No. 741,467. PATENTED OCT. 13, 1903.

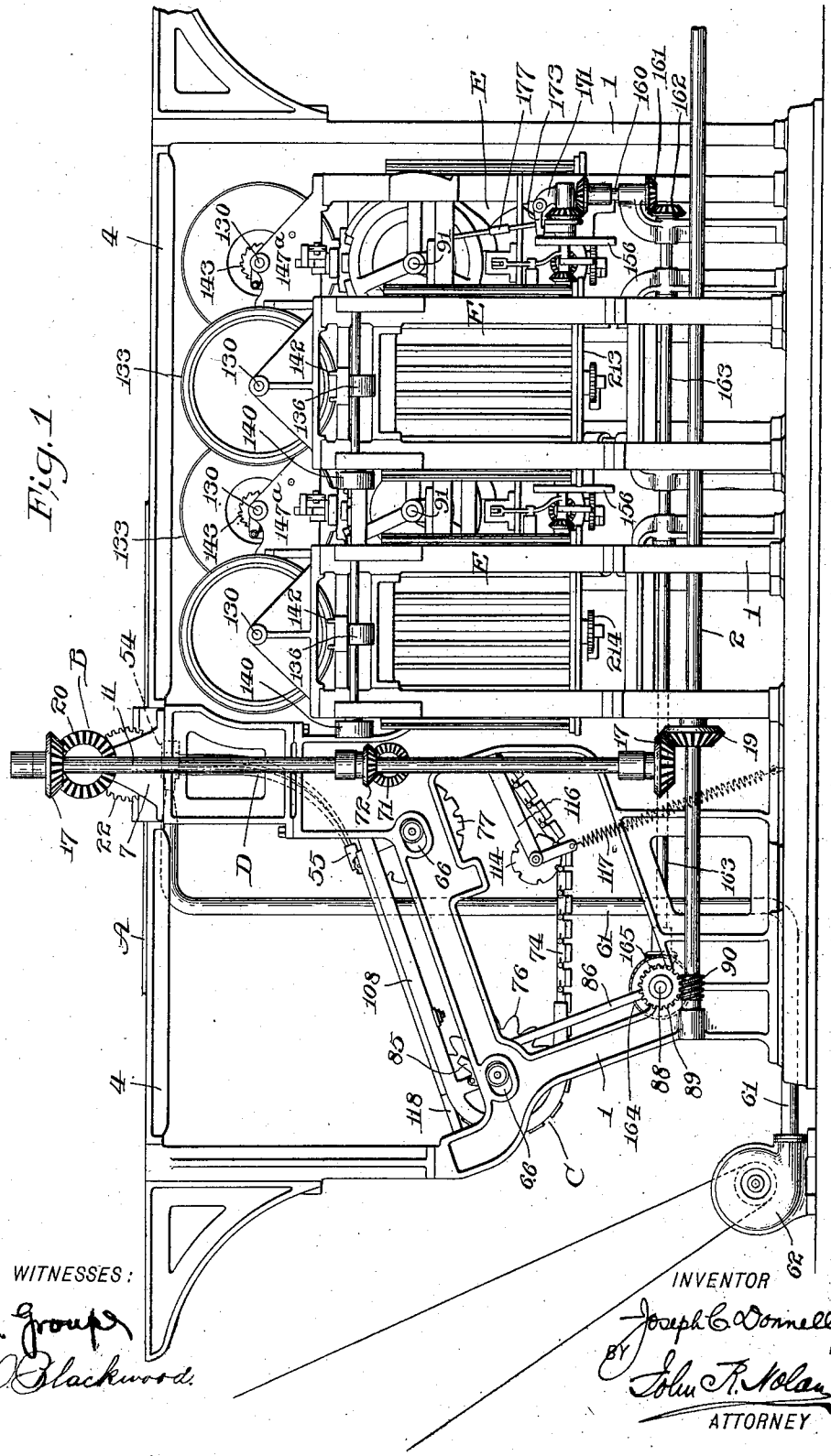
J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 1.

Fig. 1




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly

BY

John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 2.

