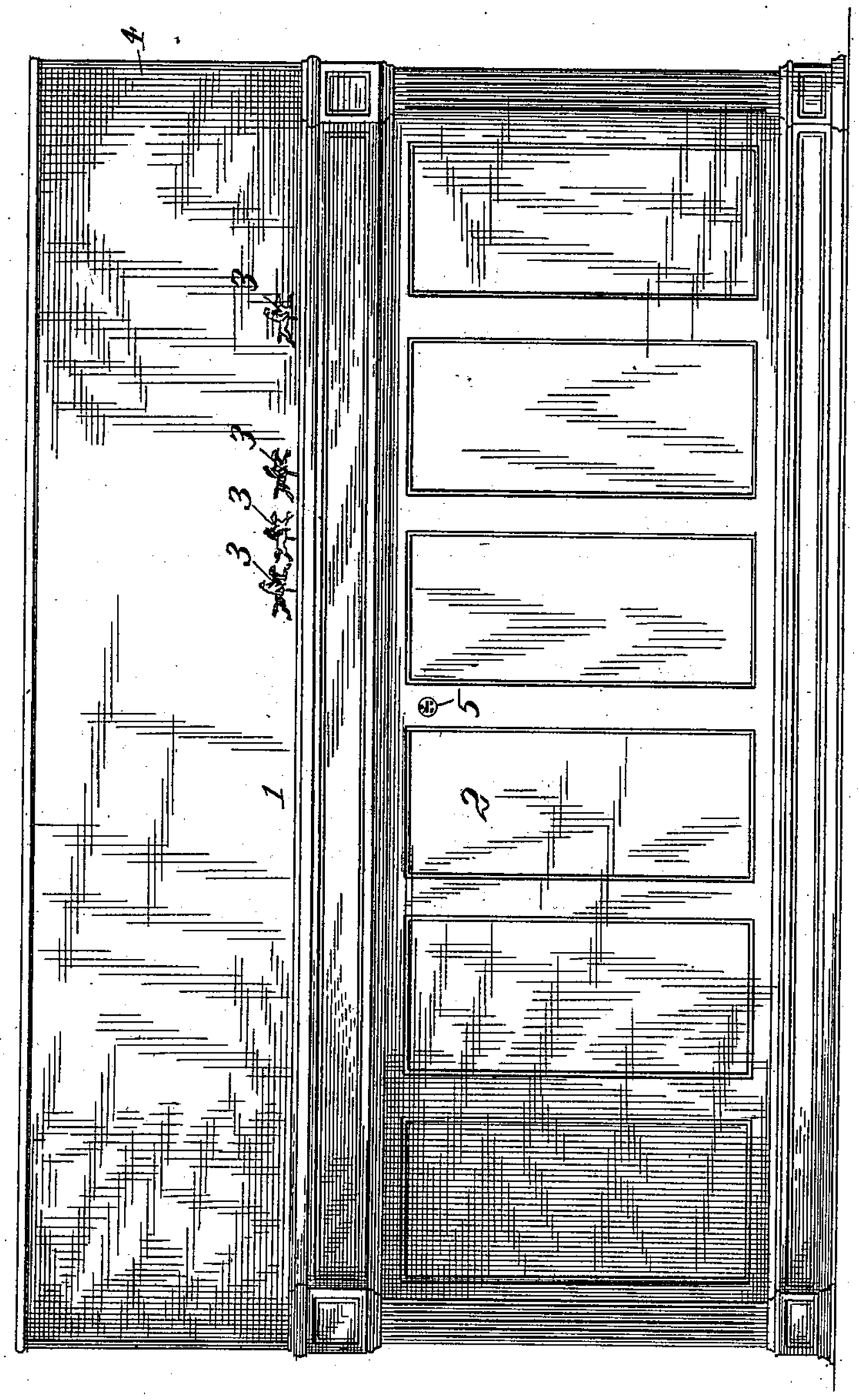
(No Model.) 18 Sheets—Sheet 1.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig 1



Attest:
C. C. Burdick
George E. Burr.

Inventor:
Charles Carroll.
By Knight Bros.
Attys.

(No Model.) 18 Sheets—Sheet 2.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

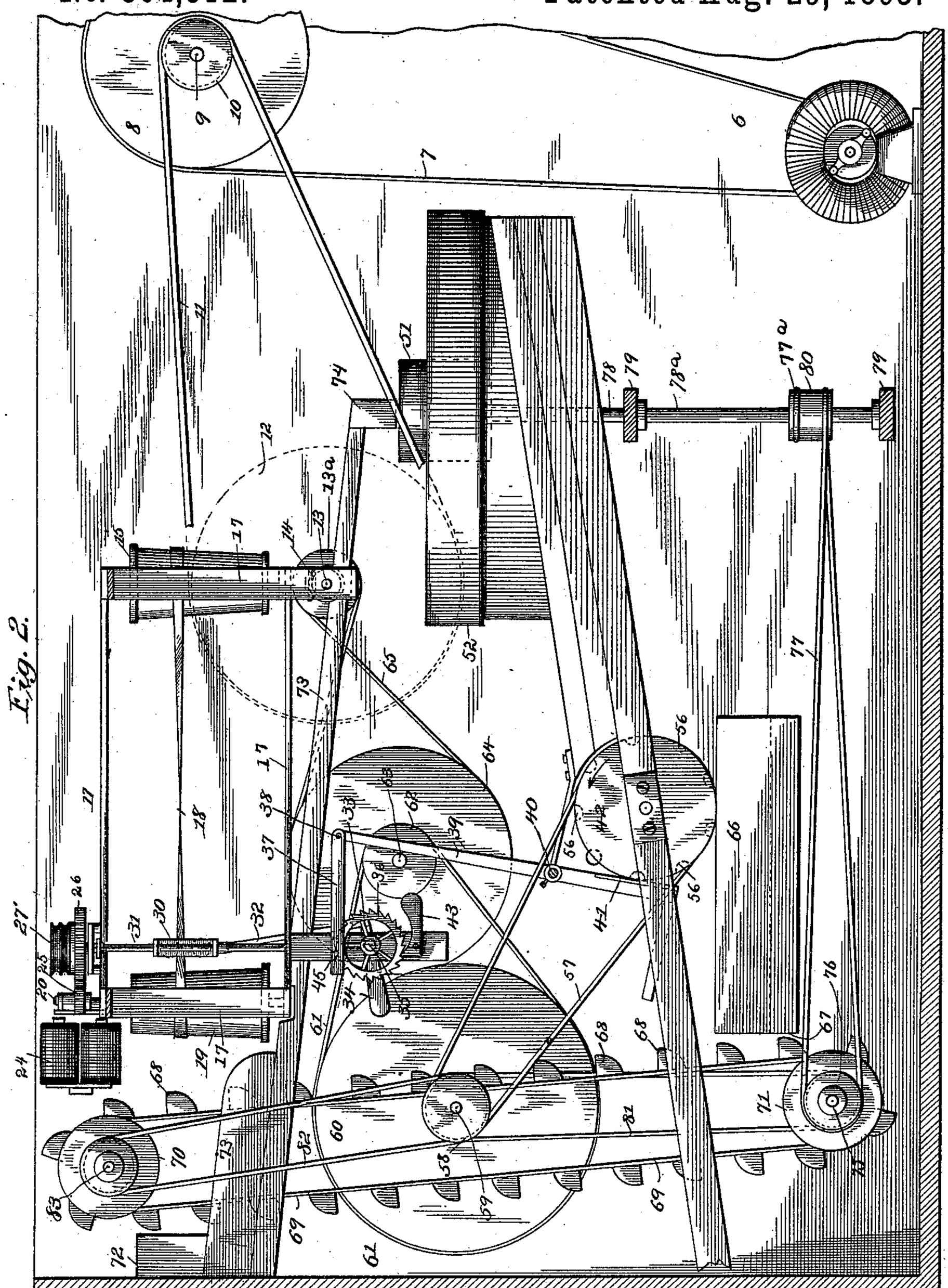


Fig. 2.

Attest:
Harry S. Rohrer.
George E. Bruce.

Inventor:
Charles Carroll.
By Knight Bros.
Attys.

(No Model.) 18 Sheets—Sheet 3.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

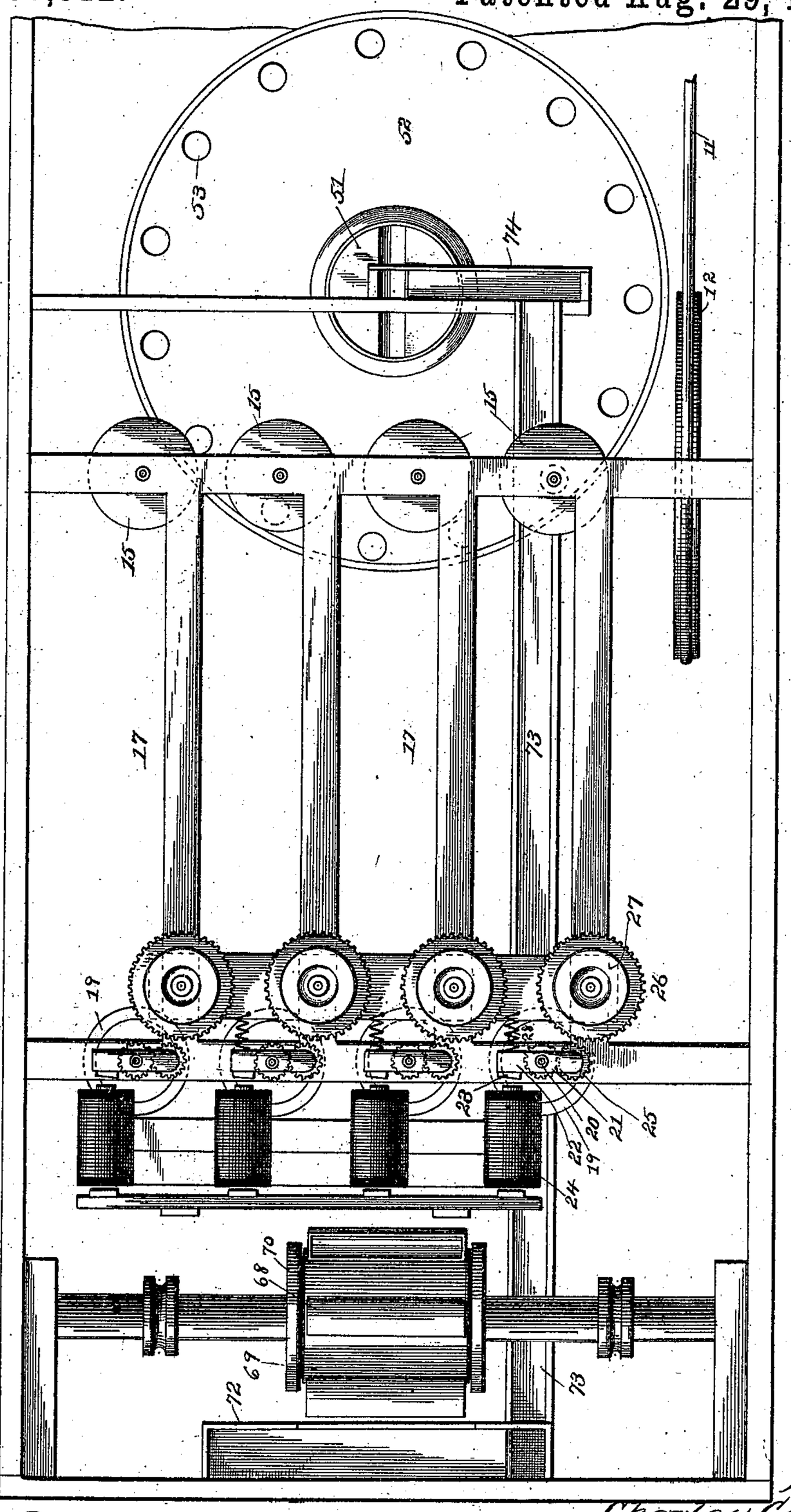


Fig. 3.

Attest:
Harry S. Rohrer.
George E. Bruce.

Inventor
Charles Carroll.
By. Knight Bros.
Attys.

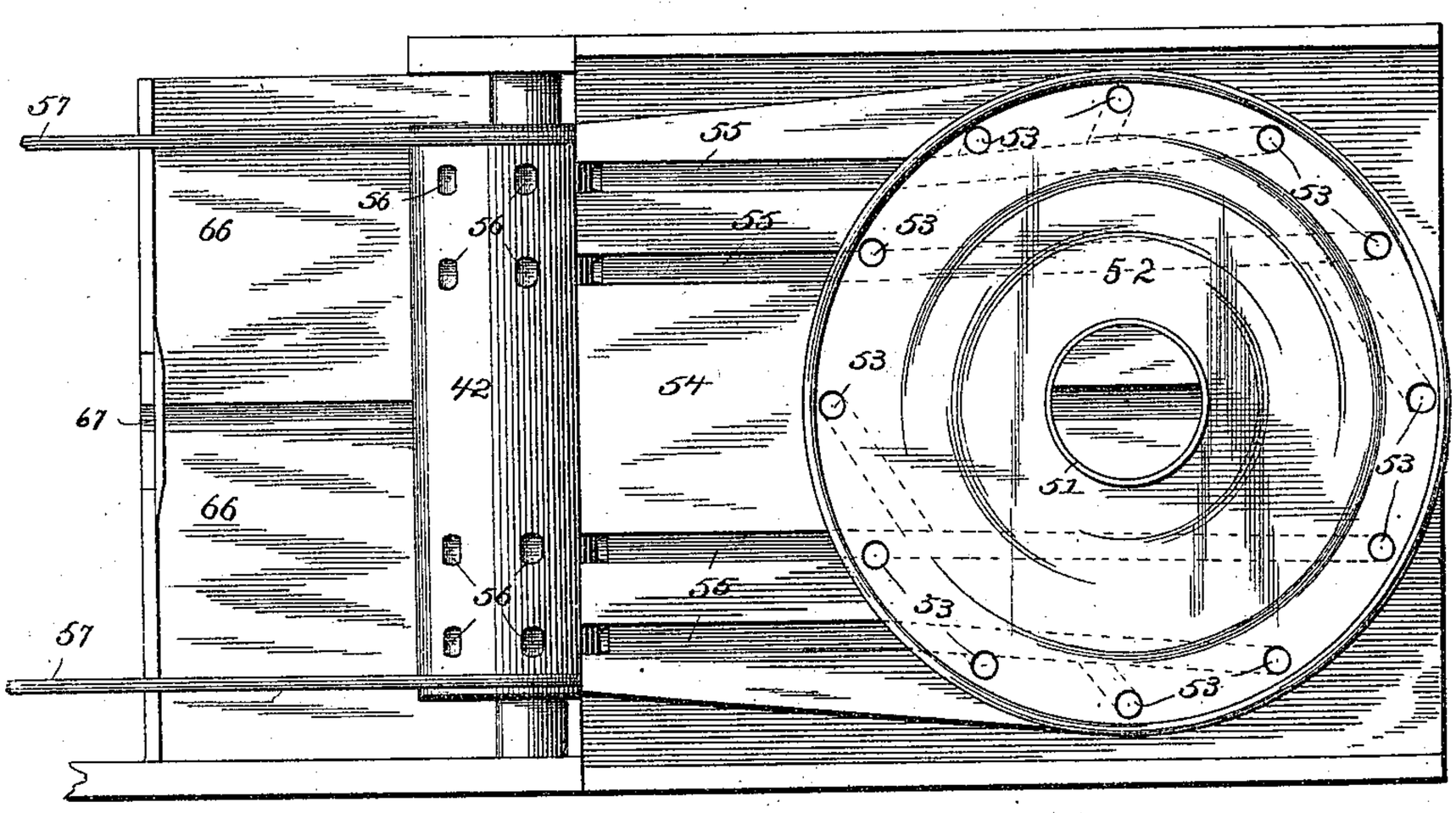
(No Model.) 18 Sheets—Sheet 4.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 5.



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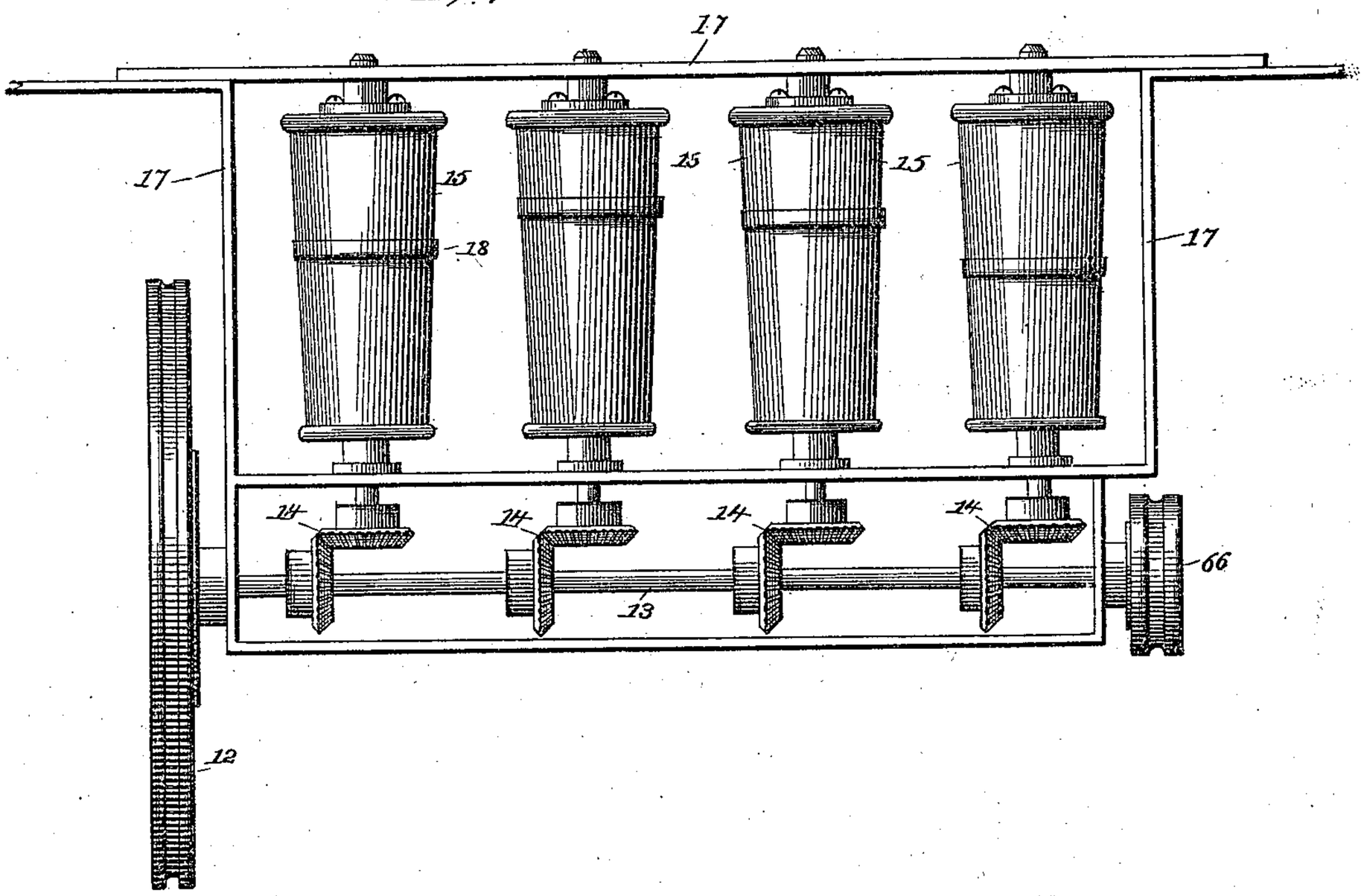

Attest:
Harry S. Rohrer.
George E. Bruce.

Inventor:
Charles Carroll.
By Knight Bros
Attys.

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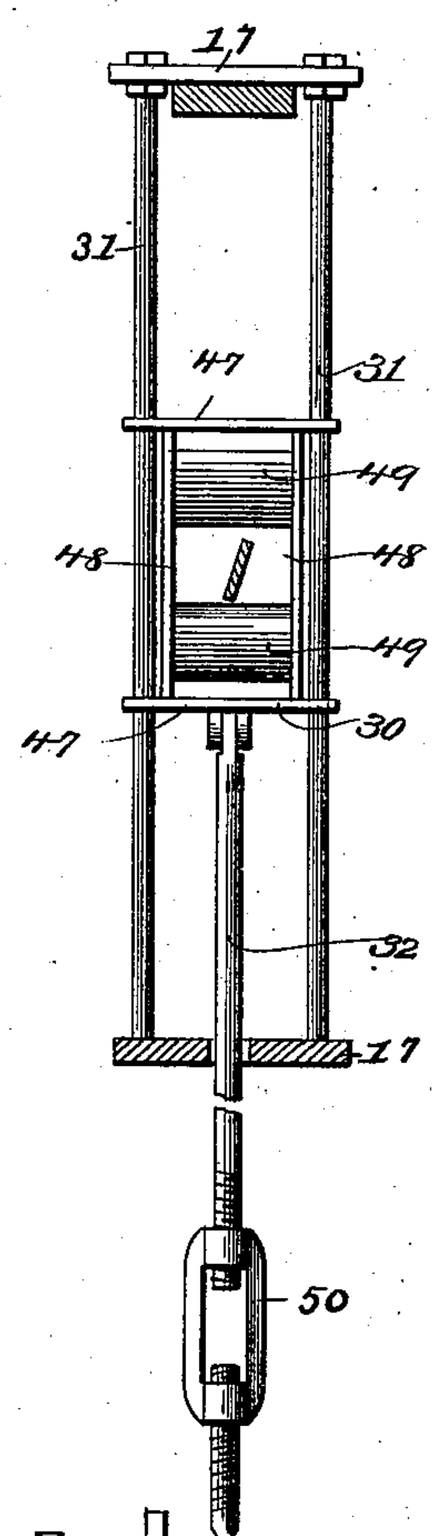
C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 7.



