for the bunches of unsorted cards rotary, while the selecting devices are stationary. 75 indicates the card holders, which are carried by plates or supports 76 which are equivalent in their arrangement and mode of operation to the plates 8 already described, being moved rotatively and vertically by a shaft 77. The selecting devices on the other hand are stationary and are indicated at 78, being mounted upon frame plates or rings 79, which latter are preferably provided with inward extensions 80 to properly support and secure the bottom plates of the selecting devices. It will be understood that the latter plates will be made of a size and shape to correspond approximately with the cards to be sorted. In Fig. 17 they are shown as adapted for an elongated form of card. When the vertical movement is imparted to the card holders, as indicated in Fig. 16, it will be understood that they should be normally kept in their most elevated position, and periodically lowered to bring the bunches of cards down upon the selecting devices. The cam which gives this vertical movement is indicated at 81 and is shaped in a well known manner with a greater part of its periphery circular so as to normally hold the roller 82 which it engages at its highest point. The said roller is equivalent in its operation to the roller 64 already described and is connected with the shaft 77. It is however independent of the ratchet arm 83 so that the latter may be oscillated horizontally while the roller 82 remains in contact with and supported by the cam 81. The said arm 83 is operated in the manner already described with reference to the arm 56.

The operation of the machine is as follows; The perforated and unsorted cards, which will ordinarily be left by the perforating machine all faced the same way and with their tops all lying in the same direction, will be placed in bunches in the several holders 21, say two hundred cards in each holder in which case the machine illustrated will accommodate at once about ten thousand cards. Power is then applied to the pulley 49 and the vertical shaft carrying with it the selecting devices (or the holders in Fig. 16) will receive a step by step rotation, at each intermission of

which the selecting devices will be lifted into contact with the bunches above them and receive from each bunch any card or cards which lie on the bottom of the bunches and are perforated to correspond with the engaging selecting device. The rotating frame is then lowered and turned another step and again raised, this operation being continued until the cards in the holders are exhausted.

On account of a chance arrangement of the cards in any bunch which is more favorable to their collection, the cards in such bunch will be exhausted more rapidly than others, in which case the attendant will momentarily stop the machine and introduce a new supply of unsorted cards into the empty holder. So some selecting devices will become filled to their full capacity sooner than others, and such may be removed and replaced by empty selecting devices as occasion requires. A card which has been improperly perforated ordinarily will not correspond with any selecting device, and the said card, when it arrives at the bottom of the bunch will prevent the further collection of cards therefrom, and if the attendant notices that cards are not being taken from any bunch the bottommost card is removed and the machine is thus the means of detecting the error. When all the cards have been exhausted they will be found collected without error into their proper classes.

The operation of the machine is very rapid. Under the most unfavorable chance arrangement of the unsorted cards at least forty-eight cards will be classified at each rotation of the vertical shaft, but in practice many more cards will be collected in that time. In many instances a plurality of cards of the same class will lie together and will be simultaneously dropped upon their proper selecting device as soon as the latter comes in contact with the bunch at the bottom of which said cards are situated.

Having thus described my invention, what I claim is—

1. In a sorting machine the combination of a holder for a pile of cards or other articles having a movable support for such pile, a series of differing selecting devices, mechanism for bringing said selecting devices successively and said holder opposite each other, and means for operating said support to release said articles, substantially as set forth.

2. The combination of an endless series of holders having means for supporting and releasing the cards, an endless series of selecting devices beneath said holders, means for bringing said holders and devices successively opposite to each other, and mechanism operating, when the devices are in said position, to release the cards, substantially as set forth.

3. The combination of a suitable frame, a second rotary frame, a series of holders having card supporting and releasing devices and a series of selecting devices below said holders the former supported upon one of the said

frames and the latter supported upon the other of said frames, and means for actuating the rotary frame to bring the said holders and selecting devices successively opposite to each other, substantially as set forth.

4. The combination of a suitable frame, a second rotary frame, a series of holders and a series of selecting devices the former supported upon one of the said frames and the latter supported upon the other of said frames, and beneath the holders means for actuating the rotary frame to bring the said holders and devices successively opposite to each other, and means for moving one of said frames in a direction parallel with the axis of the rotary frame, to release the contents of the holders substantially as set forth.

5. The combination of the frame 3, a vertical shaft therein provided with horizontal supporting plates arranged one above the other in two or more stories, two or more series of selecting devices and holders arranged in corresponding stories and carried respectively by said supporting plates and frame 3, and means for actuating said shaft, substantially as set forth.

6. The combination of a series of holders, having movable supports and a series of selecting devices, and means for rotating one of said series intermittently and mechanism for moving one of said series relative to the other in a direction parallel with the axis of rotation to operate said supports and release the contents of the holders, substantially as set forth.

7. In a card sorting machine the combination with the rotary frame, of a radial shaft, a cam thereon having a suitable connection with said frame for rotating it intermittently, a cam on said shaft engaging said frame or part connected therewith for moving it in a direction parallel with its axis of rotation, and a catch operated by said radial shaft for preventing the rotation of the frame while it receives its latter movement, substantially as set forth.

8. The combination of the frame 3 the shaft 6 mounted therein and provided with the supporting plates 8, the selecting devices carried by said plates, card holders 21 mounted on said frame, the shaft 44 provided with the cams 50, 63 and 72, a ratchet movement for intermittently rotating the shaft 6 and operated by said cam 50, a catch 66 operated by the cam 72, and means for rotating the shaft 44, substantially as set forth.

9. In a sorting machine a selecting device having a plate 10 provided with regular series of perforations 11, and the pins 9 adjustable from one to the other of the perforations of said series, said pins being adapted to pass through the perforations of the cards of the desired class and to support the cards whose perforations do not correspond to the arrangement of the pins, substantially as set forth.

10. The combination, in a sorting machine, with one or more holders adapted to hold and

deliver cards to be sorted of a series of separate plates 10 having the upwardly projecting pins 9, the plates being adapted to collect and retain their appropriate cards and to be independently removed from the machine with their contents, substantially as set forth.

11. The combination of a supporting plate having a pin 13 and spring 14, and a spring-actuated catch 17, of the plate 10 provided with pins 9 and having the slot 12, substantially as set forth.

12. In a sorting machine the combination of a selecting device, a holder adapted to contain the cards or other articles to be sorted, laterally movable shelves for sustaining said cards, and means for bringing said selecting device and holder together and for withdrawing said shelves, substantially as set forth.

13. The combination of the selecting device having upward projections adapted to support the cards to be sorted and to permit the deposit of the properly perforated cards, a holder for the cards to be sorted, removable shelves for sustaining the cards in the holder, means for bringing said selecting device and holder together, and means cooperating with the selecting device to keep the cards in the holder horizontal upon the withdrawal of the said shelves, substantially as set forth.

14. The holder 21 having the shelves 29 piv-

otally mounted thereon, outwardly extending stop arms connected with said shelves, a selecting device having upward projections adapted to be moved toward said holder, and suitable connections whereby said movement causes the oscillation of said stop arms and the withdrawal of said shelves, substantially as set forth.

15. The combination with the selecting device having upward projections, of the holder above said device and provided with the vertically movable follower 37, and means for maintaining the horizontal position of the follower to properly confine the cards in conjunction with the projections of the selecting device, substantially as set forth.

16. In a sorting machine the combination of a holder adapted to contain a pile of articles to be sorted one above the other, a support for the pile, means for moving said support to release the pile, and a series of selecting devices having upward projections and moving in a path below said holder, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN K. GORE.

Witnesses:

GRANT CARPENTER,
M. M. CARPENTER.