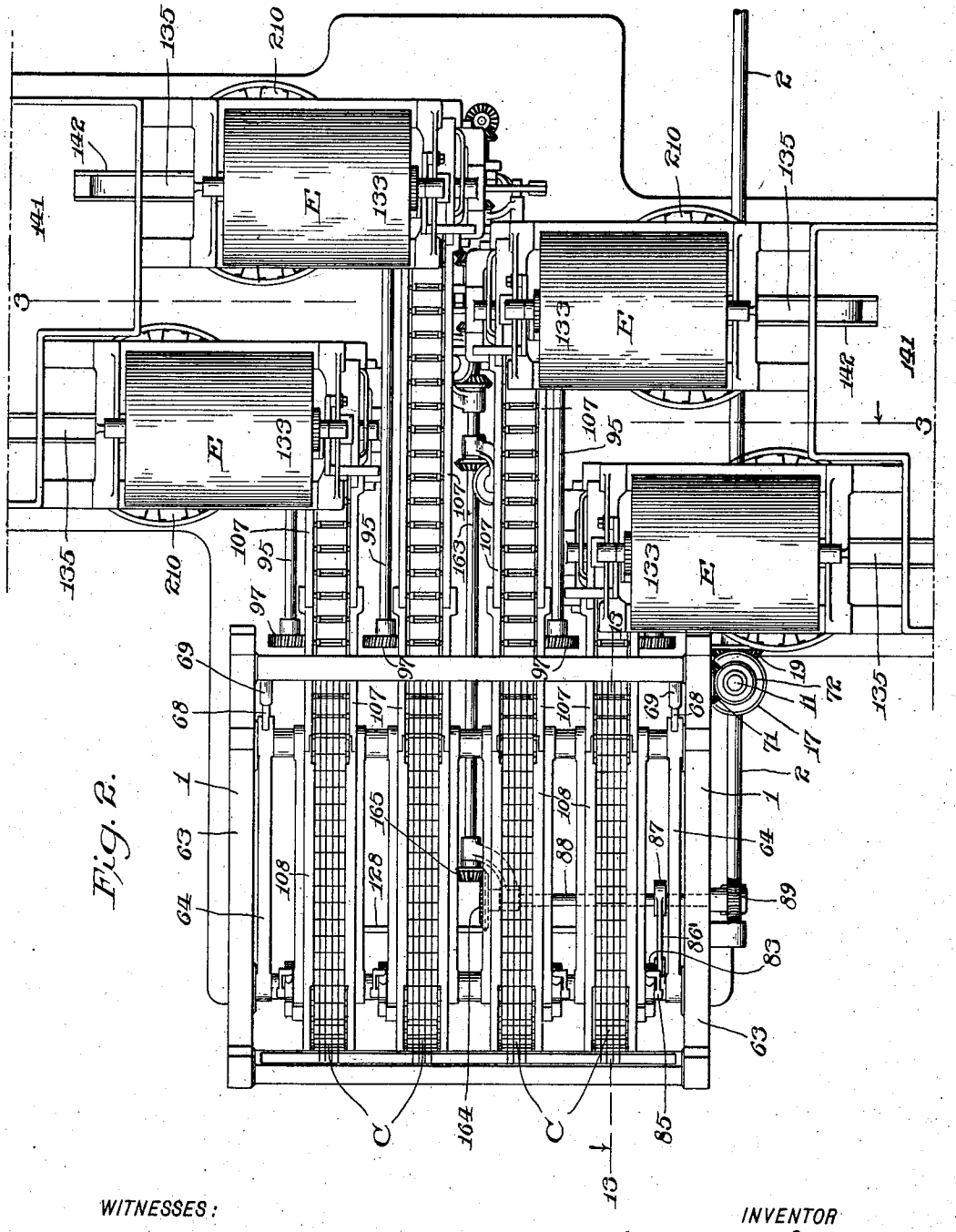



Fig. 2.

WITNESSES:

A. V. Groupe

H. A. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

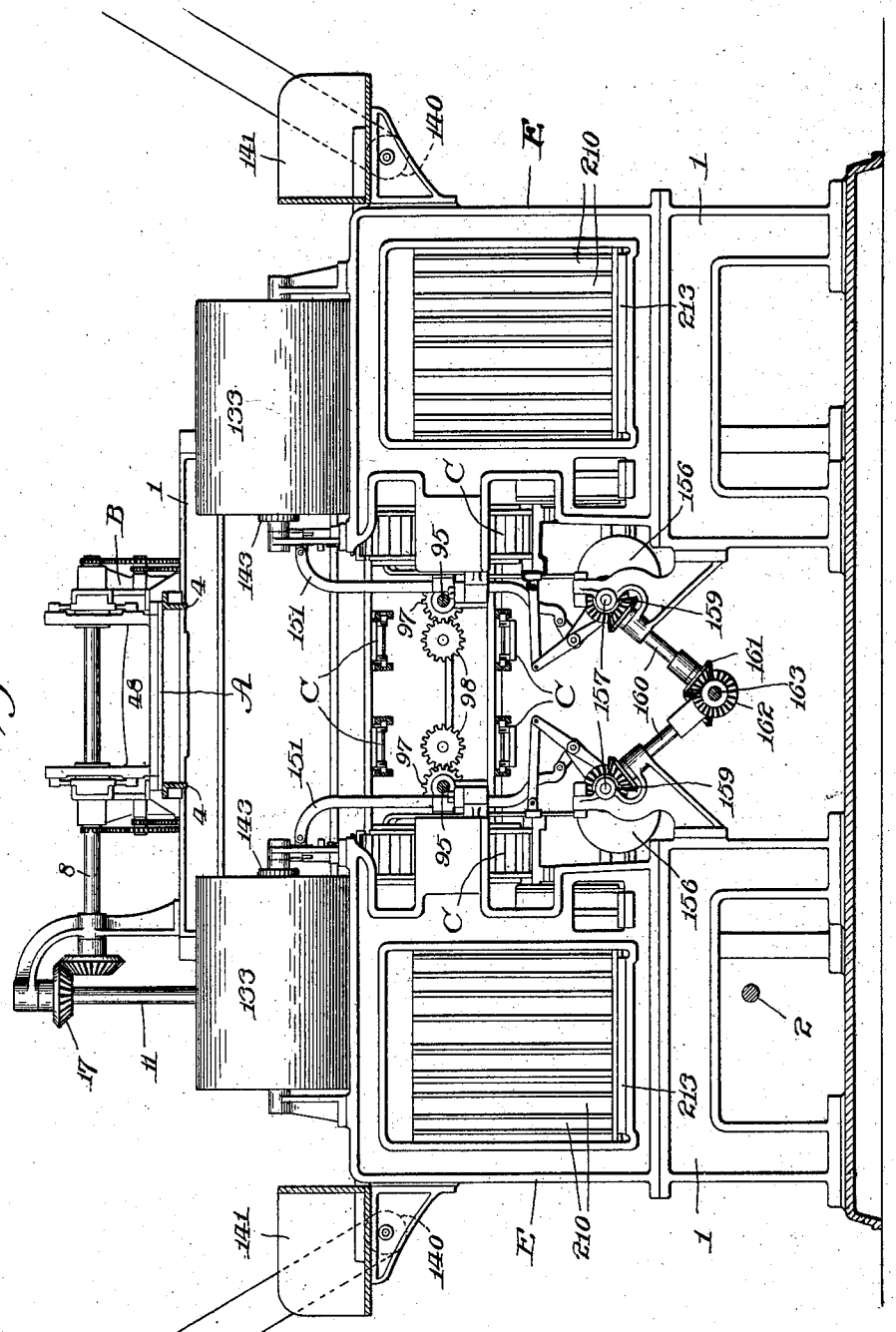
J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 3.