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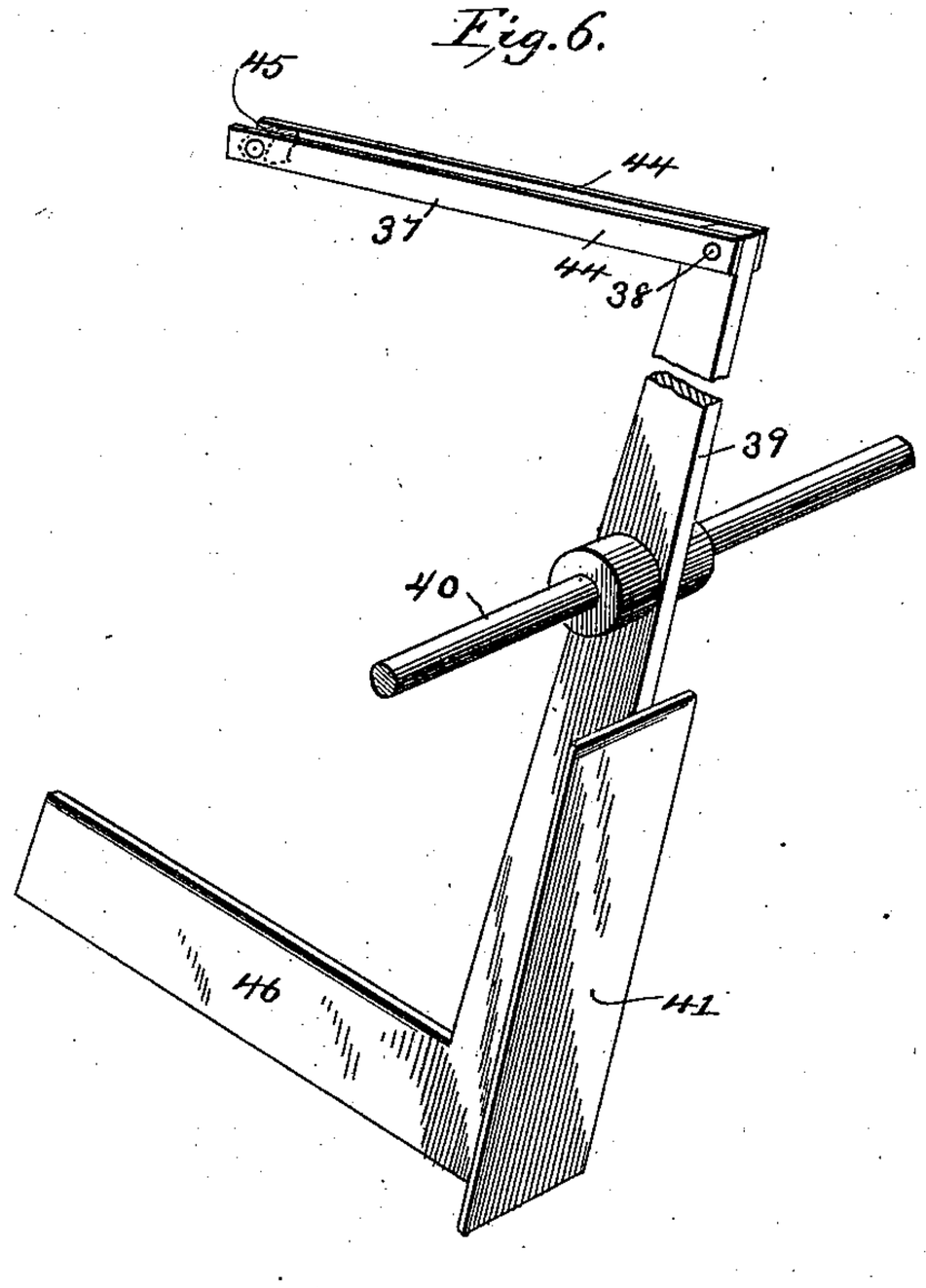

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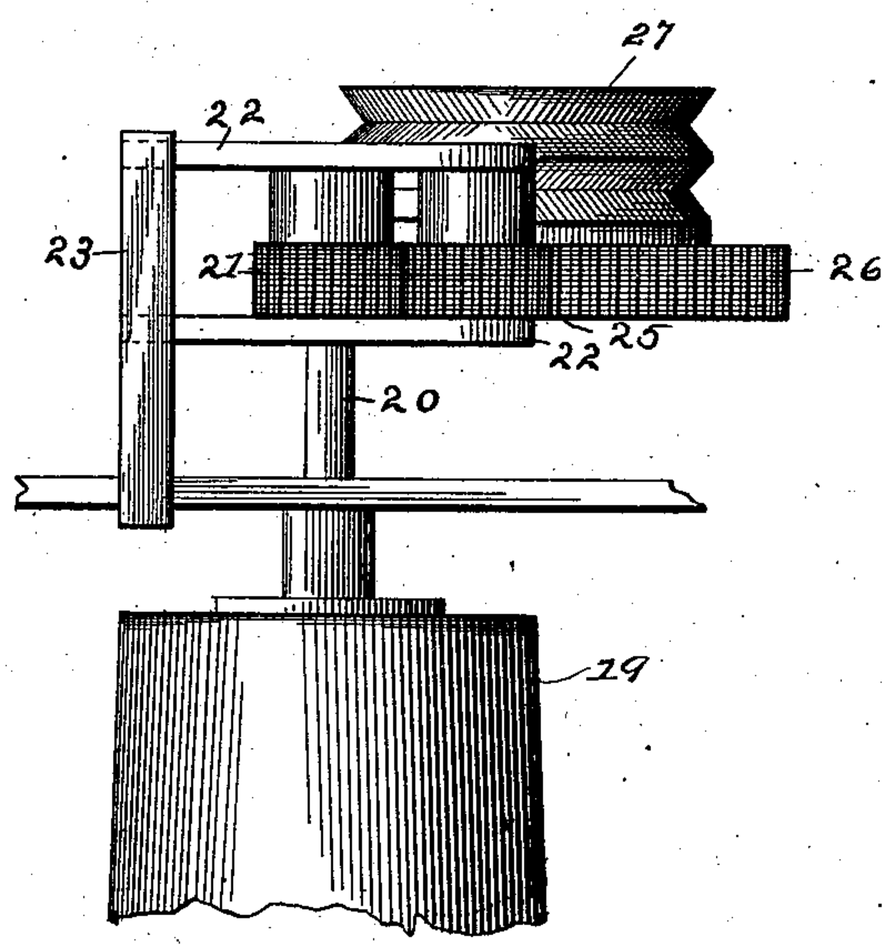

Attest:
Harry S. Rohrer.
George E. Lane.

Inventor:
Charles Carroll.
By Knight Bros.
Attys.

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C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 8a

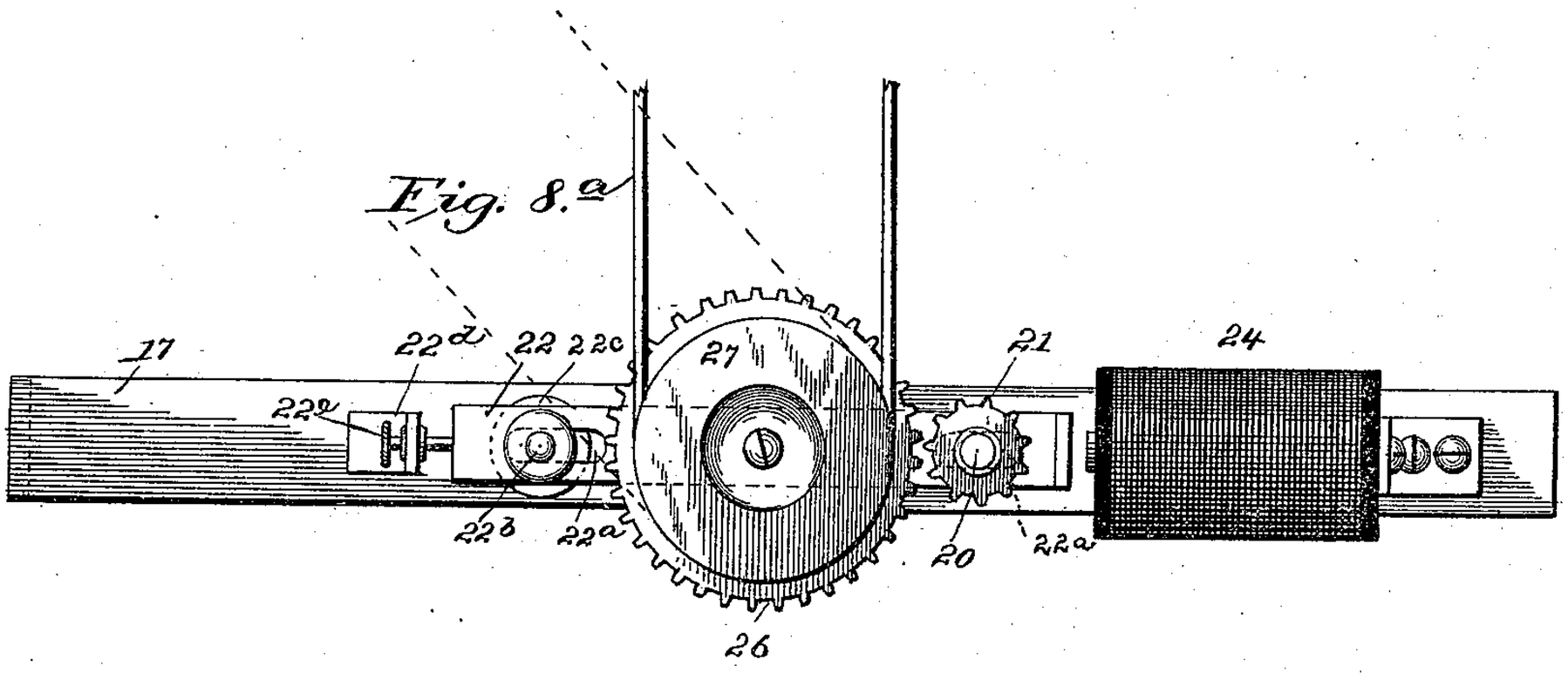
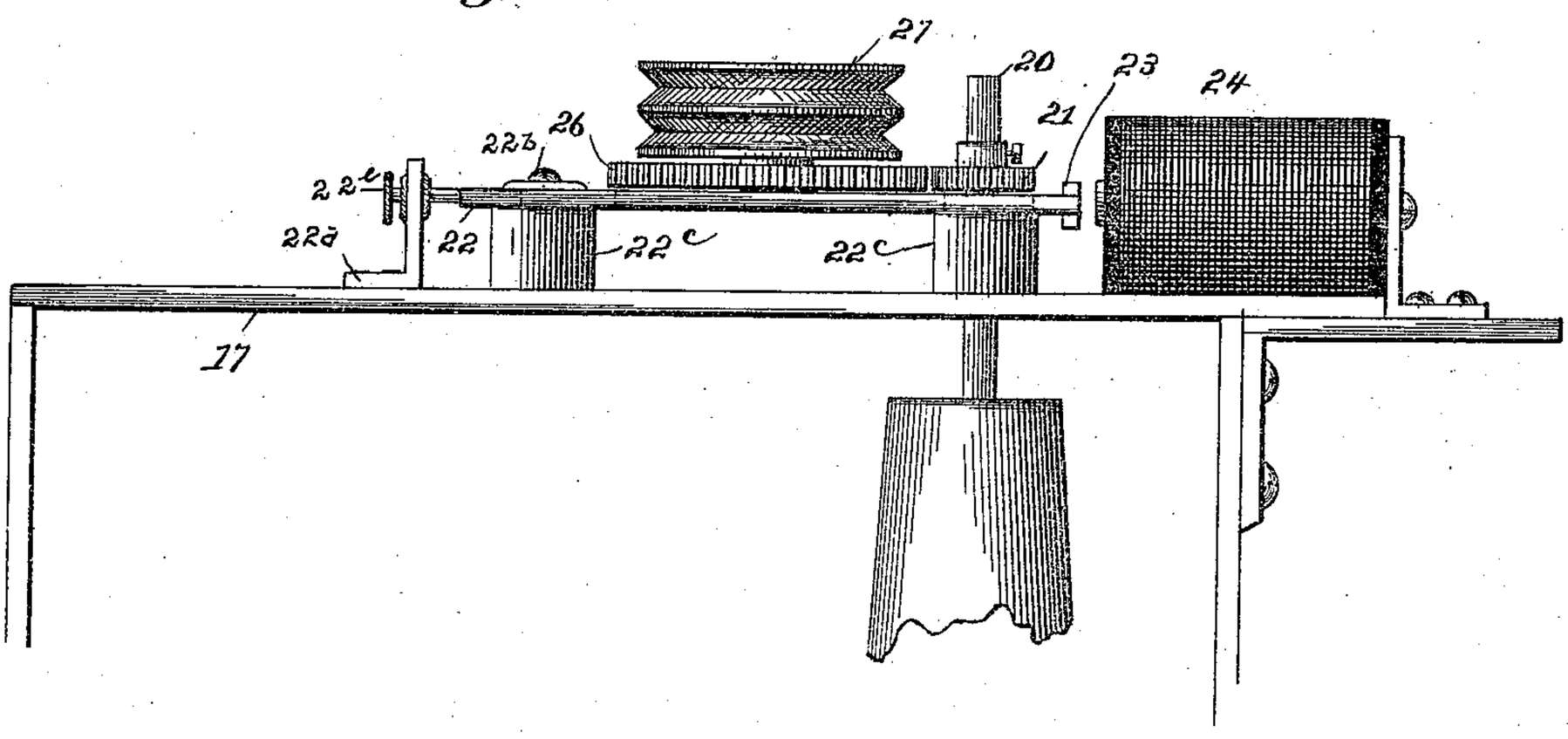


Fig. 8b



Attest:

Harry D. Rohrer.
George E. Bruce.

Inventor.
Charles Carroll.

By. Knight Bros.
Attys.

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C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

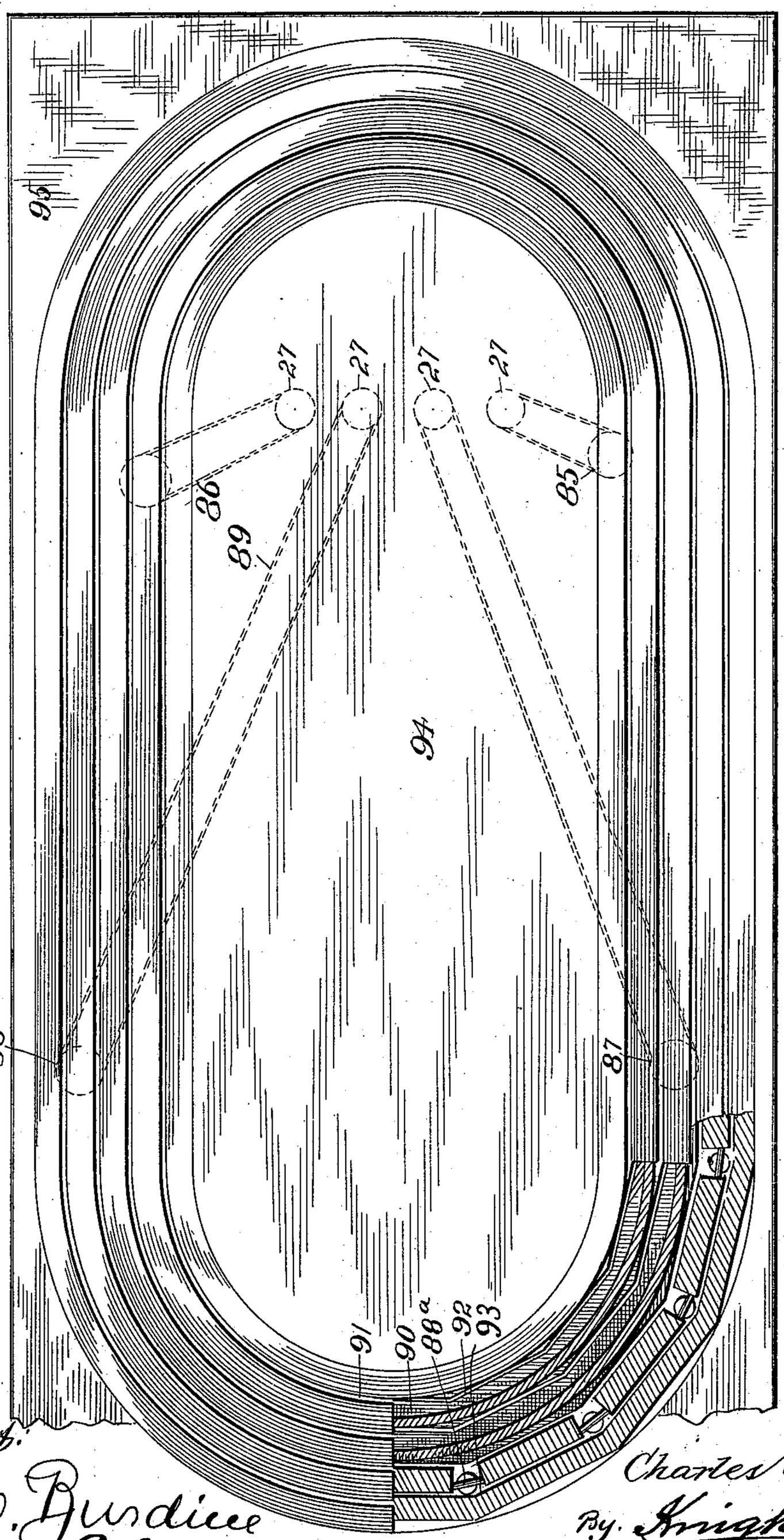

Fig. 9

Attest:
C. C. Burdick
George E. Lemmon.

Inventor:
Charles Carroll.
By. Knight Bros.
Attys.

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COIN CONTROLLED RACE COURSE.

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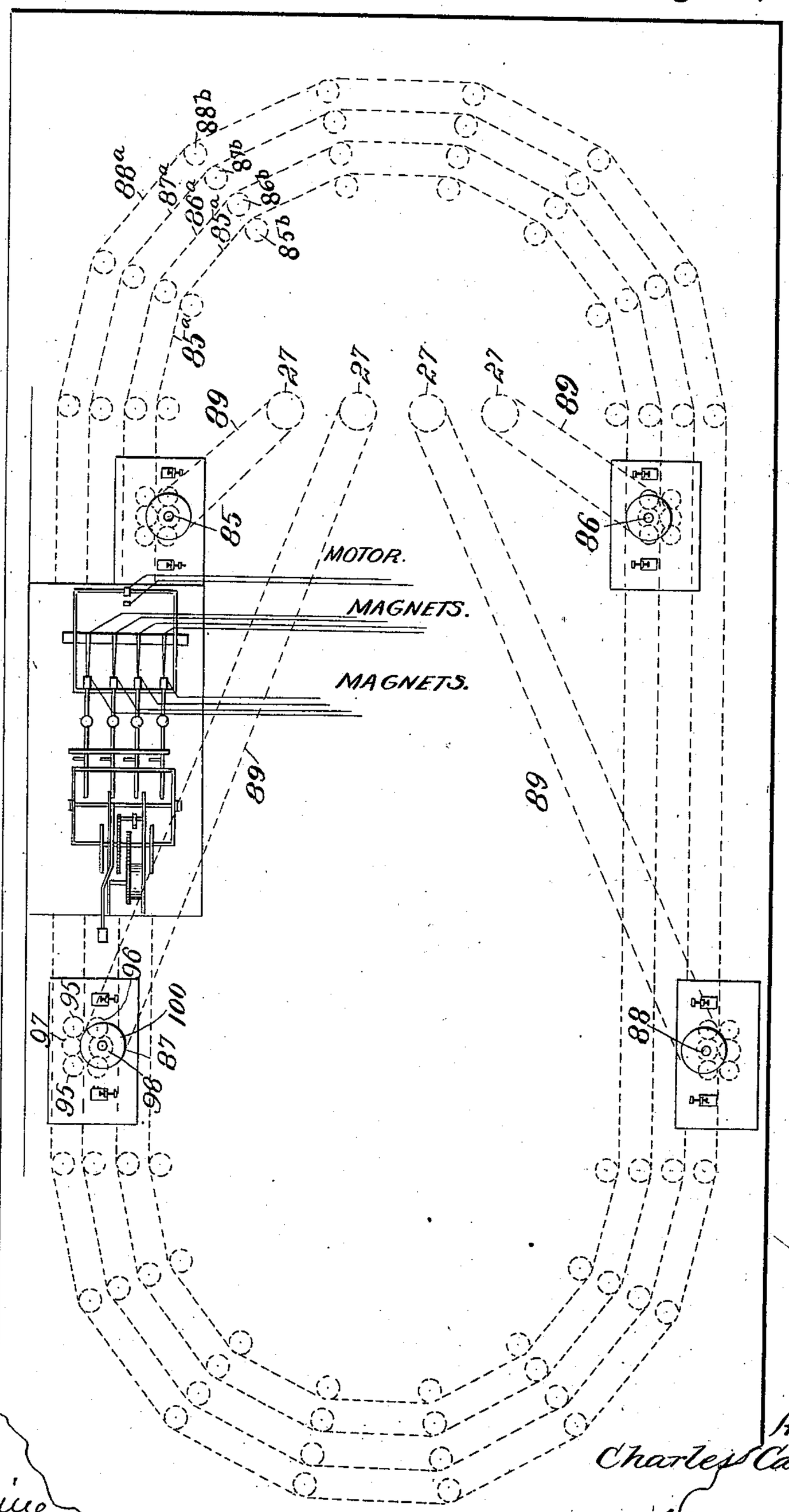


Fig. 10.