Fig. 3.




WITNESSES:

A. V. Groupe

H. C. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 4.

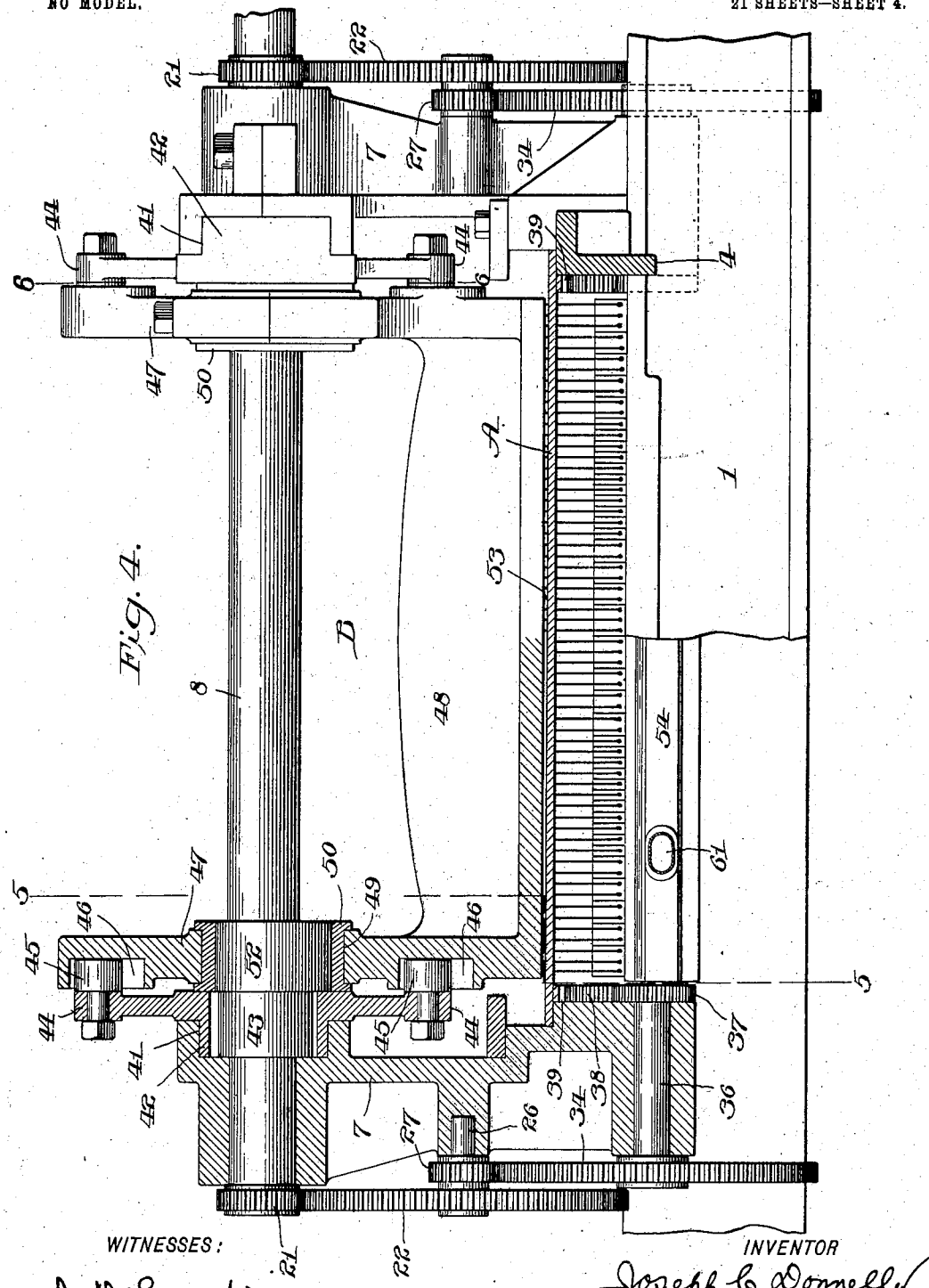



Fig. 4.

WITNESSES:

A. V. Group

H. A. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 5.

Fig. 5.

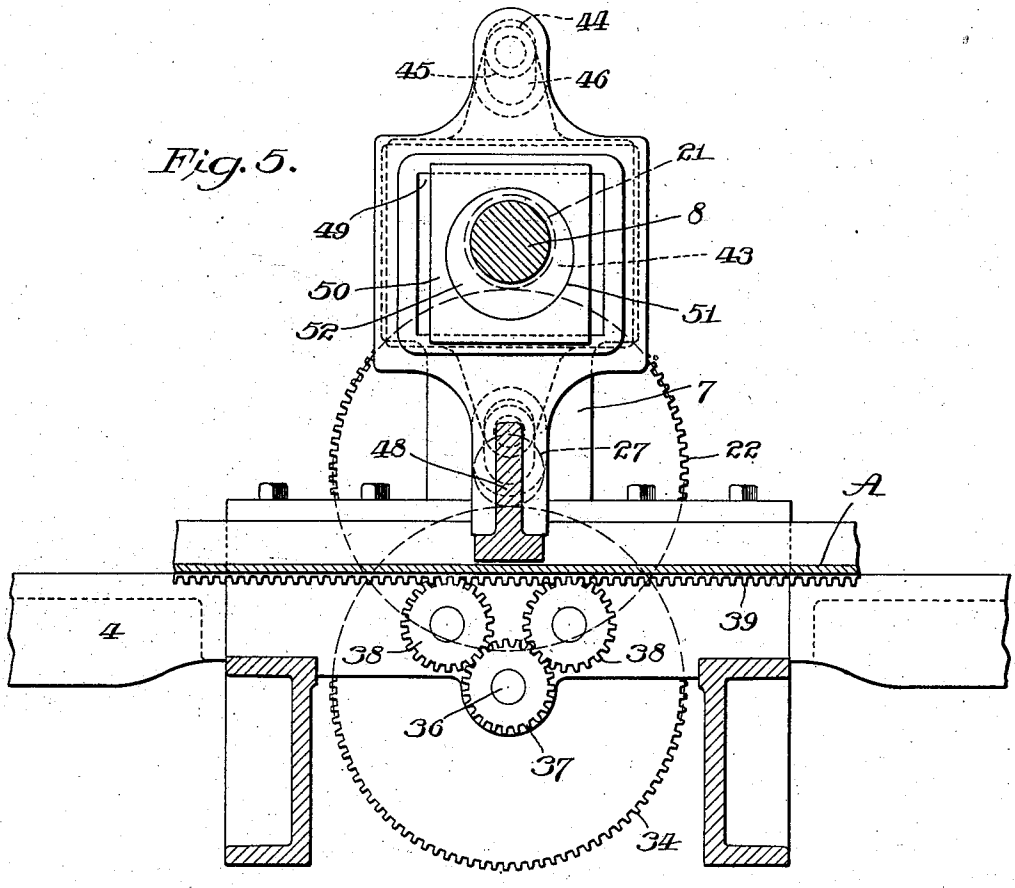



Fig. 7.

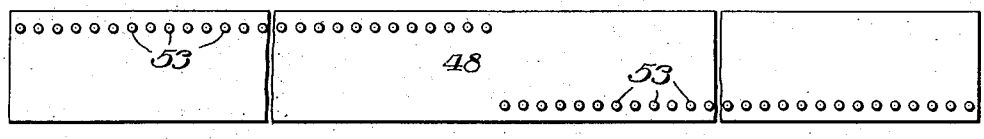
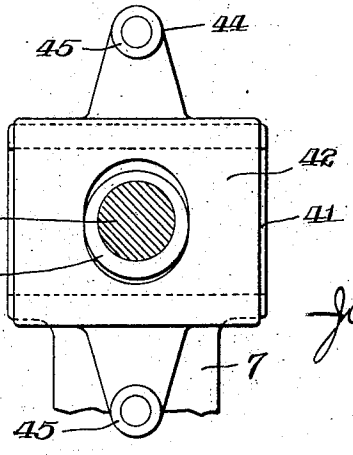



Fig. 6.




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 6.

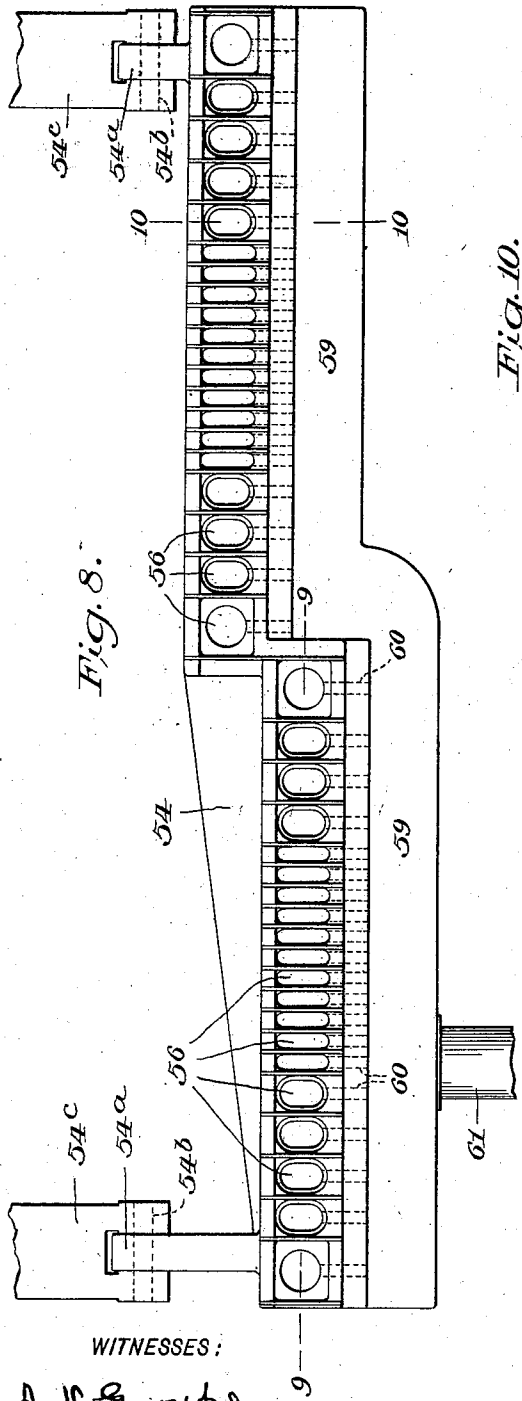



Fig. 8.