Attest:
C. Burdine
George E. Crane

Inventor:
Charles Carroll.
By. Knight Bros.
Attys.

(No Model.) 18 Sheets—Sheet 9.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 11.

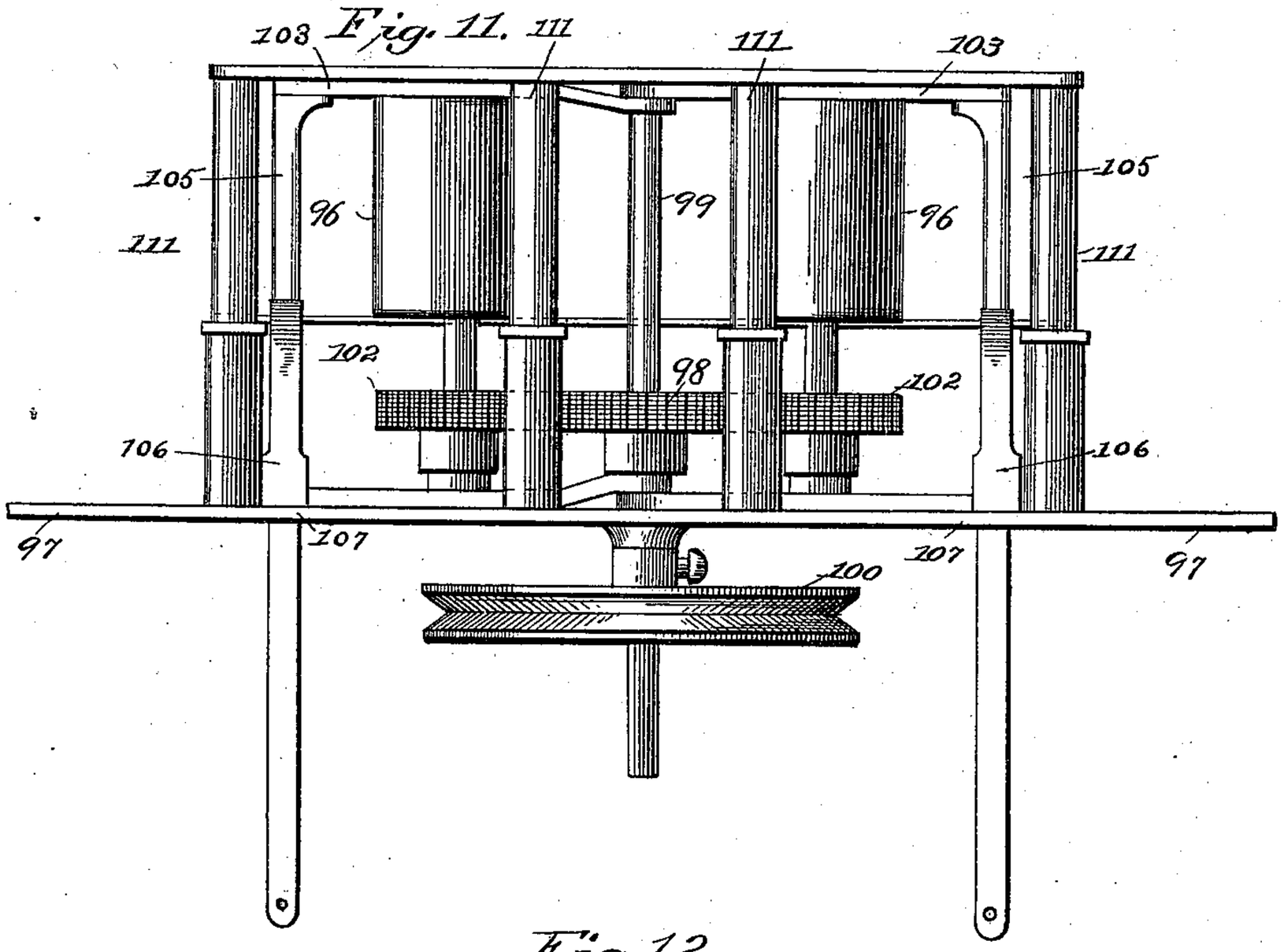
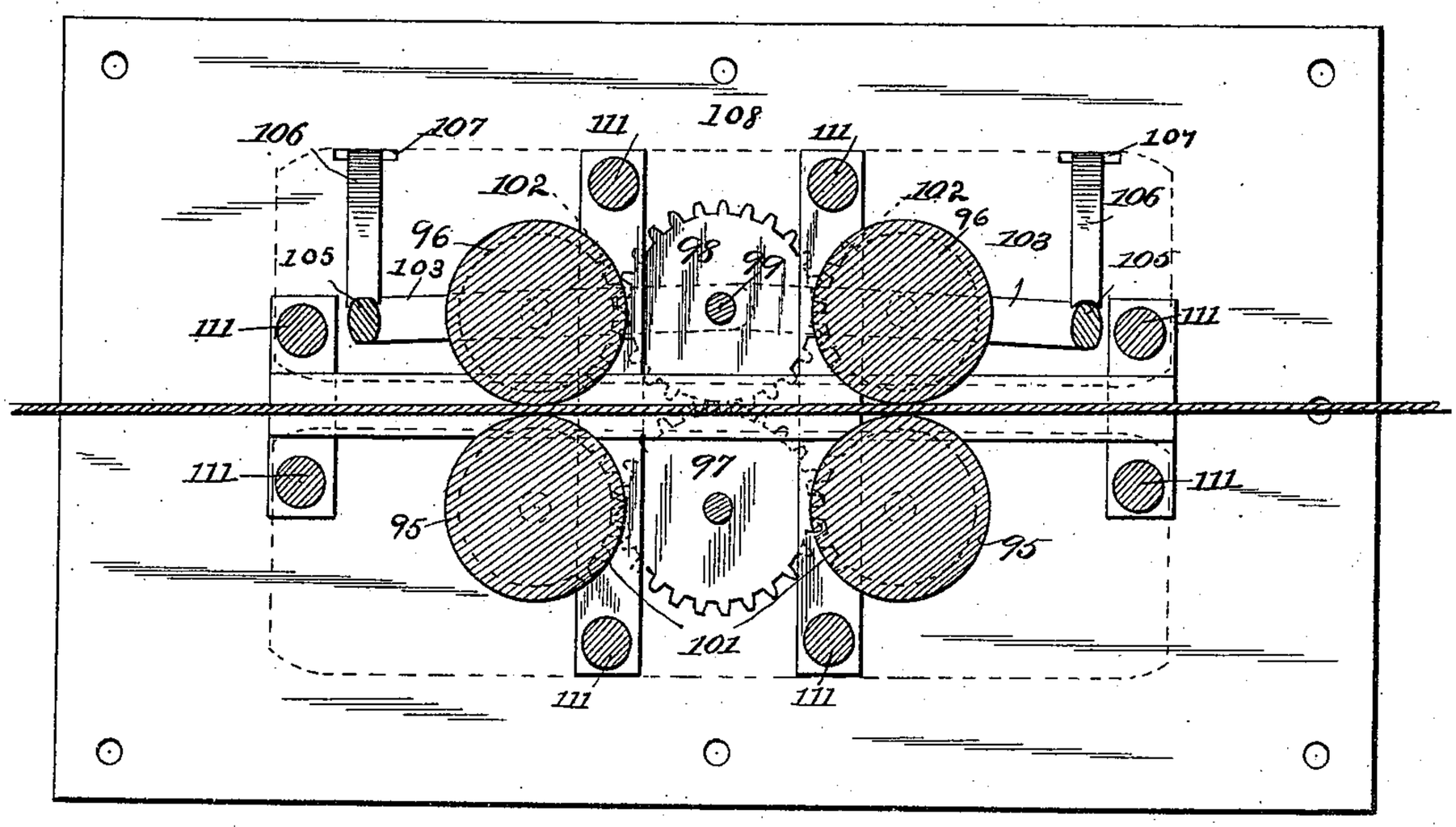


Fig. 12.



Attest:
Harry S. Arthur.
George E. Lucas.

Inventor
Charles Carroll.
By Knight Bros.
Attys.

(No Model.) 18 Sheets—Sheet 10.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig 13

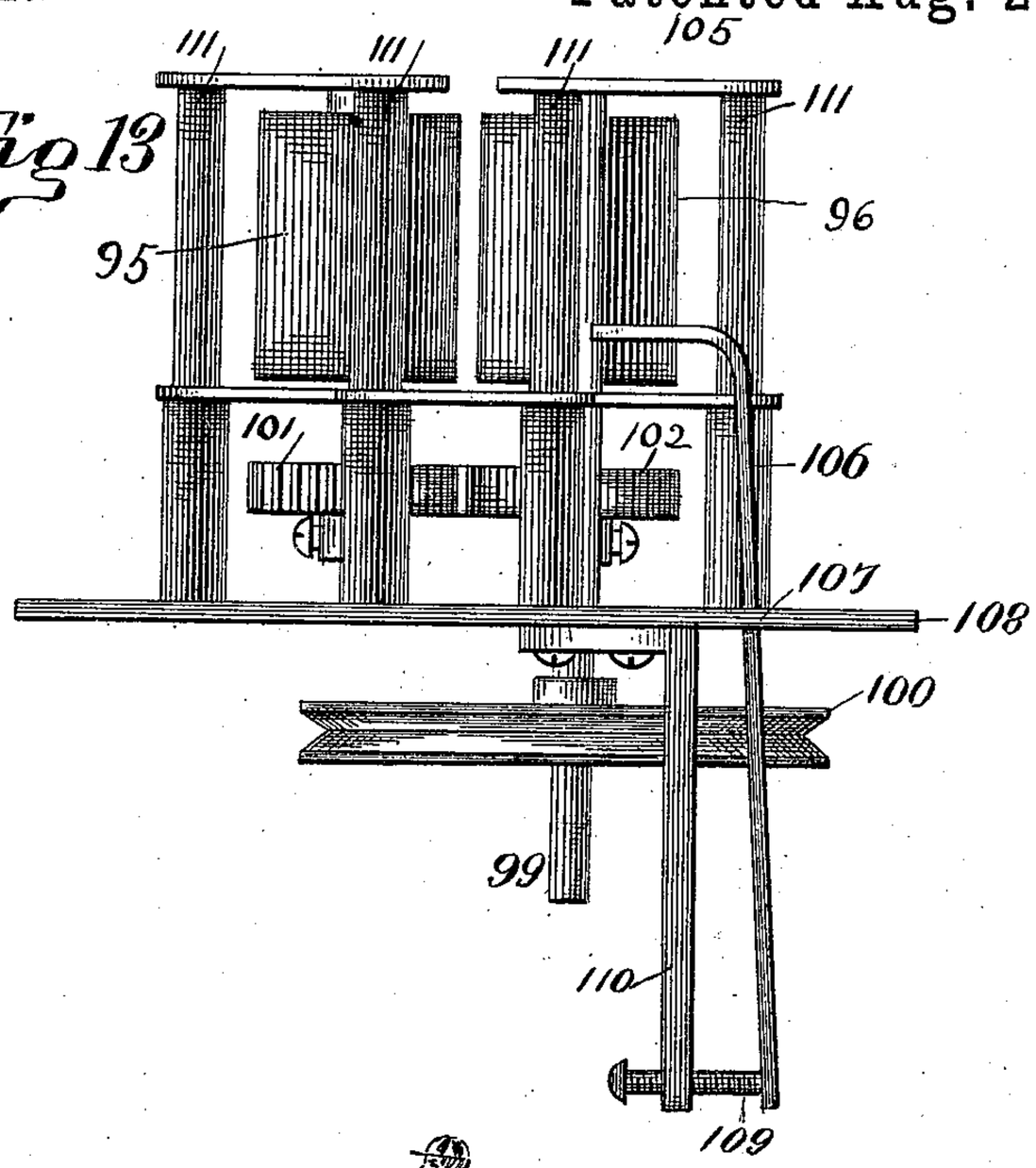


Fig 14

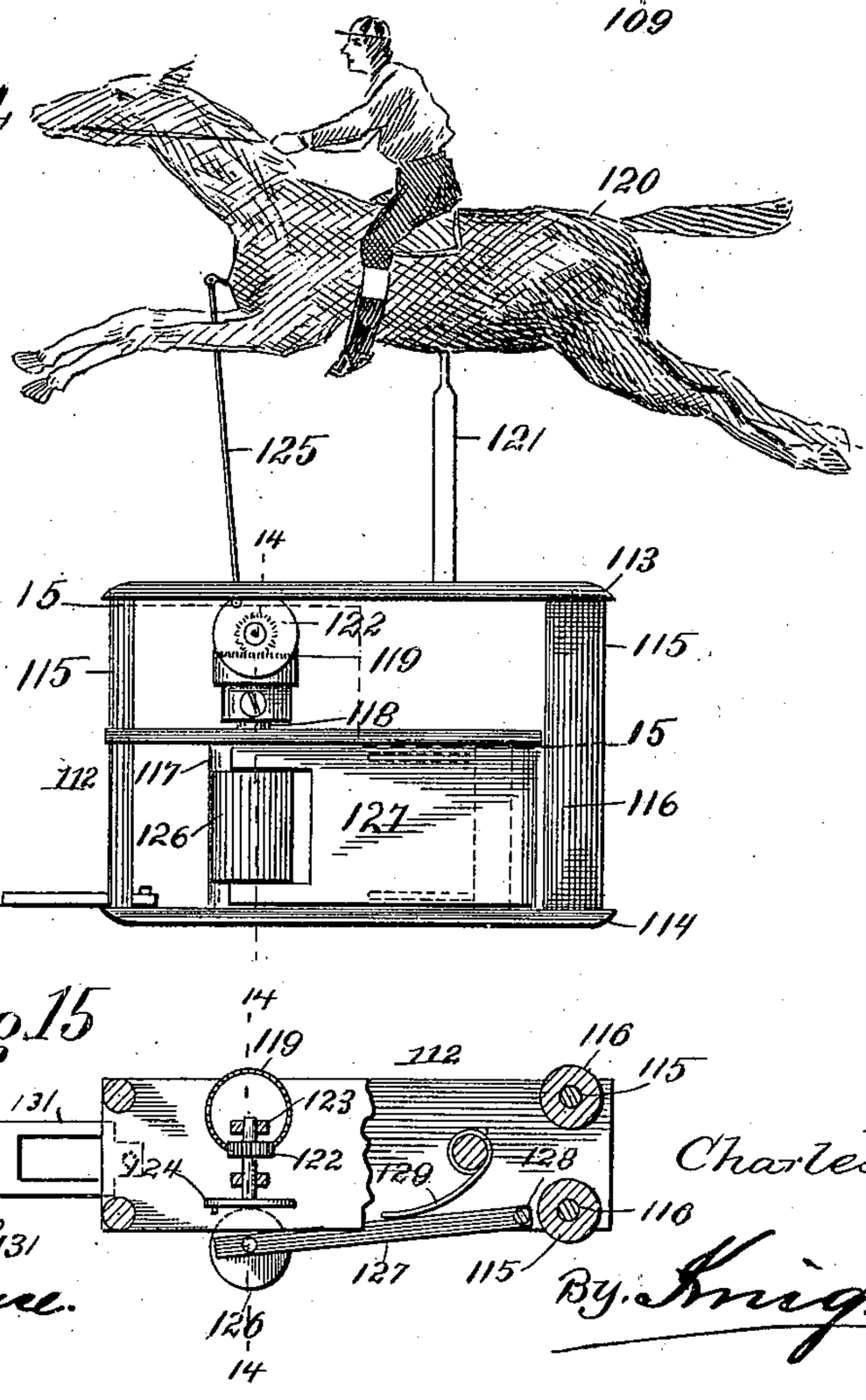


Fig 15

Attest:
C. C. Burdick
George E. Crane.

Inventor:
Charles Carroll.
By. Knight Bros.
Attys.

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C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 14a

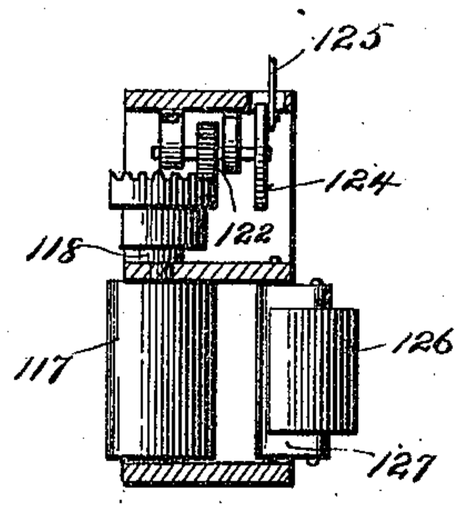
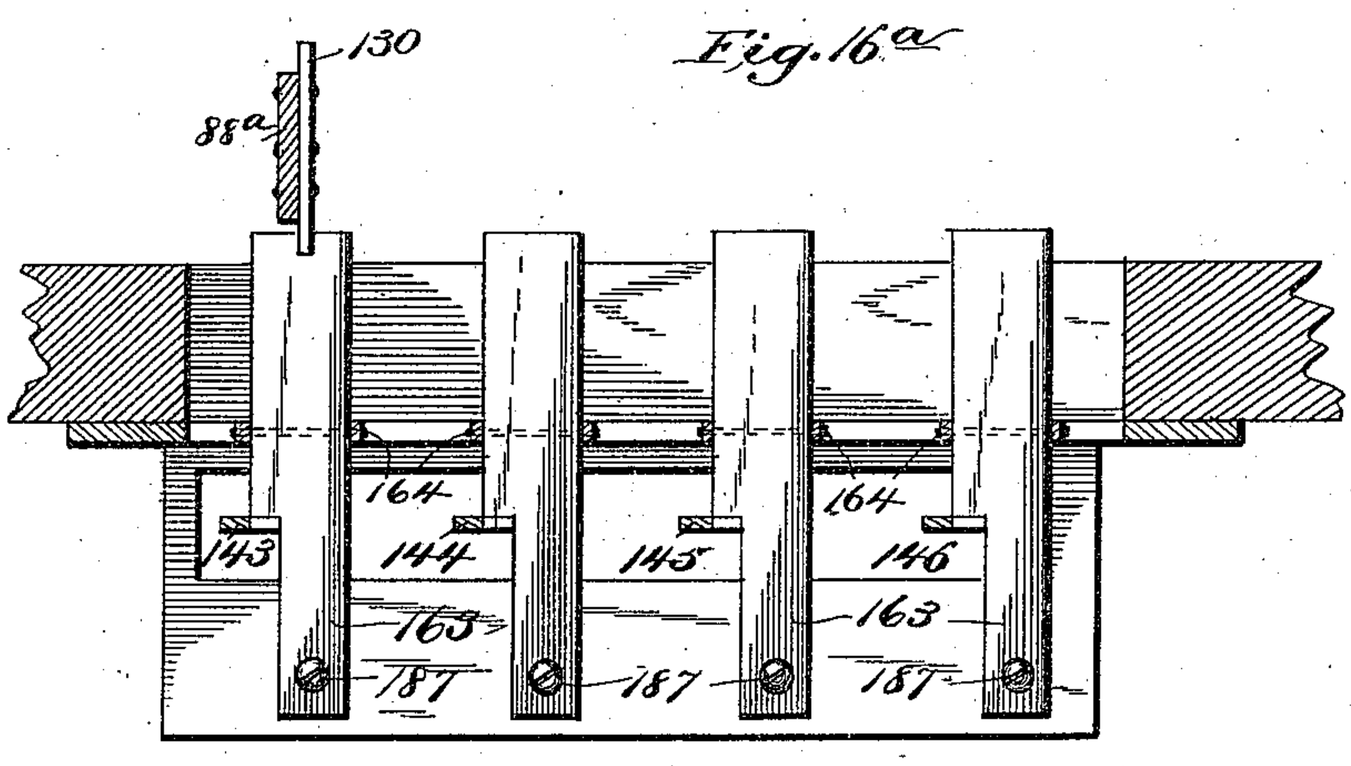


Fig. 16a



Attest:
Harry S. Rohrer.
Geo. E. Corse.

Inventor:
Charles Carroll.
By. Knight Bros.
Attys.

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C. CARROLL.

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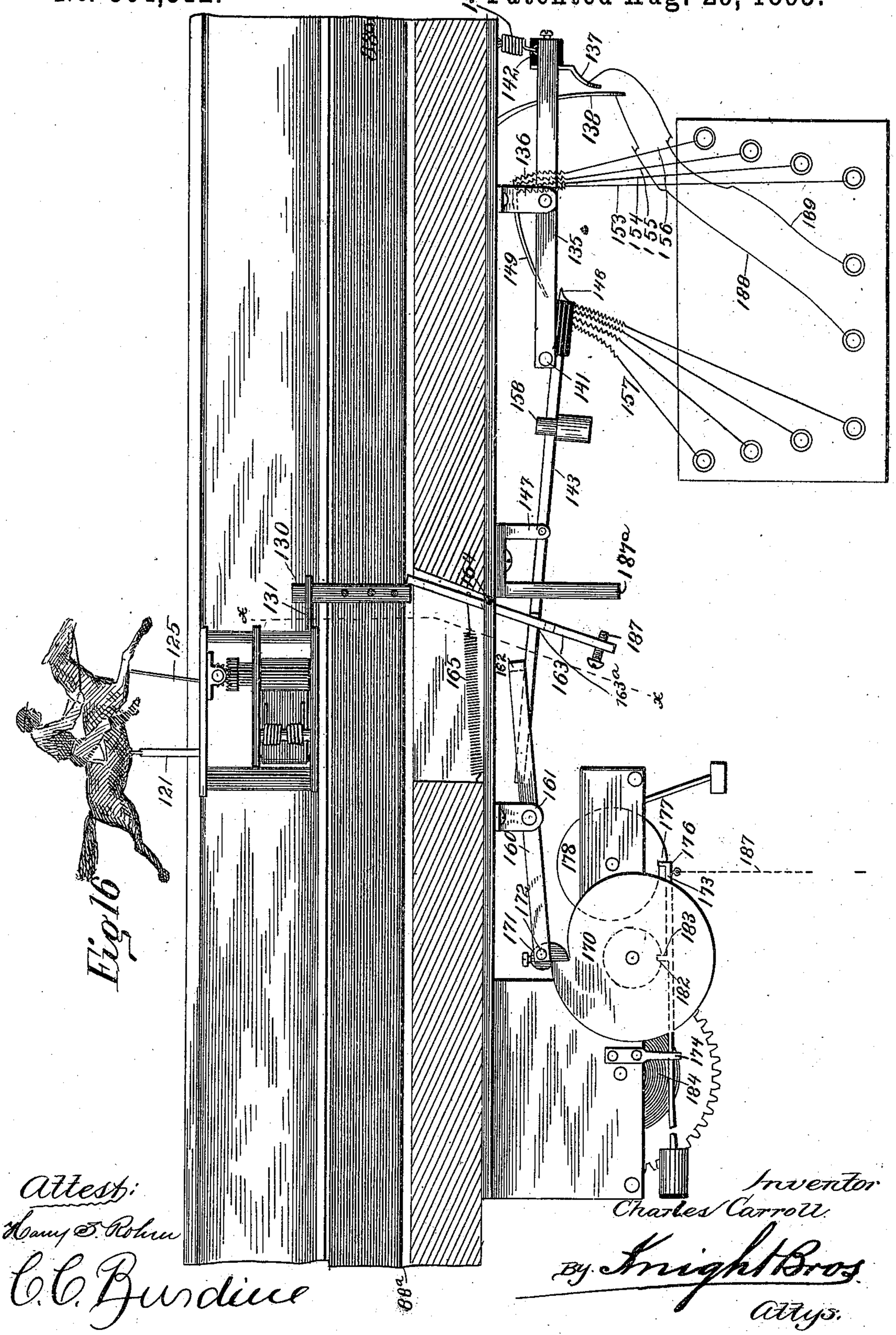

Attest:
Harry S. Rohrer
C. C. Burdick

Inventor
Charles Carroll
By Knight Bros.
Attys.

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C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

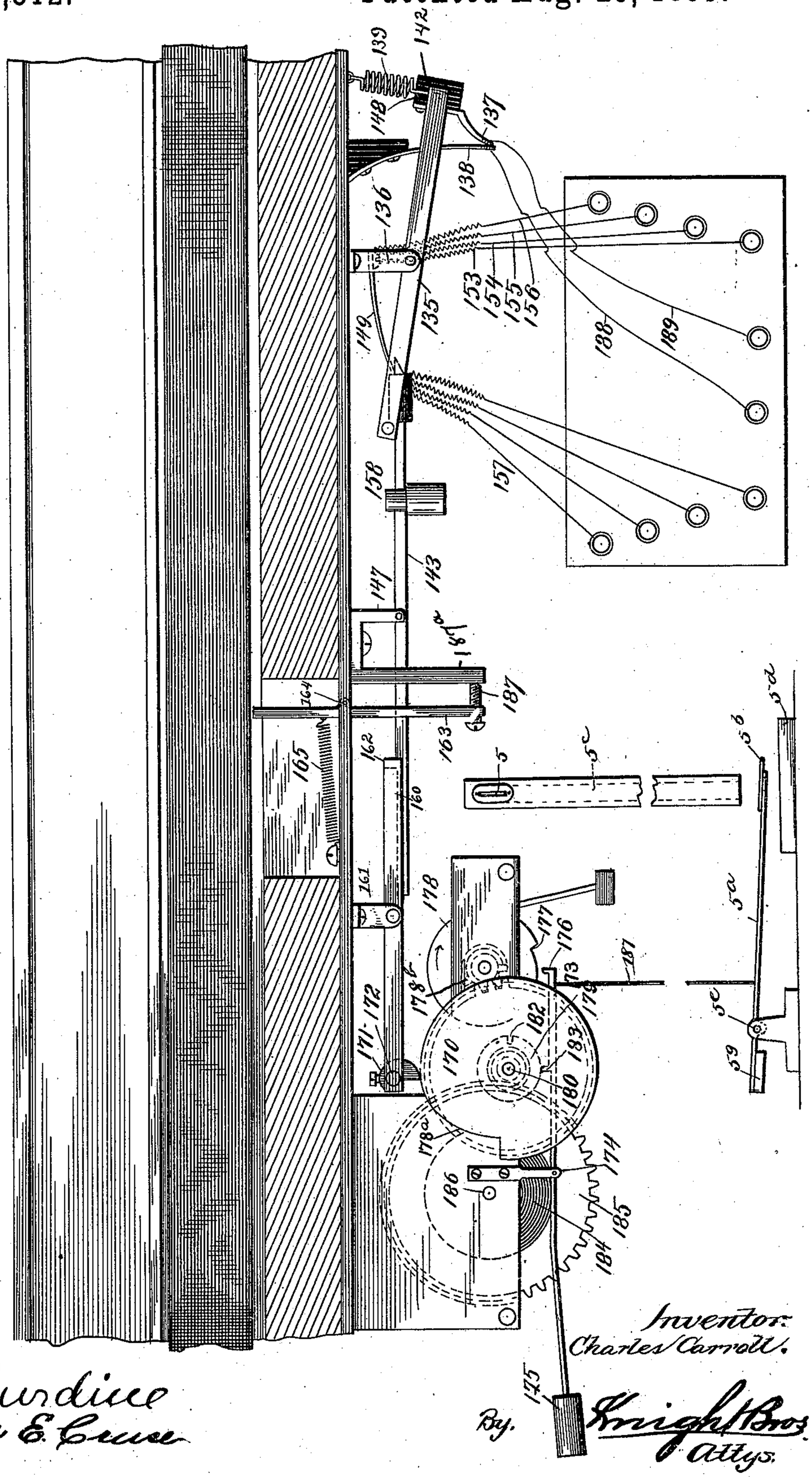


Fig. 17.

Attest:
C. C. Burdine
George E. Lemmon

Inventor:
Charles Carroll.
By. Knight Bros.
Attys.

(No Model.)

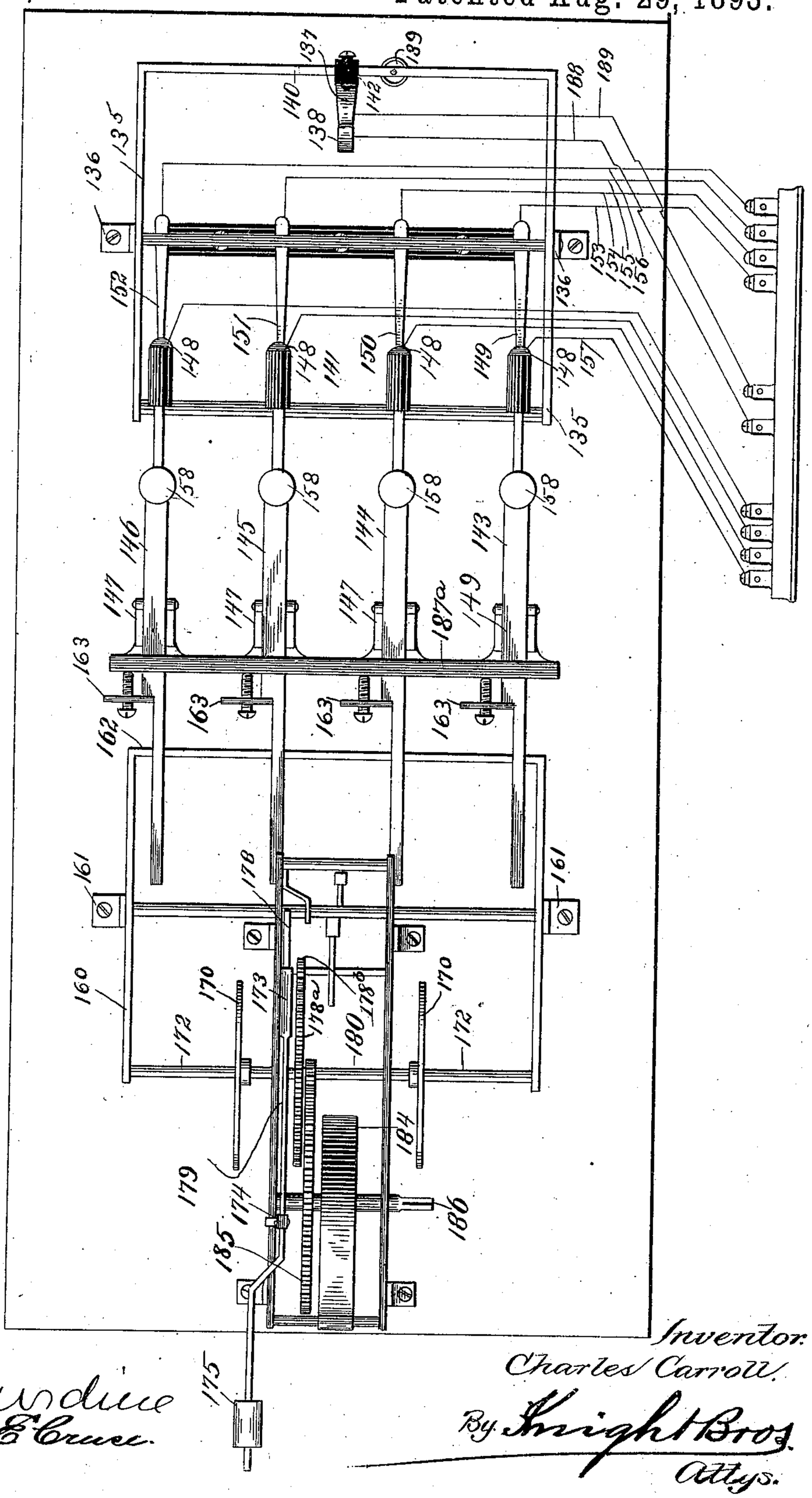
18 Sheets—Sheet 14.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig 18



Attest

C. C. Burdine
George E. Bruce.

Inventor.
Charles Carroll.
By Knight Bros.
Attys.

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C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

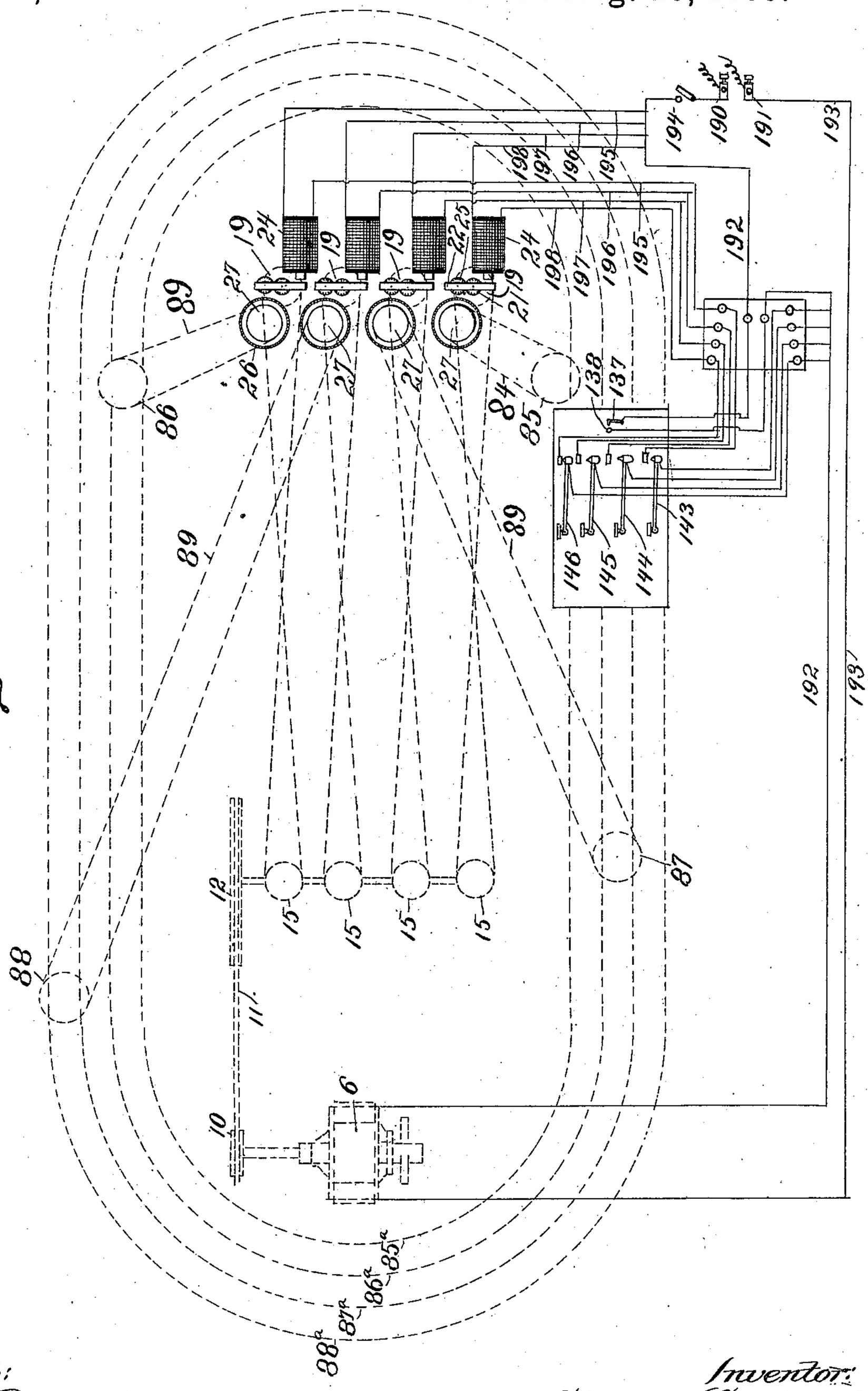

Fig 19

Attest:
C. C. Burdick
George E. Bruce.

Inventor:
Charles Carroll.
By Knight Bros.
Attys.

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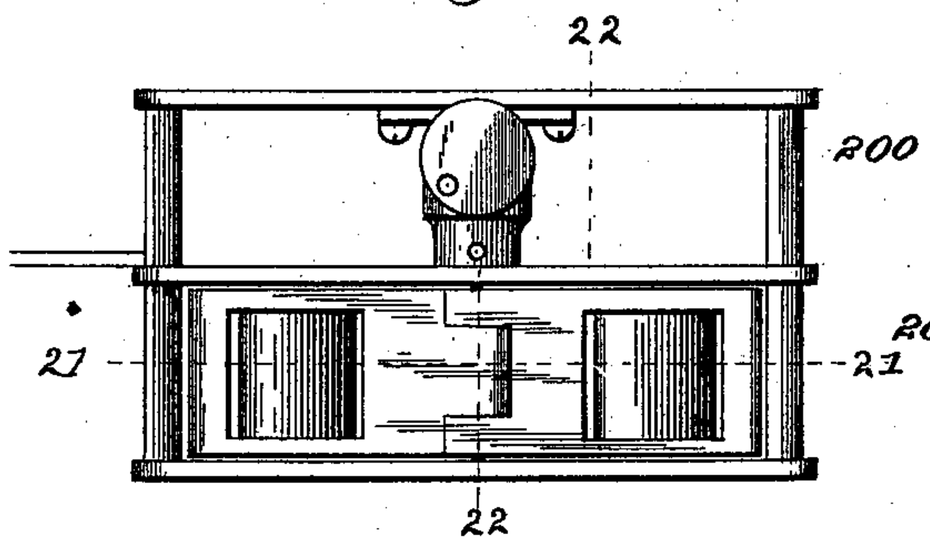
C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 20.



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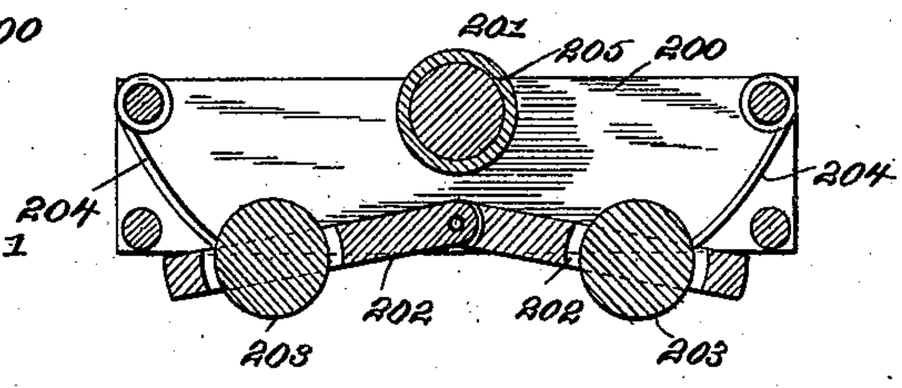

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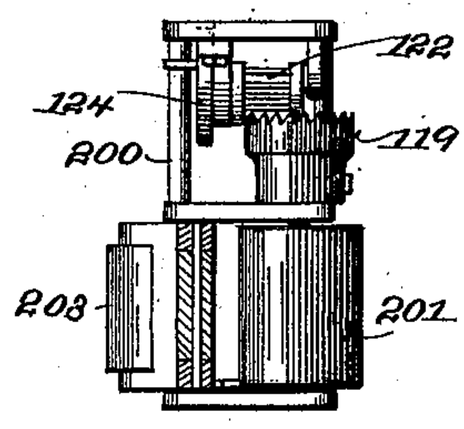

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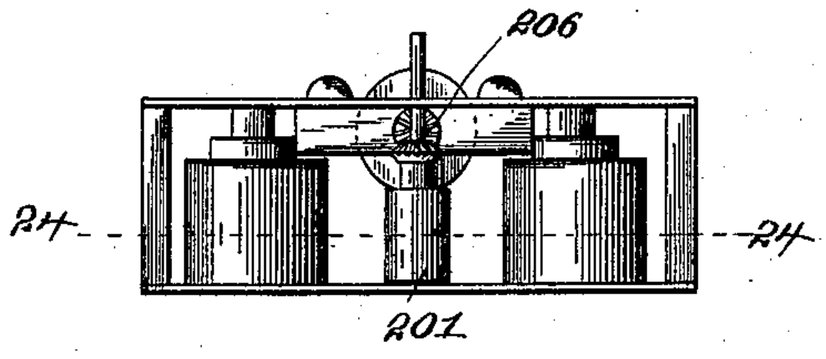

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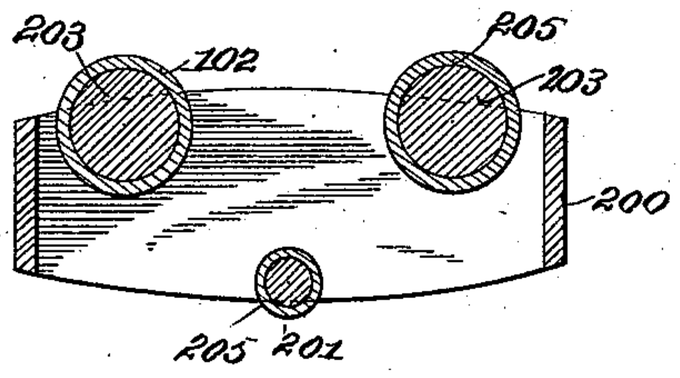

Attest:
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George E. Bruce.