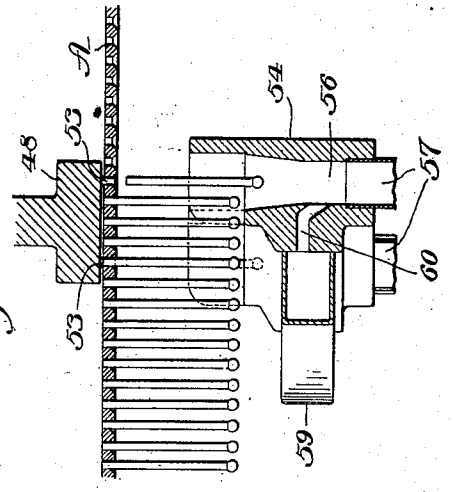



Fig. 10.

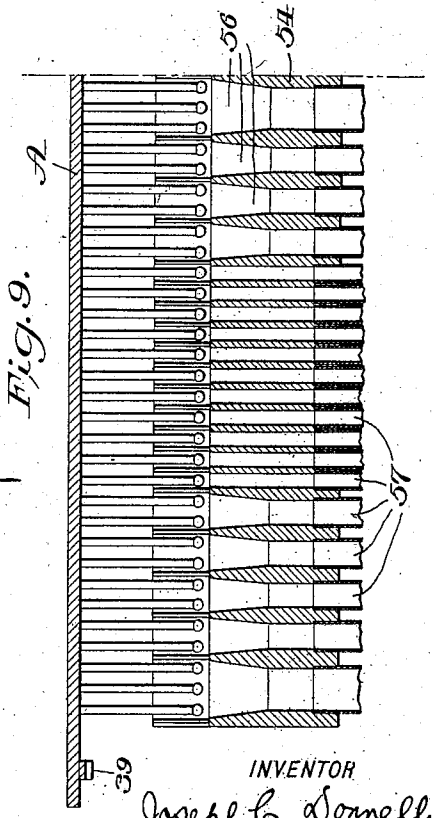



Fig. 9.

WITNESSES:

A. V. Groupe

H. W. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

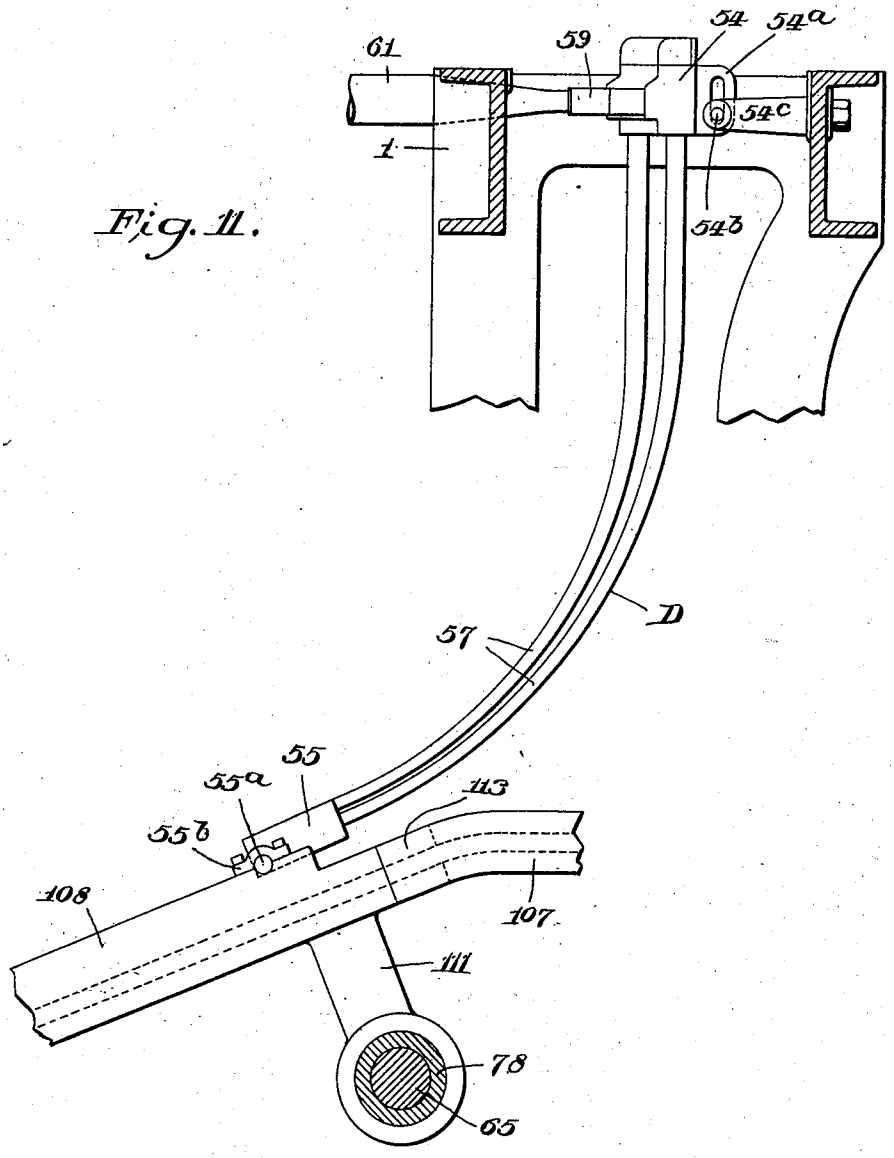
J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 7.