Inventor:
Charles Carroll.
By Knight Bros.
Attys.

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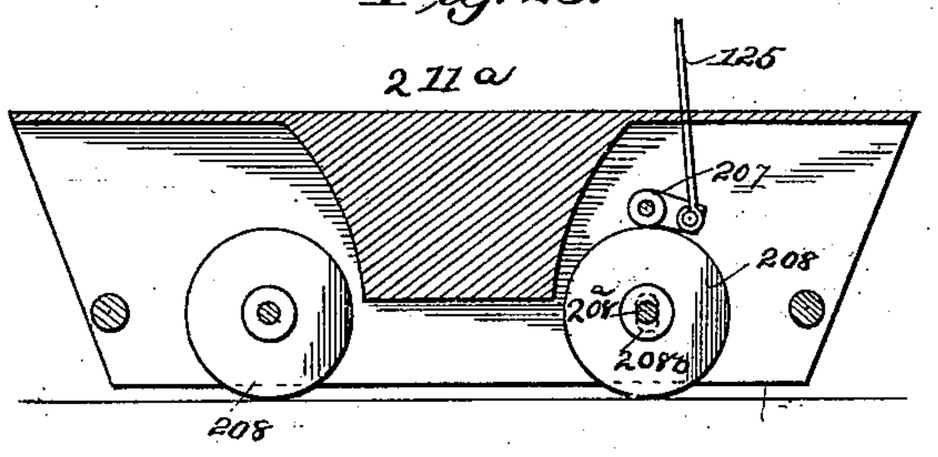
C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 25.



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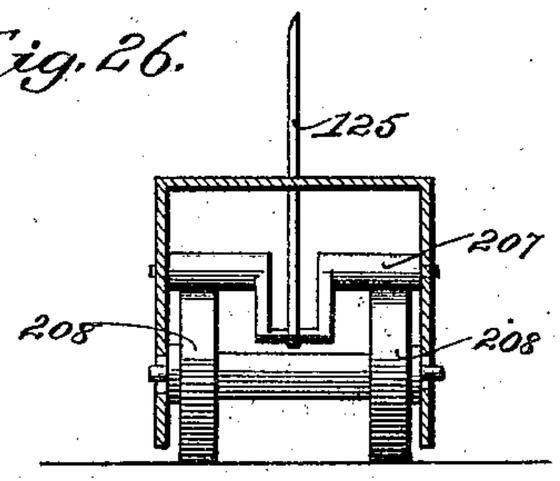

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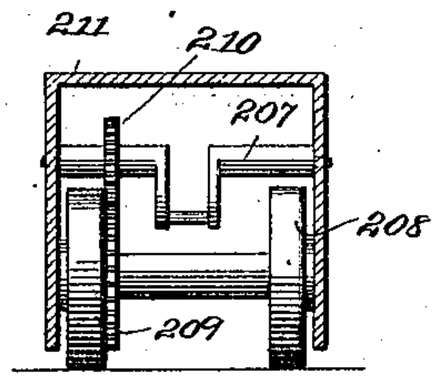

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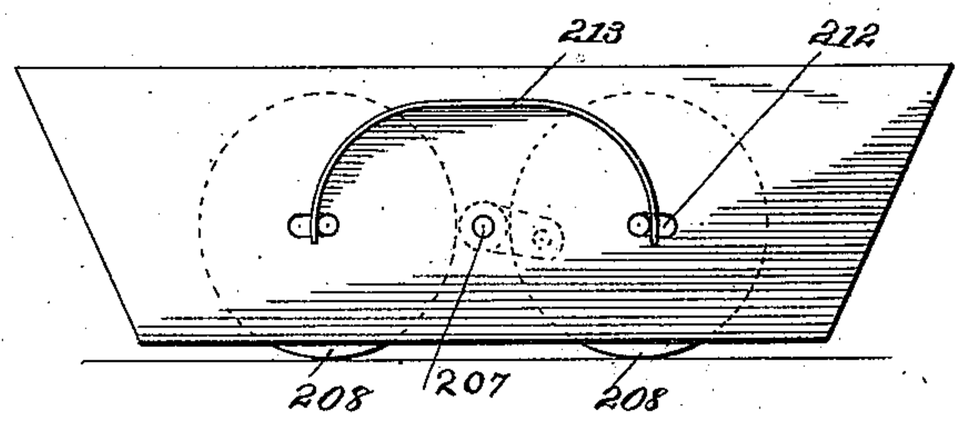

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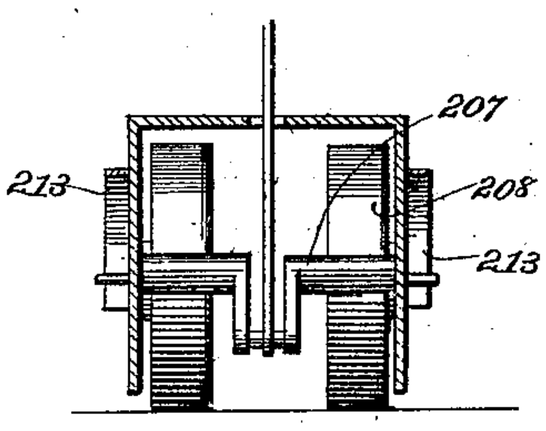

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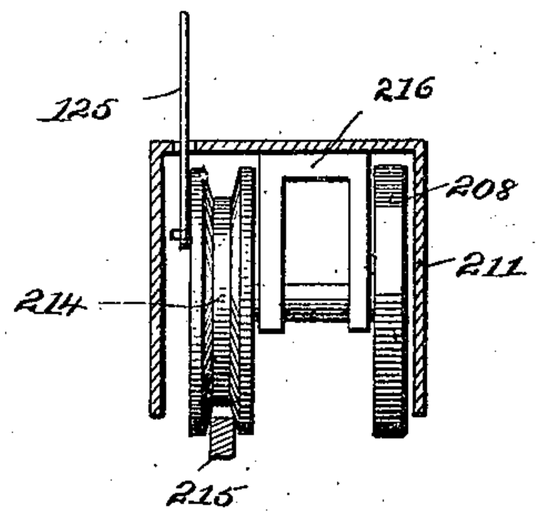

Attest:
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George E. Bruce.

Inventor:
Charles Carroll.
By. Knight Bros.
Attys.

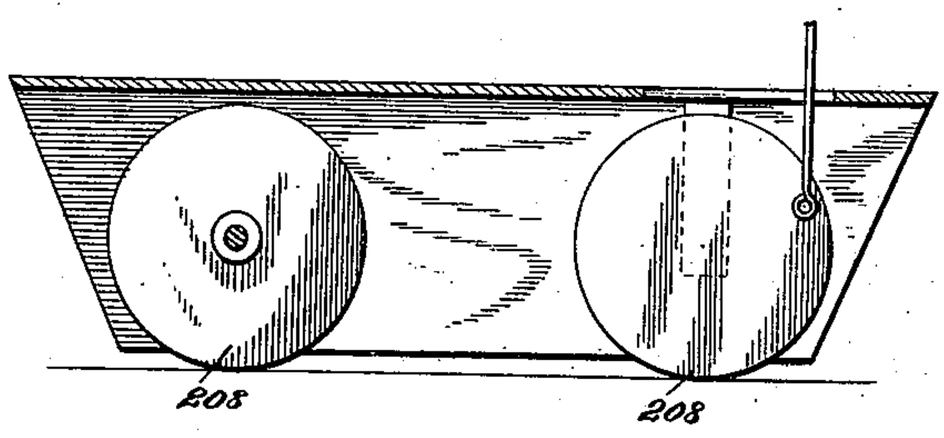
(No Model.) 18 Sheets—Sheet 18.

C. CARROLL.

COIN CONTROLLED RACE COURSE.

No. 504,312. Patented Aug. 29, 1893.

Fig. 31.



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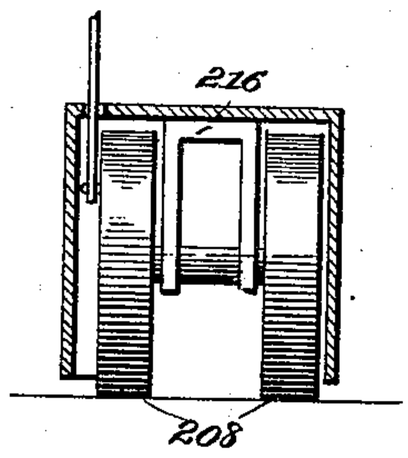

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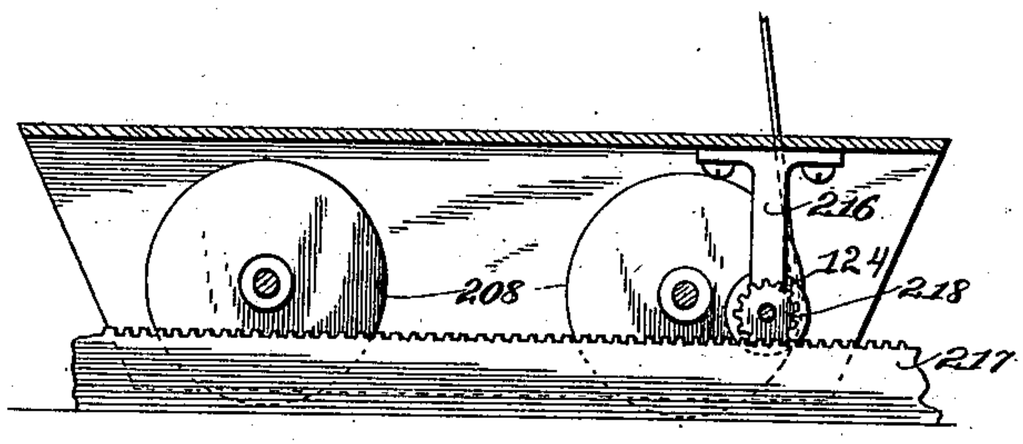
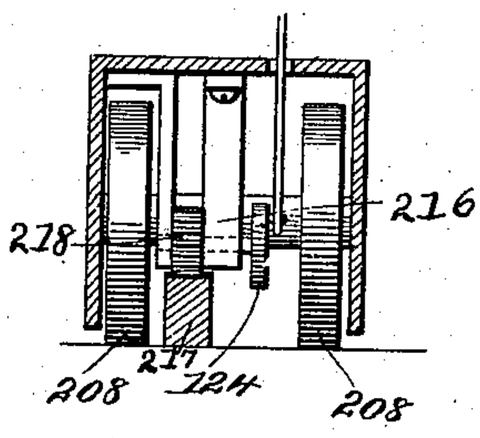


Fig. 34.



Attest:
Harry S. Rohrer.
George E. Lemmon

Inventor:
Charles Carroll.
By Knight Bros.
Attys.

UNITED STATES PATENT OFFICE.

CHARLES CARROLL, OF NEW ORLEANS, LOUISIANA, ASSIGNOR TO THE AUTOMATIC MACHINE COMPANY, LIMITED, OF SAME PLACE.

COIN-CONTROLLED RACE-COURSE.

SPECIFICATION forming part of Letters Patent No. 504,312, dated August 29, 1893.

Application filed August 29, 1891. Serial No. 404,113. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CARROLL, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Coin-Controlled Race-Course, of which the following is a specification.

My object is to provide a machine which shall represent an ordinary horse race in miniature. By means of the mechanical devices and appliances, of which I make use, certain figures or images, representing horses, start simultaneously as if setting out on a race, the speed of each being varied from time to time, and at the end of the race each is stopped almost or absolutely in line with the others, so as to have all in position for the ensuing race. The race-track may be circular, elliptical or in any desired form. In practice I have found the most satisfactory results when the track is straight on each side and has its ends in a curved or circular shape. The images representing horses may be made of metal, papier maché, or any suitable material, and each preferably should have the form and position generally shown in pictures or engravings as representing a running horse. Each of these figures should be surmounted by the image of a jockey, the whole being painted in suitable colors so as to represent actual life as near as may be. There may be any desired number of horses, but I think the most satisfactory results would follow from having six, seven or eight. In this application reference is made to a machine having four horses, but there will be no difficulty in understanding the construction of a machine with a larger or smaller number, since the necessary changes and modifications amount merely to multiplying or decreasing the numbers of certain parts and are so slight as to suggest themselves.

Each image, by means of mechanism described hereinafter, is made to imitate the running or galloping motion of a horse, when running a race, the mechanism effecting this result being concealed from view. When the machine is in operation, each image is seen supported by a rigid upright piece on the top of which it rocks or oscillates, the image or horse deriving its running or galloping motion from a vertically reciprocated rod connected at its upper end with the horse and at its lower end with suitable actuating mechanism to be hereinafter described. Suitable carriers support the uprights or standards upon which the horses are mounted together with the reciprocating rod, and also carry the actuating mechanism for said rod, there being one carrier for each horse in the race. These carriers travel in suitable channels or conduits formed parallel with, but beneath the surface of the track and they are moved in said channels by means of endless belts and driving pulleys. The belts travel in a series of lower conduits in which are also located the driving pulleys, which receive movement from a suitable source of power through the medium of a chance speed changing mechanism to be hereinafter described. The belts are provided with upwardly and downwardly extending projections, the former of which engages the carrier, while the latter is adapted to engage and operate a compound switch located beneath a certain point in the track. The compound switch comprises a set of make and break controlling electro-magnets and the motor which are adapted to establish working connection between the driving gear and the belt driving pulleys. The projections on the belt may be at the same place or they may be at different points in the belt. In practice, however, I have found the best results to follow when they are located at the same point and made in one piece.

It is possible to construct the machine so that each strip or bar attached to its belt can serve the double purpose of pulling along a horse and of stopping that horse at the desired point, say the termination of the race, but the arrangement suggested above is to be preferred. The belt passing from pulley to pulley, takes the form of a broken line made up of sections each being a straight line, and, where the course is circular, the belt resembles a series of chords in an arc of a circle. The greater the number of pulleys, the more nearly the belt becomes a perfect curve.

The groove provided for the carrier or mechanism which carries the horse and gives the running motion is rectangular in cross-sec-

tion, but is straight or curved in its general direction according to the portion of the track under consideration. Where this groove is straight the belt is also straight, but where the groove is curved, the belt takes the shape of a broken line as explained. I prefer to place the belt so that the strip attached to it may move in the center of this groove, but this cannot be the case in curves without having more pulleys than I desire, and on curves the belt does not always carry the strip or bar, which pulls along the mechanism carrying the horse, precisely in the center of the groove in question. Accordingly, the connection or coupling between the strip or bar and the carrier which it pulls along is made so as to give suitable play to the parts and allow the mechanism in question to be pulled smoothly and evenly along its uniformly circular groove by the bar moving with the belt on a broken line.

It is necessary to so arrange the mechanism that the machine as a whole shall start and all of the magnets shall be thrown in simultaneously at the commencement of each race, (starting the horses together) that each magnet shall retain its power until the horse to which it belongs reaches the end of the race; that, when this occurs, the circuit controlling the magnet in question shall be broken, (stopping that particular horse;) and that, when the last horse reaches the end of the race, the action of the entire machine shall cease.

Since the machine is moved by electricity, it is started and stopped by closing and opening an electric circuit. It is necessary, therefore, to provide a switch so arranged that, at the moment of starting five circuits shall be closed, one for the motor which operates the machine as a whole and the four others to close the circuits which govern the magnets above referred to. If there were five horses, then the switch would be required to open and close six circuits, one for the machine at large and one for each of the horses.

The compound switch comprises as many make and break devices as there are electromagnets and one more for the motor circuit. The magnets are equal in number to the horses in the race and each is designed to establish and maintain connection between the power and the driving pulley of the particular horse controlled by said magnet, until the horse has finished the course. The working connections between the power and the driving pulleys include the speed changing device as will hereinafter appear.

The compound switch comprises a number of pivoted levers controlling the respective magnet circuits, and an additional pivoted lever or frame controlling the motor circuit, the latter lever or frame being so arranged that, when any one of the magnet switches energizes its magnet, then the motor circuit is closed. At the same time, this latter lever or frame can be moved so as to close the motor circuit without closing any of the magnet circuits. Hence the motor circuit can be closed and the general machinery kept in operation although none of the magnet circuits are closed; but, if any or all of the magnet circuits be closed then the motor circuit is also closed and remains so until each and all of the magnet circuits are open.

Each one of the magnet-controlling levers is provided with a detent which projects upward and these detents are adapted to be engaged by the hereinbefore mentioned downwardly projecting arms, on the respective driving belts. The respective levers will by this means be released, the individual circuits opened, the magnets de-energized, and the horses stopped as each arm strikes its detent and the horse arrives at the stopping-place. When the last horse arrives at the stopping-place or when the arm of the belt which drives said horse reaches the detent, the lever controlling the motor circuit also operates to break the motor circuit so that the whole mechanism comes to a standstill.

In order to close all the circuits employed, simultaneously, a pivoted frame is made to engage, by one of its ends, all of the switch levers of the magnet circuits, while the opposite end is adapted for engagement by any form of operating mechanism or by hand.

In order to adapt the machine for operation by a coin, a suitable cam is arranged to be operated by a spring power and a detent for said cam mechanism is adapted to be disengaged by a coin dropped upon a tray or lever with which said detent is connected.

The changes of speed are effected by cone pulleys. Motion is communicated to a suitable shaft, which by means of beveled gearing turns a number of cone pulleys, the number being the same as the number of horses. Each of these cone pulleys has a uniform or constant speed or velocity, during a race, all deriving their motion from the same shaft, but, compared with each other, they preferably differ in speed to a degree corresponding with the difference in distances to be traveled by the several horses, the object being (disregarding the speed changing device) to have the cone pulleys cause all the horses to traverse the course in the same time. As there are differences in the distances traveled by the horses, there should be corresponding differences made in some part of the machinery, so that each horse, (when all are similarly situated and none is influenced by the speed changing device,) may make the course in the same, or approximately the same, time. It is easiest to arrange for these differences by modifications in the bevel gearing from the main shaft, but it may be made in the pulleys connecting the "followers" with the belt drivers, or in other parts of the machinery. The method of accurately adjusting the machine on this point will be explained later. Each one of these pulleys is connected by a belt with another cone pulley, which has its

axis parallel with the first. For convenience, I shall call the first set of cone pulleys the "drivers" and the second set the "followers." When the belt connecting any "driver" with its "follower" is at the large end of the former, it passes around the small end of the latter, thereby causing it to make more revolutions than the "driver" and when this belt is at the small end of the "driver" it is upon the larger end of the "follower" which then makes fewer revolutions than the "driver." It follows, then, that although the velocity of the "driver" be constant, yet the velocity of the "follower" is increased and diminished by shifting the belt back and forth. Any mechanism which shifts this belt will make changes in the speed of the "follower." If this shifting be regular and uniform, the changes of speed will also be regular and uniform; but, if the shifting be irregular and uncertain, then the variations of speed will likewise be irregular and uncertain.

In order to effect the shifting of the belt, I provide a frame running on guides, which frame as it is moved, carries the belt back and forth. To avoid friction, a small pulley may be placed at each end of the frame, these small pulleys coming in contact with the belt as the frame is moved from place to place. The movement of this frame back and forth is effected by means of a crank and pitman, arranged so that, as the crank is revolved upon its axis, the rod moves the frame back and forth along its guides, the motion being the reverse of that seen in steam-engines where the reciprocating motion of the piston is changed to rotary motion. This crank is on the same axis with a wheel which can be revolved at will. As the wheel revolves the crank turns with it and moves the frame which shifts the belt, thus varying the speed of the "follower." Each wheel in question, for reasons that will appear later, is provided with a ratchet, and there are a ratchet-wheel, a crank and a rod and a belt-shifting frame for each of the "followers," and it results that whatever turns or revolves any one of the ratchet-wheels will effect and regulate the changes of speed in the "follower" corresponding with that particular wheel. During each race, these "followers" are connected respectively with the devices which move or drive the belts carrying the horses, so that changes of speed are effected by the moving of the belt-shifting frame.

The changes of speed are regulated by the falling and movement of balls or marbles, of which as many may be used as shall be found most satisfactory in practice. The balls start from a small hopper or receptacle situated at the center of what may be called a tray, which is preferably circular in form and is so shaped that a ball starting at its center will roll down toward its outer edge, the tray being highest in the center and gradually sloping down on all sides. The outer edge of this tray ends in, or turns up into a rim or barrier, which prevents the balls or marbles from rolling off or away and compels them to roll or fall into holes made in the circumference of the tray just inside the rim or barrier. These holes terminate in chutes which lead to longitudinal channels in and upon an inclined plane or apron below the hopper. There should be as many channels as there are images of horses; that is to say, in the case now under consideration there are four of these longitudinal channels. The holes spoken of should be placed around the entire circumference of the tray and should be equi-distant from each other, so that each may have the same chance to get its full and fair number and proportion of the balls or marbles which roll out from the hopper or receptacle at the center of the tray. The chutes extending from these holes to the longitudinal channels should be so arranged as to connect the same number of holes with each of the channels, in order that each one of the horses may have the same chance of having its speed accelerated (or diminished) by the action of the balls. If it be desired to give greater chances to any one or more of the horses, then the chutes may be so arranged as to throw a greater number of marbles into the channel or channels corresponding with such horse or horses. The longitudinal channels, their ends being open, terminate at a cylinder, which has its axis in a plane parallel with the apron containing the channels. In this cylinder are hemispherical depressions of such size that when any one of the balls rolls down one of the channels and comes in contact with the cylinder, the latter as it revolves, presents one of these depressions into which the ball rolls being then taken up by the cylinder and carried along on and with it until in the revolution a point is reached where the weight of the ball causes it to fall away from the cylinder. When this occurs, the ball is caught by a box having a slanting or inclined bottom so shaped and arranged that all of the balls roll to a given place, at which they fall into buckets attached to an endless belt or elevator, which lifts them until they reach a place the altitude of which is above the point of distribution in the center of the hopper mentioned above. When the balls have been carried to this altitude, that is, to the top of the belt to which the buckets are attached, they are some distance from this hopper, but as the belt moves, they are discharged from the buckets over into a trough or receptacle, which has a slanting bottom causing them to roll to one end, at which they fall into another trough, also slanting, which delivers them into a third trough or receptacle, also slanting at the bottom, from which they pass into the hopper first mentioned above. This hopper is made to revolve by suitable machinery and a ball or marble passing into it rolls out to one point or other of the tray according to the position of the hopper at the moment that it discharges the ball. The hop-

per, the cylinder, and the elevator belt are constantly revolving, while the machine is in operation, and consequently the balls are continuously and continually engaged in traveling from the hopper to the tray, thence through one of the channels to the cylinder, thence on the surface of the cylinder, until it falls into the box below the cylinder, thence into the elevator buckets, thence to the series of troughs which return them back to the hopper, and so on indefinitely.

It will be observed that it is entirely a matter of chance as to the particular channel in which the balls shall fall. If the machine be operated for a long while, the average number rolling into each channel will be about the same; but, if the operation be continued for only a very short time there is an utter absence of regularity and uniformity: some of the channels will receive twice as many balls as others. The time required for a race being very short, there is a great difference between the number of balls falling into one channel as compared with the number falling into another channel during a given race, and there is also quite a difference between the number of balls that fall into any given channel during one race and the number falling into the same channel during another race. Since the balls are carried over the cylinder in the same order that they fall into the channels, (the balls from each channel following each other in the same line overthe surface of the cylinder,) and since there is great disparity, from time to time, in the number of balls falling into the respective channels, it follows that the balls are carried over by the cylinder in an irregular and uncertain manner. If this irregularity in the movement of the balls on the surface of the cylinder be used to transmit or communicate motion to the ratchet-wheel mentioned above, that connects with the belt-shifting frame, it is evident that the movement of that frame becomes equally irregular and uncertain, and, as a result, there is a constant change or variation in the speed of the images representing horses. The variations depend upon the movement of the marbles and that movement is wholly uncertain and irregular.

The depressions in the cylinder which carry over the balls as described, are hemispherical so that each ball protrudes or projects, more or less, according to its size, beyond the surface of the cylinder. Each ball as it moves around on the cylinder becomes temporarily a knob or an eminence on the cylinder and this is used to revolve the ratchet-wheel spoken of above. Corresponding with each of these wheels, there is resting upon the cylinder a lever, which is not affected by the turning of the cylinder when there is nothing in the hemispherical holes, but simply rests and remains stationary. When, however, a ball is caught in one of these holes and brought around on the cylinder, the temporary knob or projection thus formed slightly raises the lever, which rests upon the cylinder. The other end of this lever has attached to it another lever or pawl which engages the teeth of the ratchet-wheel which governs the movement of the belt shifting frame. A dog working in this ratchet-wheel prevents the latter from returning to its former position when it has been moved by the lever actuated by the marble. It will thus appear that when the machine is in motion there is no change of speed until a marble is carried over by the cylinder. When this happens, the marble raises the lever just mentioned and causes the catch to revolve the ratchet-wheel to the extent of one or two teeth. This revolution, though very slight, is sufficient to move the speed changing frame and to cause an acceleration or diminution of the speed of the belt which carries some one of the horses. In each case there is a constant change from a slower to a faster gate and then from the latter to the former; but the number of changes to which each horse is subjected in any given race is purely a matter of chance, and the question as to whether or not any given horse will have its speed accelerated or diminished or first accelerated and then diminished or remain the same during any race, is equally a matter of chance. In some cases, it may happen that not a single marble will fall into the channel controlling some one particular horse: in which case the speed of that horse remains the same throughout the race.

Each belt, or rather the wheel communicating motion to each belt, is thrown in and out of connection with the general movement by means of a clutch worked by a magnet, the magnet, or pair of magnets, being so placed that when an electric current is turned on, two toothed wheels are made to engage each other, and, when the current is off, the same wheels are thrown out of gear automatically. Each of the cone pulleys called "followers" above, has on the end of its shaft a toothed wheel, above and below which are bars connected so as to make a rigid frame. These bars, forming the sides of the frame, contain on one side a toothed idler which engages that attached to the end of the shaft of the "follower." On the other end of this frame is an armature, which is attracted by the magnet when the electric circuit is closed. When this armature is drawn to the magnet, the end of the frame containing the idler is revolved slightly about the shaft of the "follower" and the idler is brought in contact and engages with a toothed wheel which communicates motion to the belt-driving device. When the circuit is closed, the magnet draws the armature to its face and throws the idler so that it transmits motion to this last mentioned wheel. The idler being geared with the wheel on the end of the shaft of the "follower," whenever the latter is revolved and the circuit controlling the magnet is closed, then one of the belts (which carry the horses) is put into operation. On the other hand, when

the electric circuit is broken, then the belt carrying the horse is thrown out of connection and ceases to move, thereby bringing to a stand the horse which it carries. There is one of these magnet clutches for each horse, and while the machine is in operation each horse is carried along, or left standing, according as the circuit of its magnet is closed or opened.

In order to fully understand how these results are effected it is necessary to examine most of the movements in detail, and I now shall proceed to more fully describe the device which effects the changes of speed; the device which regulates these changes; the device which throws each belt in and out of connection with the general movement, (thereby causing the horse which that belt carries to move along the track or to come to a standstill;) the device which causes the movement and action of the belt; the devices which give the galloping or running motion to the images; and, finally, the device by which the action and motion of the whole machine are started; all of which are represented in the accompanying drawings, in which—

Figure 1 is a side elevation of the complete machine suitably housed or incased. Fig. 2 is a side elevation of the driving mechanism and speed changing mechanism. Fig. 3 is a plan of a part of the same. Fig. 4 is an elevation showing the power shaft and its connection with the driving cones. Fig. 5 is a plan representing the hopper and the cylinder through and over which the marbles pass. Fig. 6 is a perspective view of one of the levers and pawls which transmit movement from the cylinder to the ratchet-wheel when a marble passes around on said cylinder. Fig. 7 is a perspective view of the belt shifting frame. Fig. 8 is a detail view representing the connection between one of the follower cones and the pulley which imparts movement to one set of belt driving pulleys. Figs. 8[a] and 8[b] represent in plan and side elevation respectively, a modification in the form of the electro-magnetic clutch for the use disclosed in Fig. 8, the armature frame being arranged to slide and carry the transmitting pulley upon it. Fig. 9 is a plan of the race-track, a portion of the flooring being removed and the location of the pulleys, the individual belt drivers, and the connection between the said pulleys and belt drivers being shown in dotted lines. Fig. 10 is a bottom plan of the same, the compound switch being also represented. Fig. 11 is a detail view in side elevation of one of the belt-driving devices. Fig. 12 is a plan of the same. Fig. 13 represents an end view of the same. Fig. 14 represents the side elevation of one form of the horse carrier and the means for imparting the galloping motion to the horse. Fig. 14[a] is a vertical section through the carrier in the transverse plane of the horse reciprocating mechanism. Fig. 15 is a horizontal section on the line 15—15 Fig. 14. Fig. 16 is a side elevation of the compound switch, a portion of the course or track to which it is secured and one of the horses and carriers at the moment of stopping one race and just ready to start another. Fig. 16[a] is a vertical section on the line *x*—*x* Fig. 16. Fig. 17 is a side elevation of the compound switch and a part of the track, shortly after the race has started. Fig. 18 is a plan of the compound switch. Fig. 19 is a diagrammatic view illustrating the electrical working connections of the whole device. Fig. 20 is a side elevation of another form of the horse carrier. Fig. 21 is a horizontal section on the line 21—21 Fig. 20. Fig. 22 is a vertical transverse end elevation of the device shown in section on the line 22—22 Fig. 20. Fig. 23 is a side elevation of a further modification in the carrier. Fig. 24 is a section on the line 24—24 Fig. 23. Fig. 25 is a vertical longitudinal section representing a further modification in the form of carrier. Fig. 26 is an axial section of the same. Fig. 27 is an end elevation of another form of the carrier. Fig. 28 is a side elevation representing another form, showing the wheels and crank shaft rotated thereby. Fig. 29 is a central vertical section illustrative of the form shown in Fig. 28. Fig. 30 is an end elevation of a form having a track which is used for the purpose of guiding the carrier and imparting the rotating motion to the wheel which may either directly or indirectly impart the reciprocating motion to the vertical rod. Figs. 31 and 32 represent in vertical longitudinal and transverse section respectively another form of the device. Figs. 33 and 34 represent in longitudinal and transverse section a still further modification.

Referring to Fig. 1, 1 represents the race-course and 2 the base or support therefor within which are contained the driving mechanism and other parts which control the device. The course has images 3 supported in such relation thereto as to present the appearance of running upon the course and said course is covered by a suitable casing 4 of glass. In the side of the support 2 may be located a slot 5 for the admission of a coin which may be used to release certain mechanism and thus start the machine.

Referring to Figs. 2, 3, 4 and 8; 6 represents a suitable motor which imparts motion through the belt 7 to a larger pulley 8 mounted upon the shaft 9 which has on its other end a small pulley 10. These parts constitute simply a driving power and reducing gear and they may be of any suitable form or replaced by any mechanical equivalents. Motion is imparted from pulley 10 through the medium of a belt 11 to a pulley 12 on the power shaft 13 which drives the whole device. This is where the machine proper begins for it is obvious that power may be imparted to the pulley 12 by any convenient means. As shown in Fig. 4 the shaft 13 which is preferably arranged horizontally imparts movement through beveled gears 14 to the series of vertical cones 15. These cones I denominate the

"drivers" and there are as many of them as there are horses mounted upon the course. All of these cones 15 are preferably driven at a uniform rate of speed through each race, but differing from each other, so that the several images, although traveling different distances according to their relative positions, complete the course in about the same time, when no influence is exerted by the speed changing device; and it is from them that speed is imparted through the changing device to the respective belt driving pulleys which impart movement to the belts which draw the horses. From each of the cones 15 runs a belt 18 to the cone 19 whose position is reverse to that of the cones 15. The cones 19 are equal in number to the cones 15 and are denominated for convenience the "followers." All the cones are mounted in a suitable frame 17, whereby they bear a fixed relation to each other and it is by shifting the belt 18 up and down upon these cones through the medium of suitable mechanism to be hereinafter more fully described that variations in the speed of the cones 19 are made. At the upper ends of the shafts 20 of the follower cone 19 are mounted pinions 21 and frames 22. Upon one end of each frame 22 is the armature 23 of an electro-magnet 24, while on the other end is an idler 25 in mesh with the pinion 21, the wheel constituting in each case an electro-magnetic clutch. The frames 22 are pivoted on the shafts 20 and located near said frames are pinions 26 suitably journaled and fixed to pulleys 27. The locations of the magnets 24 and wheels 26 are such that when said magnets are energized the frames 22 will be swung on their pivots and cause the engagement of said wheels 26 by the idlers 25. 28 represents springs for returning the frames 22 to normal position when the armature is released. From the above it will be seen that the energizing of any electro-magnet 24 will throw the idler 25 into gear with wheel 26 from which will result the imparting of motion from the cone 19 to the pulley 27, and that the de-energizing of said magnet will cause the cutting off of the motive power from said pulley. From pulleys 27 motion is imparted to the respective belt driving pulleys in the conduits of the course and means are provided for energizing and de-energizing the magnets as has been hereinbefore stated and will be hereinafter described.

The mechanism for changing the relative speed between the "drivers" and "followers" is as follows:—30 represents a guide-frame through which passes belt 18, and this frame is to slide on vertical bars 31 mounted in the upper and lower portions of frame 17. Pivoted to the lower side of frame 30 is a pitman 32 which has pivotal connection at 33 with a crank arm 34 of shaft 35. 36 represents a ratchet-wheel also mounted on shaft 35 and upon the periphery of this ratchet-wheel rests a pawl 37 pivoted at 38 to a lever 39. The lever 39 is pivoted at 40 and has a spread or enlarged end 41 which bears upon the periphery of the cylinder 42. This mechanism is such that when the lever 39 is rocked on its pivot the wheel 36 is rotated by pawl 37 and the crank arm turned, with the effect of moving the belt up or down. The lever 39 and sliding mechanism which it controls are represented more clearly in Figs. 6 and 7. The pawl 37 may be constructed of a pair of rods 44 spaced at one end by the upper end of lever 39 and at the other by claw, 45 shaped to engage the ratchet wheel, in one direction and to slide over its teeth in the other. The lower bearing-face 41 of lever 39 may be formed by a plate attached to said lever and at said lower end the lever is preferably provided with a counter-poise 46. The shifting frame may be of any suitable construction though I find it convenient to employ a pair of cross heads 47 and side pieces 48 and if desired friction rollers 49 may be inserted between said side pieces. The pitman 32 is preferably formed in two parts connected by a screw swivel 50. The object of this is to provide means for accurately adjusting the upper and lower limit of the movement of the frame. This is an important feature, for the reason that it permits the speeds of the respective horses to be accurately limited and arranged according to their location on the track, without necessitating very great accuracy in adjusting the pulleys and gearing. In order that all chances may be even, the course should be made so that every horse shall complete the round in about the same time, when all are in the same relative condition. That is, if every horse be at the greatest speed, or at the slowest speed, or at any fixed rate of speed as compared with either extreme, then each should cover the course in about the same time. This may be approximately regulated in the bevel gearing, or in the pulleys, preferably in the former, by arranging and adjusting the size of the wheels so that each horse travels at such speed with relation to the others, that, when all are in the same condition, each consumes about the same time from start to finish; but it is extremely difficult to adjust accurately this difference in speed by changes in the gearing and pulleys alone. By means, however, of the screw swivel 50, great accuracy of adjustment is obtained, for, by this, the position of the belts on the cone pulleys can be very slightly or very considerably altered and controlled; and, after an approximate adjustment is made by gearing or pulleys, accurate adjustment is secured by changing the length of the pitmen 32, which control the belts on the cones imparting motion to the respective horses. For example, the outside horse travels farthest, and, in order to complete the circuit in the same time as the others, must go at a greater speed, and allowance for this would be made in the bevel gearing or in the pulleys. If this allowance were not exactly

right, a change in the length of the pitmen 32 would increase or diminish the speed of this horse, as should be desired or found necessary to secure accurate correspondence in the time of movement. And the same is true as to each of the others. A dog 43 opposes retrograde of the wheel 36 and it will therefore appear that in a complete revolution of the wheel and crank arm, the belt is moved as much in one direction as in the other. There are as many belt-shifters and controlling levers as there are cones 19, but all the levers preferably bear against a common cylinder 42.

The element of chance is introduced in a very simple but effective way as has already been stated, through the medium of rolling marbles or balls. The mechanism through which these marbles act will be understood upon reference to Figs. 2, 3 and 5, in which 51 represents a hopper which receives the marbles and deposits them into a concentric circular tray 52 whence they pass through a circumferential series of openings 53 into channels 55 of an inclined board 54. The ends of these channels terminate at the cylinder 42 and by said cylinder the marbles are stopped. 56 represents pockets formed in the surface of cylinder 42 and these pockets are arranged in circumferential series which correspond in number and location to the channels 55 which terminate on one side of the cylinder and to the actuating lever 39 of the speed-changing device which rests against the periphery of said cylinder. A slow rotary movement is imparted to cylinder 42 by means of a pair of belts 57 passed around the ends of said cylinder. These belts receive motion from pulleys 58 on shaft 59, (one pulley only being shown) and said shaft 59 carries a large pulley 60 which receives motion from power-shaft 13 through the medium of suitable speed reducing gear consisting of belt 61, small pulley 62, shaft 63, large pulley 64, belt 65 and small pulley 13^a on said power shaft 13. By the rotation of the cylinder in the manner described which is in the direction indicated by the arrows, the marbles will be picked up from the ends of the channels and carried over by the pockets and deposited on the collector boards 66 and directed into a longitudinal channel 67. Channel 67 is inclined and delivers the marbles into buckets 68 of an endless belt elevator 69 which travels around upper drum 70 and lower drum 71, said buckets being made to ascend on the side adjacent to said channel 67 and descend on the opposite side. By the endless belt conveyer 69 the marbles are elevated to a height sufficiently above the level of the hopper 51 to enable said marbles to return with certainty to said hopper through a suitable conduit. Having reached this height, the endless belt passes over the upper drum 70 where the buckets 68 are inverted and the marbles deposited into a receptacle 72 located in such close proximity to the descending buckets that the marbles will be caught thereby. From one end of the inclined bottom of receptacle 72, the marbles are discharged into a trough or chute 73 through which they pass to a transverse trough 74 located above and emptying into the hopper 51 where the marbles are finally delivered to renew their passage through the same course just described. This movement of the marbles is continuous and uninterrupted during the operation of the device. The marbles may roll into any one of the circumferential series of holes 53 and thus determine by mere chance which channel 55 they pass through. Having thus delineated the course of the marbles through the machine, the manner in which said marbles are brought into use may be seen upon reference to Fig. 2, and is as follows: As hereinbefore stated, the actuating levers 39 bear by the ends 41 against the periphery of cylinder 42. The ends 41 of said levers bear directly over the circles of the respective peripheral series of pockets 56, and said pockets which receive the marbles are approximately hemispherical so that said marbles while being readily retained therein while passing over, form protuberances or knobs on the surface when they pass into the pockets. These protuberances, as will readily appear, serve to press the ends 41 of levers 39 away from the cylinder and thereby rock said levers upon their axes 40. The effect of this movement is to draw the pawls 37 in the direction in which they engage the teeth of ratchet-wheels 36 and to turn said wheels a distance of one, two or more teeth, according to the relative lengths of the parts of said lever 39 above and below the pivots 40. As has heretofore been described the movement of the ratchet-wheel 36 shifts the belts on the cones and inasmuch as this shifting is effected by the marbles passing over the pockets in the cylinder, the shifting of said belts is absolutely dependent on the manner in which the marbles happen to roll, into the channel.

In order to increase the uncertainty of the direction in which the marbles pass, and to give all channels an equal chance for receiving marbles and consequently all horses an equal chance for change of speed, the hopper 51 which has an outlet on one side only, is made to rotate and deliver the marbles in constantly changing radial directions, so as to constantly alter the chance for any particular channel.

For the purpose of imparting rotary movement to the hopper 51, the shaft 75 upon which the lower roller 71 is mounted, is further provided with a pulley 76 around which passes a belt 77, and the hopper 51 is mounted upon a stem 78 which passes upward through the center of the tray 52. A shaft 78^a parallel to shaft 78 is provided with bearings 79 and a pulley 80 around which pulley said belt 77 also passes, and from pulley 80 movement is imparted to the stem 78 by a belt 77^a.

In order to impart movement to the endless belt-drums 70 and 71, belts 81 and 82 are run from pulleys on the shaft 59 to pulleys on the shafts of said endless belt rollers. The rotary movement of shaft 59 is imparted through speed-reducing gear from the power shaft 13, and the connections between shaft 59 and pulley 80 are so arranged that the speed of the hopper will be very slow. This is not essential to the operation of the machine, but I find the best results produced when the hopper 51 rotates slowly so as to present its discharge opening in constantly but slowly changing radial directions.