Fig. 11.




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

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BY John F. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 8.

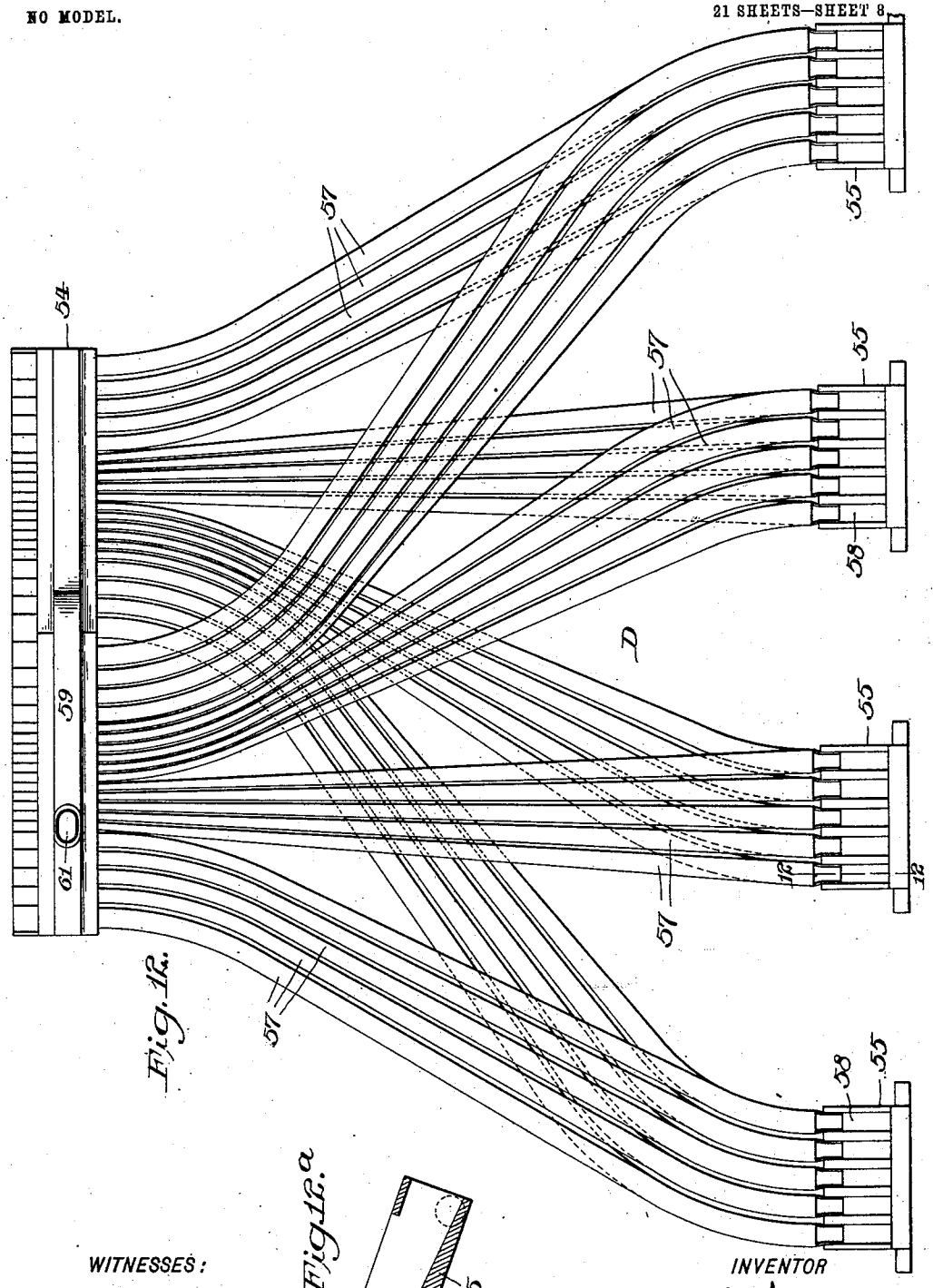



Fig. 12.

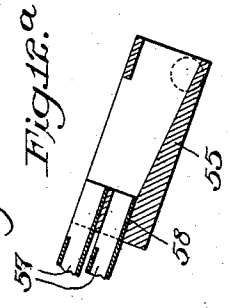



Fig. 12a.

WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

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BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 9.

Fig. 13.