In Figs. 8^a 8^b I have illustrated a modification in the form of electrically controlled clutch, in which the frame carrying or constituting the armature slides in a direction parallel to the magnet core and also carries the transmitting pulley and its gear wheel with it. The frame 22 in the modification has slots 22^a through one of which passes the axis 20 of the cone pulley or follower, while through the other is inserted the pin 22^b. The frame is thereby adapted to slide on the pin 22^b and axis 20 but prevented from lateral movement. 22^c represents sleeves or washers which are placed over said pin and axis and are of such thickness as to keep the armature elevated in proper position for the magnet 24. The pinion 26 in this form of the clutch is adapted to engage directly with the pinion 21 and said pinion 26 and pulley 27 are supported by and move with the frame 22. 22^e represents a set screw mounted in bracket 22^d and adapted to limit the outer movement of frame 22. When the magnet is energized the frame is drawn toward the magnet and the pinions 21 and 26 made to engage; when the magnet is de-energized, the frame and the pinion which it carries are moved away by the action of the gear wheels. If desired, however, a spring could be used for disengagement of the parts as in the pivoted armature frame shown in Fig. 8. In the use of this form of clutch the belt runs off substantially at right angles so that the change in tension on the belt due to shifting of the pulley is not sufficient to overcome the force of the magnet, as shown by full lines Fig. 8^a. The belt may run off at an angle, away from the magnet as shown by dotted lines in the same figure. From the foregoing description it will be seen that while the entire driving mechanism may be constantly running yet inasmuch as the movement is imparted to the running devices through pulleys 27, and said pulleys 27 are normally out of engagement with the driving mechanism, said running devices will not be operating except while the respective electromagnets controlling them are energized.

The manner in which motion is transmitted from the pulleys 27 and the mechanism which drives the horses or other running devices as well as the construction of said driving mechanism will now be described with reference to Figs. 9 to 16 inclusive. Each of the pulleys 27 is connected to one of the endless belt drivers 85, 86, 87, 88 by a belt 89. The belt drivers 85, 86, 87, 88 are arranged to drive the corresponding endless belts 85^a, 86^a, 87^a, 88^a. These belts run around on the sheaves or guide rollers, 85^b, 86^b, 87^b, and 88^b. The course is provided with upper conduits 90 having slots 91 and these conduits 90 are adapted for the traveling therein of the carriers upon which the running horses are mounted. The conduits 90 communicate through slots 92 with the space 93 below in which the belts travel. In Fig. 9 the upper flooring is removed to expose some of the upper conduits while the lower flooring and the sides of the upper conduits are also removed over a portion of the space to disclose the lower belt spaces. In one of these spaces 93, may be seen several guide rollers 88^b, the belt being removed. I may locate the belt drivers at such points in the course as will readily adapt them to be coupled with the respective pulleys 27 by the belts 89 without the interference of said belts with each other, as shown. It is obvious, however, that said drivers may be located at any points in the course and they may be connected with the pulleys 27 of the respective "follower-cones" by any means which would under the circumstances be the mechanical equivalent of the belt and pulleys. 94 represents a central board or filling which may be painted green or any other suitable color to represent the center of the course and 95 is a similar filling located on the outside of the course.

By referring to Figs. 10, 11, 12 and 13, it will be seen that each endless belt driver consists of a pair of stationary friction-rollers 95, and a pair of adjustable co-operating rollers 96, said pairs of rollers being provided with intermeshing pinions 97, 98 respectively. The pinion 98 is carried upon the shaft 99 of the pulley 100. The pulley 100 receives the belt 89 from one of the pulleys 27 and the pinions or gear-wheels 97, 98 not only mesh together but they also engage pinions 101, 102, carried by the stationary and movable rollers respectively. In order to adjust the movable rollers for the purpose of bringing a greater or less pressure to bear on the endless belt, said rollers are mounted in a pair of frames 103 which support said rollers and their pinions 102 by affording bearings for the opposite ends of their axes. The frames 103 are pivoted upon the axis 99 of the pulley 100 while their outer ends 105 are left free to swing and are engaged by a pair of levers 106 having bearings at 107 in the bottom plate 108 of the driving device. The levers 106 extend downwardly and are engaged at their lower ends by set screws 109 mounted in brackets 110, which brackets project downwardly from the under side of the bottom plate 108. From the construction above-described it will be seen that inasmuch as the shafts or pinions 102 have fixed bearings in the frames 103 and these frames are pivoted on the shaft 99 of

the pinion 98, the pinions 102 may be moved at will with their rollers 96 without in any manner affecting the gearing or working connection between said gears 102 and the driving pinion 98. 111 represents suitable posts which separate the upper and lower plates and form with said plates the frame of the belt driving device. The details in the construction of the belt driving device will be best understood with reference to Figs. 11, 12 and 13. It is evident that the construction may be varied so as to connect the shaft 99 directly with the wheel 26, by changing the location and arrangement of the frame 17 containing the cone pulleys 15 and 19. In other words said wheel may be placed upon the shaft 99, thus dispensing with pulleys 27 and 100 and the intermediate belts 89. In this arrangement the endless belt drivers would be assembled in one location and the position of the "cone followers" would be changed so as to bring each cone under the corresponding endless belt driver.

Referring to Figs. 14 and 15, 112 represents the carrier upon which the running horse is mounted. This consists of upper and lower plates 113 and 114 separated by suitable end-pieces 115, the rear ones of which are provided with friction-rollers 116. 117 Figs. 14, 14[a] and 15 represents a friction-roller mounted upon a vertical shaft 118 on the upper end of which is mounted a crown-wheel 119. The friction-roller 117 is designed to press against the adjacent side of the conduit and thereby cause its constant rotation so that rotary motion is imparted to the crown-wheel 119 when the carrier is moved. In order to impart rocking motion to the horse 120, the pinion 122 mounted upon a shaft 123 engages said crown-wheel and transmits motion to the crank-disk 124 which is connected by a driving-rod 125 to the horse. From this construction it will be seen that if the carrier moves and the pulley 117 is in contact with the side of the conduit, motion will be imparted through the crown-wheel 119, pinion 122 and shaft 123 to the crank-disk 124 and by said crank-disk revolved into a reciprocating movement and imparted as such to the horse. In order to cause constant contact between friction-roller 117 and the side of the conduit, a roller 126 is mounted just opposite the roller 117 in a frame 127 pivoted at 128 and provided with a spring 129 which constantly forces said frame 127 outward and consequently has the effect of keeping said rollers 117 and 126 in intimate contact with the side of the conduit. The rear rollers 116 as well as rollers 117, 126 project slightly beyond the sides of the horse carrier. This construction and the fact that the conduit curves are greater than the arcs passing through the peripheries of rollers 116 and 117 and adjacent end piece 115 or the arc which passes through roller 126 adjacent roller 116 and the intermediate point in frame 127, make it possible for the carrier to round a curve with ease.

By referring to Fig. 16 the manner in which the horse carrier is moved in the conduit will be apparent. It is effected by the following mechanism:—88[a] is one of the endless traveling belts. To this belt is riveted or otherwise secured a transverse bar 130 which projects upward through an opening in a pivoted extension 131 on the lower plate 114 of the carrier. The opening of this extension is of such size as to allow ample play for the bar 130 in rounding curves. In case the carrier is ever to be removed, this may be done by simply removing the flooring or side-pieces which form the slot when the carrier may be readily lifted so as to disengage said bar 130 from the extension 131. Both the standard 121 and the driving rod 125 project through the slot in the upper conduit, and the carrier-frame is so formed as to allow it to slide freely in said conduit, but not to bind or tip therein. In order to decrease friction, this frame may be provided with rollers at each end both at top and bottom. The carrier is allowed to have sufficient play to go around the curves but it is prevented from vibrating transversely to an undesirable extent by means of the pivoted frame 127, its pulley 126, and friction rollers 116.

The compound switch is shown in Figs. 16, 17, and 18. This consists of a frame 135 pivoted between ears 136 and having a contact 137 adapted to impinge upon a terminal 138. The contact 137 and terminal 138 are so connected, as will hereinafter appear, as to constitute a make and break in the circuit, and these are kept normally separated by a spring 139. The frame 135 has cross-bars 140, 141, and upon the cross bar 140 is mounted the contact 137 through the medium of an insulating block 142, while the cross bar 141 serves as a convenient means for the engagement of the individual switch arms which control the magnet circuits. 143, 144, 145 and 146 represent a series of levers pivoted in brackets 147 and carrying at their forward ends contact 148 adapted to impinge upon terminals 149, 150, 151, 152. The terminals 149, &c., are electrically connected to the respective magnet circuits while the contacts 148 are connected in any suitable manner to the return wire of the machine circuit. 153, 154, 155, 156 represent the wires which connect the respective terminals 149, &c., to the respective magnets, and 157 represents the wires which connect the contacts 148 to the motor circuit. Weights 158 mounted upon the levers 143, 144, 145, 146 are so adjusted as to hold said levers normally out of contact with their corresponding terminals in the magnet circuits. In order to raise all the levers, 143, 144, 145, 146 at a single time which will close all the magnet circuits and simultaneously close the motor circuit, thus starting all the horses, a frame 160 pivoted in ears 161 and having a cross bar 162 engages above all of the levers by means of its said cross bar. It will therefore be seen that in order to raise all the levers it

is simply necessary to raise the end opposite said cross-bar. When the levers 143, 144, 145, 146 are raised individual detents 163 are adapted to engage them and hold them in contact with terminals 149, &c. These detents consist of levers pivoted at 164 beneath the respective endless belts and having notches 163ª for the admission of the broad parts of the switch levers (see Fig. 16ª) and downwardly extending ends provided with screws 187 which abut against brackets 187ª and limit the movement of said detents. These detents extend upward and their upper ends are adapted to be engaged by the cross bars 130 on the belts while their lower ends extend downward and engage the levers 143, &c., when the detents are in a vertical position. In order to force the detent into engagement with the levers, springs 165 are provided. From the above description it will be seen that if the rear end of the frame 160 is raised, all of the levers 143, 144, 145, 146 will be moved so as to complete the circuits through the respective magnets and the motor and start all the horses. After the horses have moved off, the detents 163 will engage above the respective levers and hold their rear ends downward. It will be understood that the upward movement of the forward ends of any or all of the individual switch levers, will cause the motor switch to be closed as hereinbefore explained and it will also be seen that the spring of said motor switch cannot break the contact until all of said magnet switches are open. Now since the detents 163 which engage the respective magnet levers can be made to release said levers by rocking said detents, it will be seen that as soon as one of the horses completes a circuit around the course, the transverse bar 130 which engages the carrier for said horse, will come in contact with the detent 163, rock it in opposition to its spring and permit one of the magnet switch levers to fall. This will break the circuit through the magnet which maintains working connection between the motor and the driving pulleys of that endless belt which draws said horse to the stopping point. The horse will therefore stop. This operation occurs with each horse as it comes around to the stopping point, each magnet switch being opened as the corresponding horse reaches that point and the last switch to open, operating also to allow the opening of the motor circuit, when the machinery will also come to a stop.

In order to provide for starting the machinery by the insertion of a nickel into a slot, a cam 170 having connection with suitable clock-work and controlled by a suitable detent is provided. Upon the periphery of this cam rests a lug 171 carried by a cross-bar 172 upon the rear end of the lever frame 160. The periphery of the cam 170 is in the form of a circle having a notch so shaped that as the cam turns it lifts the lug and by the time said cam makes a portion of a revolution (say about a fourth) the setting lever 160 will have been rocked sufficiently to raise all of the magnet levers and through them the motor lever of the compound switch thus closing all circuits and starting the motor and all horses. As the cam continues to revolve, it holds the lug in such position as to keep all the circuits closed and continue the operation of the machinery until the transverse bars 130 pass entirely beyond the detents, when they assume such position as to hold the respective levers in contact until such contact is broken by the rocking of the detents upon the return of the several horses. After the detents drop into position, and after the cam completes its revolution then the setting lever 160 returns to its normal position when the lug 171 drops from the summit of the cam to the starting point.

173 represents the detent of the clock work which is pivoted at 174 and has a counterpoise 175. The forward end 176 of this lever is adapted to engage a shoulder 177 in a wheel 178 which is a part of the train of gearing in the clock-mechanism and which is located at a distance from the power spring in order that the friction between the shoulder in said wheel and the detent will not be too great to be overcome by a falling nickel or other coin. The wheel 178 is geared through its pinion 178ᵇ to the periphery of a large wheel 178ª, shown in dotted lines in Fig. 17, but in full lines in Fig. 18. By this arrangement the wheel 178 will make several revolutions while the wheel 170 makes but one, and it is therefore necessary to provide some means to prevent the detent 173 from engaging the shoulder 177 until the wheel 170 has rotated far enough to do its work. For this purpose I provide an additional small wheel 179 mounted on the shaft 180 upon which the wheel 170 is also mounted. This wheel is shown in dotted lines only in Figs. 16 and 17 and is just beneath detent lever 173 in Fig. 18 and it is provided with a notch 182 on the side opposite to the notch in the cam-wheel 170. The detent 173 is provided with a tooth 183 which is adapted to fall in the notch 182 and by this tooth 183 the end 176 of the detent is held out of engagement with shoulder 177, said tooth bearing against the periphery of the wheel 179 until the notch 182 coincides with said tooth, just before the shoulder 177 arrives at the end 176 of the detent. The connections between the wheels 170 and 178 are such that notwithstanding the fact that the wheel 178 rotates several times, the notch 177 will be ready for engagement by the end 176 at the same moment that the notch 182 arrives at the point of coincidence with the tooth 183, allowing the end 176 to stop the motion of the clock-work by contact with the shoulder 177, and at the same time the end 176 is kept out of engagement with shoulder 177 until cam 170 has rotated as far as may be desired. It will also be seen that there is no engagement between the tooth 183 and the

side of the notch 182 because the movement of shoulder 177 is so many times greater than that of notch 182, that said shoulder will engage its co-operating tooth and stop the mechanism first. This is readily accomplished by making the notch 182 very slightly larger than its co-operating tooth. By this arrangement the clock-work is started at a point where a very slight force is sufficient to withdraw the end 176 and start its action.

184 represents the power spring of the setting device, 185 the drive-wheel and 186 the winding shaft upon which said spring and wheel are mounted.

187 represents a connection of any suitable kind which extends to a lever 5^a (see Fig. 17) or other suitable device having a plate 5^b upon which the coin is dropped through a chute 5^c having a slot 5 (see also Fig. 1) for the purpose of withdrawing the end 176 from shoulder 177 thus starting the clock-work. From the plate 5^b or lever 5^a the coin drops into a tray 5^d. Lever 5^a may be pivoted at any suitable point, as at 5^e, and it may have a counterpoise 5^g.

From the foregoing description of the setting device, it will be seen that if force is applied to the lever 173 sufficient to draw the end 176 from the shoulder 177 the clock-work of the setting mechanism will be started, the cam 170 rotated until the frame lever 160 is rocked sufficiently to raise the forward ends of all the magnet levers and permit them to be engaged by their detents. By the time the lug 171 passes the summit of the cam, the notch 182 and shoulder 177 will have simultaneously approached the tooth 183 and end 176 respectively, and the setting device will be stopped. At the stopping of the setting device the lever 160 returns to its normal position with its forward end elevated sufficiently to allow any of the levers 143, 144, 145 and 146 to fall whenever they are released by their respective detents. The spring 184 will serve to start the apparatus a number of times before it needs rewinding.

If it should be desired to have the horses traverse the course two or more times without any intermission, this may be accomplished by dropping a second nickel in the slot and again starting the setting mechanism just before the first horse reaches the stopping point. This will prevent the first horse and generally all the rest from stopping, for the reason that the time occupied by the wheel 170 in rotating is nearly always greater than that which elapses between the time when the first horse passes the starting point and when the last horse reaches said point.

The detents 163 may each be provided with a screw 187 for the purpose of limiting the movement of said detents by their springs 165.

188, 189 represent the wires which connect the contact 137 and terminal 138 with opposite poles of the motor circuit.

The electrical connections of the device may be seen upon reference to Fig. 19 which represents the same in diagram. The current is brought in through binding posts 190, 191, and thence passes over wires 192, 193 to the motor 6. In the wire 192 is inserted the switch 194 by which the entire circuit of the machine may be opened and in said wire are also inserted terminal 138 and contact 137 of the compound switch. From the wire 192 four shunt circuits 195, 196, 197 and 198 pass and in these shunt circuits are inserted the electro-magnets 24 which control the movement of the respective endless belts and the individual switches, 143, 144, 145, and 146 of the compound switch. From the motor 6 power is transmitted through pulley 10 and belt 11 to a pulley 12. Pulley 12 drives the cones 15 and from these motion is communicated through belts 18 to followers 19. Followers 19 are adapted to be connected by the electro-magnets, their armatures and the pinions carried thereby to the pulleys 27 from which motion is imparted through belts 89 to the respective belt drivers 85, 86, 87, 88.

I have shown the individual magnet-switch levers formed with reduced tails extending to the rear of the detents for engagement by the setting lever, and I have shown the detents as having notches or recesses 163^a for the admission of the broad parts of the said individual levers and said detents as having projections below said notches for the reception of set screws 187 which abut against brackets 187^a. I have also shown the detent retracted by means of a spring. It is obvious that the tails on the individual levers may be dispensed with and the setting lever 160 brought forward or extended to engage the ends of the individual switch levers just forward of the detents. I may also dispense with the lower extensions of the detents and have them terminate at the points of engagement with the individual levers in which case the set screws for limiting the rocking movement of the detents would be mounted in the bracket against which said set screws are shown in Figs. 16, 17 and 18, to abut. And it is equally obvious that in place of the springs 165 may be substituted suitable counterpoises upon the detents 163, which counterpoises will serve to bring about suitable engagement between the detent and the lever. I have also shown the motor switch and the respective individual (magnet) switches as provided with individual and distinct contacts, terminals and connecting wires, but it is obvious that the same function would be performed by having a single conductor or plate with a number of contact points equal to the number of switch levers connected with one pole of the generator and having said levers connected with the other pole of the generator or with the motor circuit by individual conductors which include the respective devices which the levers are intended to control.

By referring to Figs. 20 to 34, inclusive, a number of different forms of carriers will be seen, all of which are adapted to support the

horses and run in the conduit and impart an oscillatory movement to the horses.

I do not confine myself to the use of any particular form of carrier in my machine as it is obvious that many different devices may be employed. I have shown eight forms differing more or less from the preferred form shown in the connection with my machine and these are as follows:

Referring to Figs. 20, 21 and 22, 200 represents a suitable frame on one side of which is mounted a roller 201 while on the other side are two frames 202, centrally pivoted on said frame 200 and each carrying a roller 203. Each frame 202 has a spring 204 mounted upon one of the posts of the frame of the carrier and adapted to force the pivoted frame outward. The rollers 203 contact with the inside wall of the conduit and then readily adapt themselves to rounding curves and at the same time force the roller 201 into contact with the outer wall. The roller 201 has mounted above it the crown-wheel 119, pinion 122, and crank-disk 124, hereinbefore described with reference to Figs. 14 and 15. The roller 201 may, if desired, have applied to it a surface 205 of virgin rubber or other adhesive or friction producing material for the purpose of making it adhere more readily to the surface over which it passes and thus insure the rotation of said roller.

In Figs. 23 and 24 I have shown a form slightly differing from that shown in Figs. 20 and 21, in that the rollers 203 have fixed bearings in the frame 200, while the roller 201 is somewhat reduced in size to make it rotate more rapidly with any given speed of the carrier, and the crown and pinion gearing on the upper end of roller 201 is replaced by its mechanical equivalent, a bevel gearing 206. The effect produced by this carrier is substantially the same as that just described with reference to Figs. 20, 21 and 22. It is intended to be used, however, in a conduit where it fits securely and slight unevenness may be taken up by the coating 205 of soft rubber or other material which is applied to all the rollers.

In Figs. 25 and 26 is shown a form of the device, in which the frame runs on wheels, the side pressure rollers being dispensed with and reciprocating movement being imparted to the shaft 125 by means of a crank-shaft 207 which bears upon the peripheries of the wheels 208 upon which the carrier runs. In this form one of the axles 208^a works in slots 208^b in the frame 211 of the carrier, and said frame is provided with a weight 211^a. The crank shaft 207 is so mounted by fixed bearings in the frame 211 that it is in contact with the periphery of wheel 208 before its axle 208^a reaches the upper end of the slot bearing 208^b and the weight of the carrier therefore is practically supported by the crank shaft on the peripheries of the wheels. The weight is provided for the purpose of producing sufficient friction between the crank-shaft and wheels, to insure the reciprocating movement of the horse.

In Fig. 27 is shown a form very similar to that shown in Figs. 25 and 26 except that the crank-shaft 207 is rotated by means of pinions 209, 210. In this case, the weight of the carrier is presumed to be sufficient to cause the reciprocating movement of the horse and an additional weight is dispensed with. It could, however, be added as shown in Fig. 25. The frame or body 211 represented in the last two forms described as well as in those yet to be described, consists of a thin shell with top and two sides which may be formed of sheet metal bent to the proper form or cast, or constructed in any other suitable way, shape or manner.

Fig. 28 represents a form in side elevation and Fig. 29 represents the same in vertical transverse section in which the crank-shaft 207 is mounted between the peripheries of the two pairs of wheels 208 so as to be turned by contact therewith and in order to hold said wheels 208 firmly against said crank-shaft, said wheels 208 are mounted in elongated bearings 212 and provided with a spring 213 formed in the shape of a bow and having its ends engaging on opposite sides of the axes of said wheels in order to force them constantly inward.

Fig. 30 represents a form in transverse section in which the reciprocating rod 125 is connected eccentrically to the side of a grooved wheel 214 which runs upon a track 215 and thus guides the carrier. The wheel 208 is also employed for running upon the surface over which the carrier passes and said wheels 208, 214 are mounted in a bracket 216 extending downward within the frame 211. One of the wheels is loose upon the axis in order to facilitate the rounding of curves. The groove of wheel 214 is flared in order to adapt said wheel to bind upon the tread of the rail, thus insuring its rotation.

Figs. 31 and 32 represent a form similar to that represented by Fig. 30, except that the grooved wheel and track are not employed. In this case it may be desirable to weight the carrier as shown in Fig. 25.

Figs. 33 and 34 represent a form in which a corrugated rail or rack 217 is employed in connection with traveling pinion 218 mounted in the bracket 216 and having on the end of its shaft the crank-disk 124.

In case the weight of the carrier as a whole is insufficient to maintain proper engagement between the pinion 218 and the rack 217, then a supplemental weight may be added as shown in Fig. 25 or in any other convenient way.

Each of the above described forms of carrier may have some point of special advantage and each may be best for some particular purpose but in all the same fundamental principle will be found to exist, to wit:—a carrier adapted to support a horse or other object, and means on said carrier for engaging or contacting with the surface, track, or

other fixed portion or part upon which the carrier is moving, whereby said means receives a rotary movement converting it into a reciprocating movement and as such imparting it to the horse or other object mounted upon the carrier.

I consider the device for giving the galloping or running motion of great value in connection with this invention. In some toy race courses, the images are rigid dummies, which have no movement suggesting life and which are simply whirled or moved around the track. If this movement be rapid as is sometimes the case, then it is impossible to satisfactorily follow the race with the eye or to perceive any resemblance to actual life. The images resemble lifeless objects dragged or moved around the course so quickly that the observer has no time to watch or make comparisons. On the other hand, where rigid images are moved very slowly around the course, each image appears simply to crawl or creep along and there is little or nothing to excite interest or suggest actual life. By providing a rapid oscillating or galloping motion, I give the race a close resemblance to a genuine trial of speed. Although the images do not move forward swiftly, nevertheless, this rapid galloping or oscillating motion suggests the idea of speed, struggle and competition. The effect is very much the same as when one views a real race from a long distance, where although the forward or progressive movement of the horses seems very slow, the rapid galloping motion shows that they are in fact running at full speed, dissipating all idea of slowness. Again, a railroad train seen at a great distance may appear to be going very slowly, but the rapid puffs of steam and quick movements of the pitman and crank on the locomotive, disclosed by a field glass, prove that the motion is anything but slow. A similar effect is produced by my device, where, by giving a rapid oscillating or galloping movement to the images, I create the impression on the beholder that the movement is at a rapid rate and that a real struggle and competition is taking place between the contestants. While for changing speed I have shown a particular form of differential gearing, it is obvious that there are other forms of device well known in the art which could be used in combination with the individual working connections, such for instance as a pair of reversely mounted cones in close juxtaposition with an endless friction belt passing between them and establishing contact with both at the same point; or such as a revolving disk, and a friction wheel bearing upon its face and adapted to be moved radially to and from the center of said disk.

When I use the term differential gearing, I refer to any device adapted to change relative speed between its two parts.

It will be seen that I do not claim herein details of construction of some of the machine elements, to wit, the electric clutches, the speed changers and the belt shifters as these are separate and distinct inventions for which I will file additional applications.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination of the independent running devices, the driving mechanism having independent working connections with the respective running devices and independent speed changing devices for the respective running devices, substantially in the manner and for the purpose set forth.

2. The combination of the independent running devices, the driving mechanism having independent working connections with the respective running devices, speed changing devices controlling the individual working connections and a chance mechanism for positively operating said speed changing devices, substantially as and for the purposes set forth.

3. The combination of the independent running devices, the individual endless belts engaging the respective running devices, the individual endless belt drivers, the independent connections for driving said endless belt drivers, the speed changing devices controlling said connections independently and the chance device for setting in operation said speed changing devices, substantially as and for the purpose set forth.

4. The combination with a race course having mounted thereon a number of running devices, independent endless belts driving said running devices and independent belt drivers for the respective belts; of the electro-magnetic clutches connected with the respective belt drivers, the independent driving connections for said clutches, the differential gear, in said driving connection, the belt-shifting device controlling said differential gear, the starting and setting device, and the compound switch all substantially as and for the purposes set forth.

5. The combination with a race course having mounted thereon a number of running devices independent endless belts driving said running devices and independent belt drivers for the respective belts; of the electro-magnetic clutches connected with the respective belt drivers, the independent driving connections for said clutches, the differential gear in said driving connections, the belt-shifting device controlling said differential gear, the chance mechanism controlling said belt-shifting devices, the starting and setting device, and the compound switch all substantially as and for the purposes herein set forth.

6. The combination with a race course having mounted thereon independent endless belts and independent belt drivers for the respective belts; of the electro-magnetic clutches connected with the respective belt drivers, the independent driving connections for said clutches, the differential gear in said driving connections, the belt-shifting device controlling said differential gear, the starting

and setting device, and the compound switch all substantially as and for the purpose set forth.

7. The combination with the race-course, independent running devices, and the endless belts for moving said running devices; of the endless belt driver, a suitable source of power, the electro-magnetic clutches adapted to connect the respective belt drivers with the source of power, the compound switch for controlling the said clutches, and the starting and setting device for operating said switches, substantially as and for the purposes set forth.

8. A toy race-course provided with a number of endless conduits in the same horizontal plane and separated into upper and lower parts with slots for connection between them, the carriers and endless driving belts located in the respective parts of said conduits, and the independently movable belt-drivers having driving connection with the respective belts, all substantially as and for the purposes set forth.

9. In a toy race-course the combination of the course, having a conduit, the carrier running in the conduit, and having a running device and means for imparting galloping motion to the same and an endless belt having a transverse bar projecting up into the conduit and having separable connection with the running device, substantially as and for the purpose set forth.

10. In a toy-race course, the combination of the running devices, the driving mechanism, independently movable endless belts for driving the respective running devices, transverse bars projecting from the individual driving belts, and independent detents which control the movements of the respective belts and which project in the paths of the respective transverse bars, substantially as and for the purpose set forth.

11. The combination with a race-course having mounted thereon the independently movable running devices; of the independent driving connections for the running devices and the independent detents controlling said driving connections, substantially as and for the purpose set forth.

12. In a toy race-course, the combination of an endless belt having upper and lower transverse extensions, a carrier engaged by the upper extention and a detent engaged by the lower extension, as and for the purpose set forth.

13. In a toy race-course the combination of the independently moving belt drivers, endless belts driven by the respective belt drivers, and the independently movable running devices, having connection with the respective belts and each provided with a pivoted image and working connection with the conduit for imparting an oscillatory movement to the image all substantially as herein set forth.

14. The combination with a race-course having mounted thereon the independently movable running devices; of the independent driving connections for the running devices and the electro-magnetic clutches controlling said driving connections substantially in the manner and for the purpose set forth.

15. The combination with a race-course provided with the running devices, the independently movable belts having connection with the running devices, independent driving connections for the belts and clutches controlling said driving connections, substantially as and for the purposes set forth.

16. The combination with a race-course having independent conduits all in the same plane and provided each with an independently movable endless belt below it; of independently moving belt drivers for the respective endless belts and the independent running devices having connection with said belts, all substantially as set forth.

17. The combination with a race-course having independent conduits all in the same plane, and provided each with an endless belt below it; of the independent driving connections for the respective belts, and differential gear forming a part of said driving connections, substantially as and for the purposes set forth.

18. The combination of a race-course, the independent driving connections, detents controlling the respective driving connections, and the starting and setting device for said driving connections and detents, substantially as herein set forth.

19. The combination in a race-course, of the driving mechanism, the belt-shifting device, and the chance mechanism controlling said belt-shifting device, substantially as and for the purposes set forth.

20. The combination of an endless belt having a transverse bar extending above and below the plane in which the belt runs, a carrier engaged by the upper extension, and a controlling detent engaged by the lower extremity.

21. The combination of the course, the series of conduits in the course, the running devices and endless belts running in the respective conduits, the endless belt drivers, a suitable source of power, independent connections between the source of power and the respective belt-drivers, and means for varying the said independent connections separately, substantially in the manner and for the purposes set forth.

22. The combination of the course, the series of independent conduits in a horizontal plane in which are located the running devices, series of guides around in the respective conduits which move the endless belts, the endless belt drivers, the source of power and suitable working connections between the source of power and the endless belt drivers, all substantially as and for the purposes set forth.

23. In a toy-race the combination of the running devices, the endless belts for moving said running devices, the endless belt drivers, the

set of cones having working connections with said belt drivers, the set of corresponding cones in reverse position, suitable belts connecting corresponding cones of the respective sets and a chance mechanism independent of the cones for actuating said belts upon the cones, substantially in the manner and for the purpose set forth.

24. In a toy-race course the combination of the set of driving cones adapted to receive motion from any suitable source, the set of follower cones in reverse position to the driving cones, belts connecting the corresponding cones, of the respective sets and independent means governed by a chance mechanism for shifting the respective belts, substantially in the manner and for the purpose set forth.

25. The combination of the running devices, the endless belts for moving said running devices, the endless belt drivers for moving said endless belts, the pulleys having working connections with the respective endless belt drivers, the driving mechanism adapted to receive power from any suitable source, the electro-magnetic clutches inserted between the driving mechanism and the respective pulleys which are connected to the endless belt drivers and suitable circuits and switches for the magnets of said clutches, substantially as and for the purpose set forth.

26. The combination with the running devices, means for driving said running devices, the pulleys having working connections with said driving means and a suitable source of power; of the pivoted frames carrying gear wheels, each of which is connected with the source of power and adapted to engage one of the pulleys, electro-magnets for controlling said pivoted frames and circuits and switches for controlling said electro-magnets, substantially in the manner and for the purposes set forth.

27. The combination of the running devices, the endless belts connected with the respective running devices, the endless belt drivers, the pulleys connected with said endless belt drivers, the pinions carried by said pulleys, the driving pinions connected with a suitable source of power, the pivoted frames carrying idlers adapted to couple the respective driving pinions with the corresponding pinions on the pulleys, electro-magnets controlling the respective pivoted frames and suitable circuits and switches for said electro-magnets, all substantially as set forth.

28. The combination of the course, the several running devices mounted on the course, the endless belts connected with the respective running devices, the series of driving pulleys located beneath the course, and the belts running from the respective driving pulleys to the corresponding endless belt drivers; said endless belt drivers being located at different points along the course whereby the belts radiate or spread and avoid interference, as shown.

29. In a toy race course the combination of the running devices carrying images, means for moving the running devices independently, a suitable driving mechanism, independent sets of differential gearing between the driving mechanism and the respective devices, for moving said running devices, and means for varying the respective sets of differential gearing independently, substantially as and for the purposes set forth.

30. The combination with a race course having the driving mechanism, of the differential gear and means for shifting it, substantially as and for the purposes set forth.

31. The combination of a revoluble cylinder having formed on its surface pockets, shaped to receive balls or marbles, the adjacent parts in proximity to the cylinder to be engaged by the balls or marbles when taken up in said pockets and an apron for delivering the balls or marbles to one side of the cylinder, substantially as set forth.

32. A revoluble cylinder having formed on its surface pockets or depressions arranged in different vertical planes, an apron over which balls or marbles may roll to different points on one side of the cylinder and the series of adjacent mechanical parts to be operated by the protruding balls or marbles when picked up by the pockets in the cylinder, substantially in the manner and for the purpose set forth.

33. The combination of a revoluble cylinder having formed in its surface a number of depressions or pockets in different vertical planes for receiving rolling objects, the adjacent series of parts to be engaged by the rolling objects when picked up by the pockets in the cylinder and the delivering device constructed to deliver by chance the rolling objects at different points along one side of the cylinder, substantially as and for the purpose set forth.

34. The chance mechanism consisting of the levers adapted for connection with the individual parts to be controlled, the cylinder provided with pockets against which the levers rest, a guide way or apron adapted to deliver rolling objects to the cylinder, a distributing hopper for delivering the rolling devices onto the guide way or apron and means for returning the rolling devices from the cylinder to the hopper consisting of the elevator, and the channel communicating between the upper end of said elevator and the distributing hopper, substantially as set forth.

35. The herein described means for controlling the movement of the running device by chance which consists of a lever adapted to be connected with the driving mechanism of said running device, a revolving member having pockets against which the lever rests, a channel adapted to communicate with said pockets, and means for delivering marbles or other rolling devices into the channels, substantially as and for the purposes set forth.

36. The combination of the lever adapted to be connected to the object to be controlled

and the means for moving said lever by chance consisting of the rotating cylinder having the pockets, a series of channels, one of which communicates with said pockets, and a hopper for delivering marbles to the several channels as and for the purposes set forth.

37. The herein-described chance mechanism consisting of combination of a series of levers, a revolving cylinder having series of pockets against which the levers rest, an apron having a number of channels terminating at the respective series of pockets, and a hopper adapted to deliver marbles into the channels, all substantially as set forth.

38. The combination of a series of levers, a revolving cylinder having a number of series of pockets against which said levers are adapted to rest, an apron having a number of channels corresponding in position to the respective series of pockets, a tray adapted to deliver balls or marbles into said channels and a revolving hopper adapted to deliver the marbles in constantly changing radial directions upon said tray, all substantially as and for the purposes set forth.

39. The chance mechanism consisting of a series of levers adapted to be connected with the mechanism to be controlled, the rotary cylinder having a number of series of pockets, an apron having a number of channels corresponding in position to the series of pockets, a collector located beneath the point of delivery of the cylinder, an elevator adapted to be supplied from said collector, and a chute or passage running from the delivery point of the elevator to the above mentioned apron, whereby marbles may be kept in continuous circulation through the channels of the apron and over the cylinder, all substantially as and for the purposes set forth.

40. In combination with the endless belt having the projecting bar and the herein described endless belt driver consisting of the stationary roll, the adjustable roll, and a pinion having working connection with the respective rolls, said rolls being mounted in independent separated frames, the movable roll frame being suitably pivoted and provided with means for regulating its position relatively to the stationary roll frame, whereby the projecting bar above the belt passes between the frames, substantially as and for the purpose set forth.

41. In combination with the running device, and endless belt for driving the same, the herein described endless belt driver consisting of the stationary roll, the adjustable roll and a pinion having working connection with the respective rolls, said adjustable roll being mounted in a frame suitably pivoted and provided with means for regulating its position relatively to the stationary roll, substantially as and for the purpose set forth.

42. The herein-described endless belt driver which consists of a pair of rolls having fixed bearings, a pair of adjustable co-operating rolls, a pair of pivoted frames in which said adjustable rolls are mounted, a shaft upon which said frames are pivoted, a pulley upon said shaft by which it is rotated, a pinion upon said shaft having working connection with all the rolls, a pair of adjusting levers suitably pivoted or fulcrumed, bearing at their ends upon the respective pivoted frames, and a pair of adjusting screws for adjusting the respective levers, all substantially as herein set forth.

43. The herein-described endless belt-driver consisting of a pair of fixed rolls geared together by a suitable pinion, a pair of adjustable rolls, a pinion connecting said adjustable rolls and intermeshing with the pinion first named, a pair of frames in which said adjustable rolls are mounted and which are pivoted upon the shaft upon which their connecting pinion is mounted, and a pair of adjusting levers suitably fulcrumed, each bearing upon one of the pivoted frames at one end and engaged by an adjusting screw at the other; one of said pinions being adapted to receive rotary movement, substantially in the manner and for the purposes set forth.

44. The endless belt driver comprising the fixed roller, the pivoted frame carrying a roller adapted to co-operate with the fixed roller, a plate upon which said fixed roller and frame are mounted, a lever fulcrumed in the plates and engaging the frame at one end, and a bracket extending on opposite sides of the plate from the frame and having a screw for engaging the other end of said lever, substantially as and for the purposes set forth.

45. The combination of the running devices, the endless belts connected with the respective running devices, the endless belt drivers, the motive power having independent working connections with the respective belt-drivers, the clutches controlling the respective independent working connections and detents controlling the clutches, and a projection on each endless belt engaging the corresponding detent when it arrives at the location of said detent, all substantially as and for the purposes set forth.

46. The combination of the running devices, the independent endless belts connected with the respective running devices, the endless belt drivers, the independent working connections for the respective belt-drivers, the electro-magnetic clutches controlling the respective working connections, circuits and independent switches controlling said clutches, detents for holding said switches in a given position, and projections on the respective belts adapted to engage said detents, all substantially as and for the purposes set forth.

47. The combination of the course having suitable conduits and endless belts and running devices arranged in the said conduits and in engagement whereby the former move the latter; said running devices consisting of the carriers, having pivoted thereon the image or figure, the crank connected with the image for giving it a rocking galloping move-

ment and having means in connection therewith for engagement with the conduit or surface past which the carrier moves for imparting movement to the crank, substantially in the manner and for the purpose set forth.

48. In a toy race course, the running device consisting of the oscillating image, and the friction roller having working connection with the image through multiplying gear in combination with a track over which the image moves and with which the friction roller engages, and a belt for drawing the image whereby the image is given simultaneously a galloping motion and a forward movement, as explained.

49. In a toy race-course, the running device consisting of the pivoted oscillating image, and a carrier upon which it is mounted having a friction roller and suitable driving gear, whereby the running device is given a galloping motion, in combination with a track or course over which the carriage runs, and with which the roller engages, and a driving belt having connection with the running device, substantially as set forth.

50. The combination of the carrier, the image mounted upon the carrier, the crank carried by the carrier and having connection with the image, a friction roller projecting from the carrier and adapted to engage the surface past which the carrier is moving, and suitable multiplying gear between the friction roller and crank, as and for the purposes set forth.

51. The carrier having the image, the crank for moving the image, the laterally projecting friction roller, having working connection with the crank, and a spring-pressed frame projecting outwardly from the side of the carrier opposite to the friction roller, substantially as and for the purposes set forth.

52. The combination of the frame, the image mounted upon the frame, the horizontal shaft and crank having connection with the image, a laterally projecting friction roller, a crown wheel on the shaft of said friction roller and a pinion on the crank shaft adapted to be engaged by the crown wheel, substantially as and for the purposes set forth.

53. A compound switch comprising a number of independently movable levers or switches for a set of individual mechanisms, and a motor switch lever, engaged and held in closed position by the closing of any one of the independent switches and released only after all individual switches have been opened, substantially as and for the purposes set forth.

54. The combination of the motor circuit, the individual circuits for starting the respective running devices, the switch frame for closing the motor circuit, the switch levers for closing the individual circuits each adapted to engage the switch frame and hold it in closed position, whereby the switch frame is released only after all the individual switches have been opened, means for raising said individual switches and suitable contacts and terminals in connection with the respective circuits and switches, substantially as and for the purposes set forth.

55. The combination of the motor switch, adapted to contact with a suitable terminal, individual switches for the respective running devices, all of which engage the motor switch, suitable terminals and detents for the individual switches, respectively, and a pivoted frame adapted to engage the ends of the individual switches opposite to those which engage the motor switch, substantially as and for the purposes set forth.

56. The combination of the individual switch levers having detents, the pivoted frame engaging said levers and adapted to force them into engagement with their detents, a cam for moving said frame, a motive power for said cam and a detent for said motive power, substantially as and for the purpose set forth.

57. The compound switch comprising a pivoted motor-switch lever a number of individual switch levers engaging at their forward ends beneath the motor switch lever, the setting lever engaging above the rear ends of the individual levers and suitable circuits and contacts in connection with the switch levers, substantially as explained.

58. The combination of the pivoted levers for closing the respective circuits, the pivoted setting frame engaging said levers, a cam for moving said frame to set the levers, a motive power for said cam, a detent for said motive power, and a pivoted coin lever connected with said detent, all substantially as set forth.

59. The combination of the switch levers, the pivoted setting frame, the cam for moving said frame, the motive power connected through a train of power reducing gear with the cam and through an additional train of gear with a detent wheel, a detent engaging said detent wheel and a wheel rotating synchronously with the cam and controlling said detent to prevent its engagement with the detent wheel until the cam has done its work, all substantially as and for the purposes set forth.

60. The combination of the setting device, consisting of a suitable power having working connection with the mechanism to be set; the stopping and releasing device consisting of the detent lever, the shouldered wheel, increasing leverage connection between the power and said wheel for the purpose of reducing friction between the detent lever and said wheel, the detent controlling wheel and connection of less leverage from the power to said detent controlling wheel whereby said detent controlling wheel rotates more slowly than the shouldered wheel, and the coin lever having connection with the detent lever, all substantially as and for the purpose set forth.

61. The herein described setting device consisting of the clockwork carrying the setting cam and the detent for the clockwork consisting of a shouldered wheel remote from but

connected with power, and a lever adapted to engage said remote shouldered wheel and controlled in such engagement by the position of the setting cam, substantially as explained.

62. The herein described setting device consisting of the clockwork or equivalent motive power having suitable working connection with the mechanism to be set and the stopping and releasing device consisting of the detent lever, a shouldered wheel with which said detent lever engages connected through gear which increases the leverage from the motive power to said wheel whereby friction between the lever and notched wheel is reduced, and a wheel rotating more slowly also engaging said detent lever, and controlling its engagement with the shouldered wheel for the purpose of extending the time of operation of the setting device.

CHARLES CARROLL.

Witnesses:
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