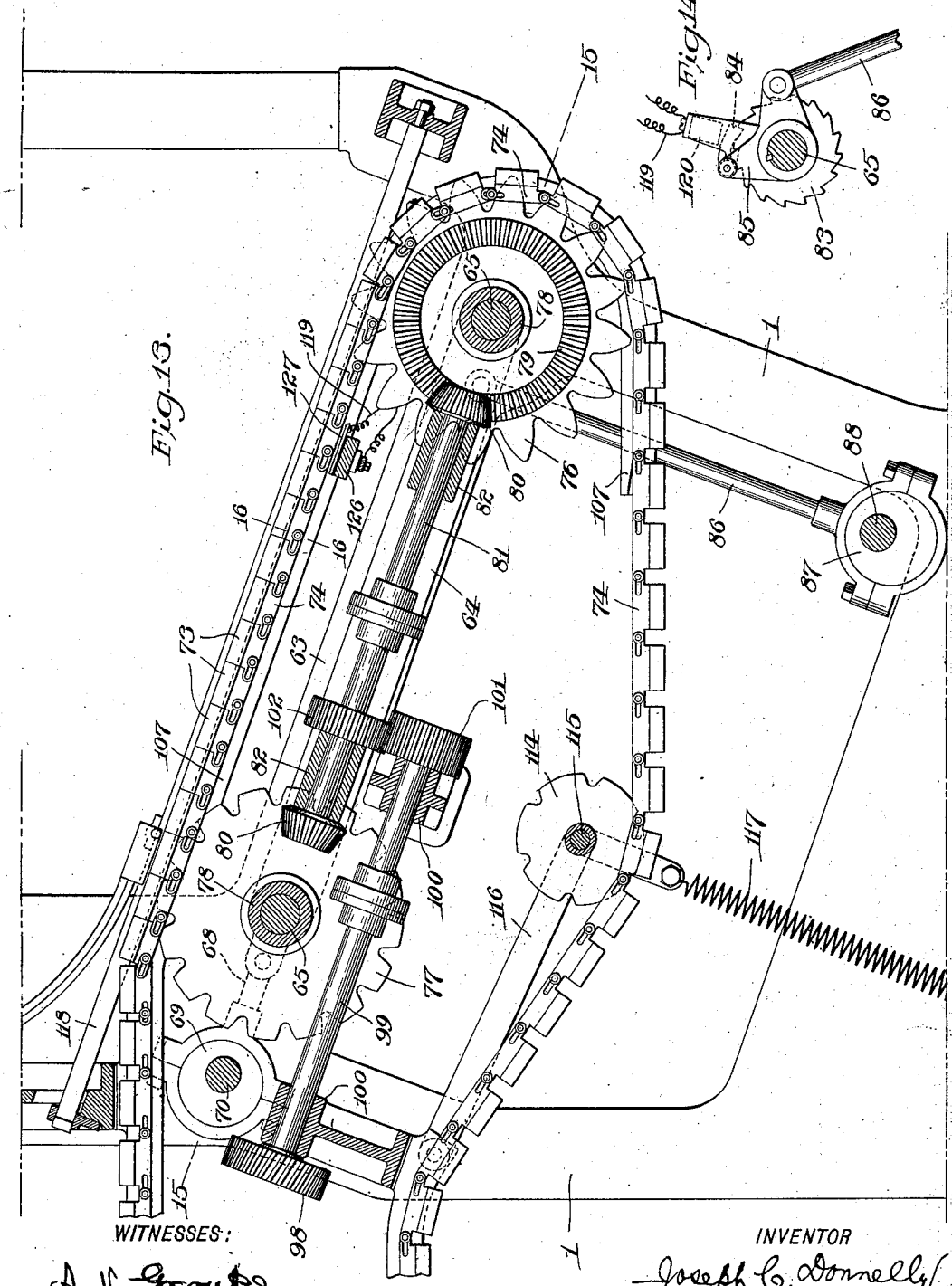



Fig. 14.




WITNESSES:

A. V. Groupe

H. W. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 10.

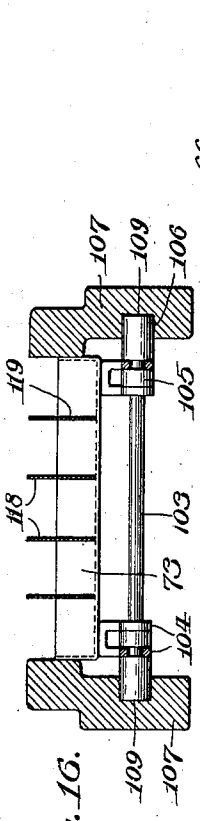


Fig. 16.

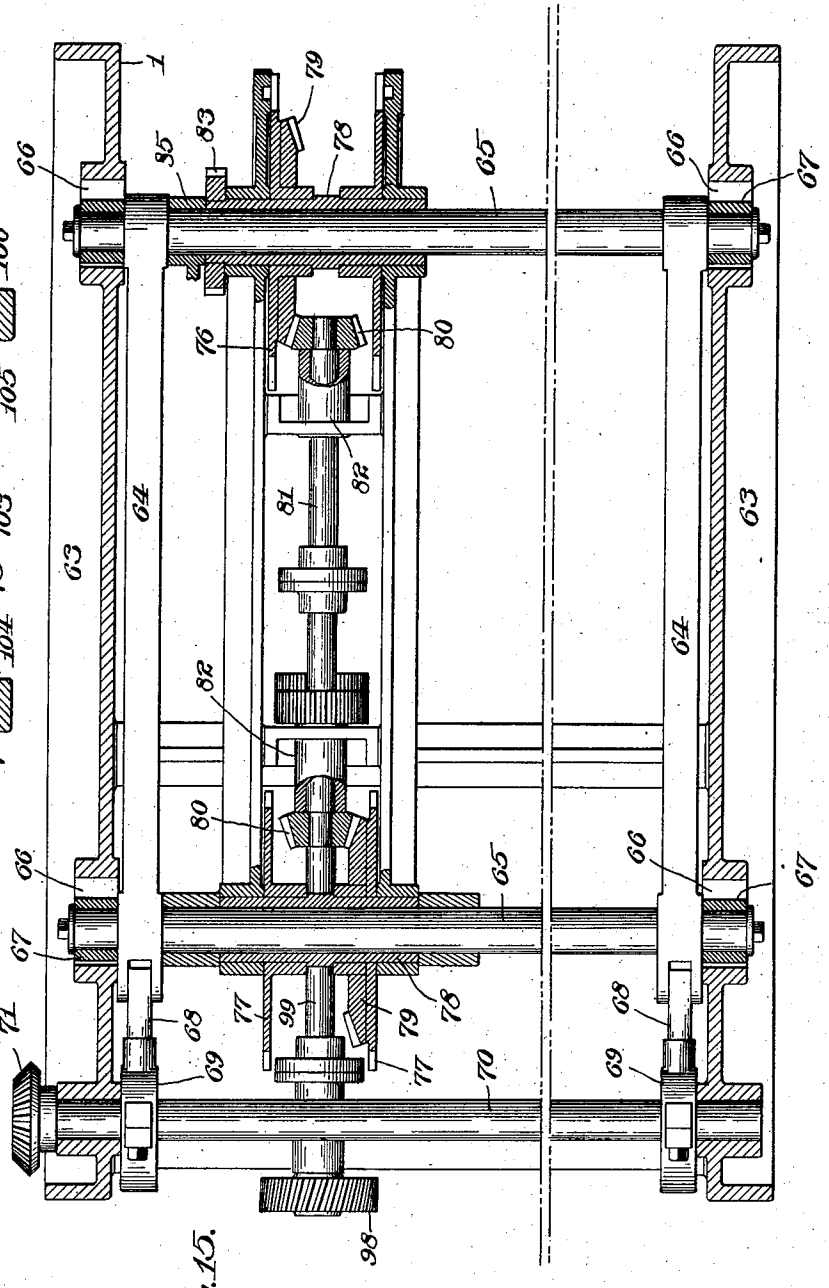


Fig. 15.

WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John F. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 11.

Fig. 18.

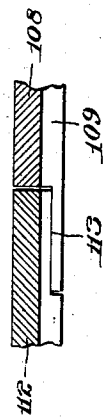



Fig. 17.




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John T. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 12.

Fig. 19.

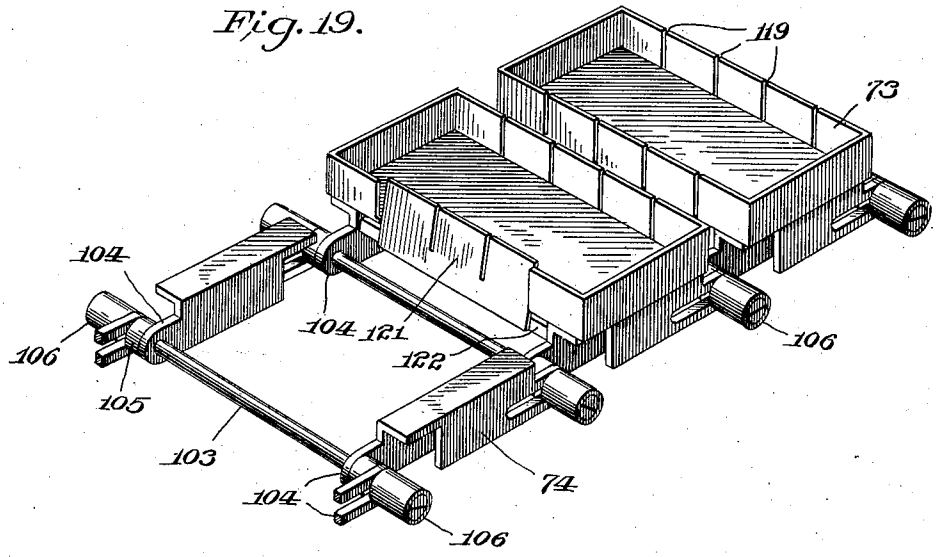



Fig. 20.

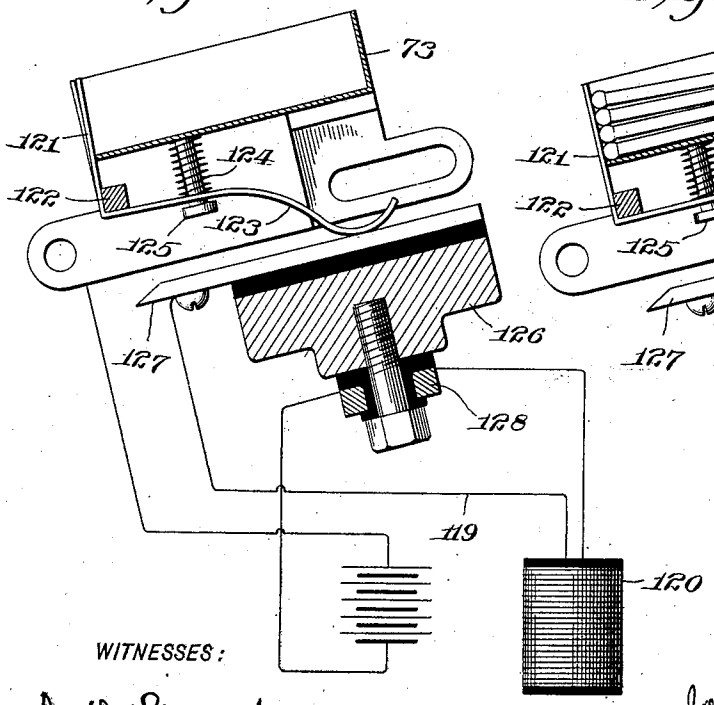
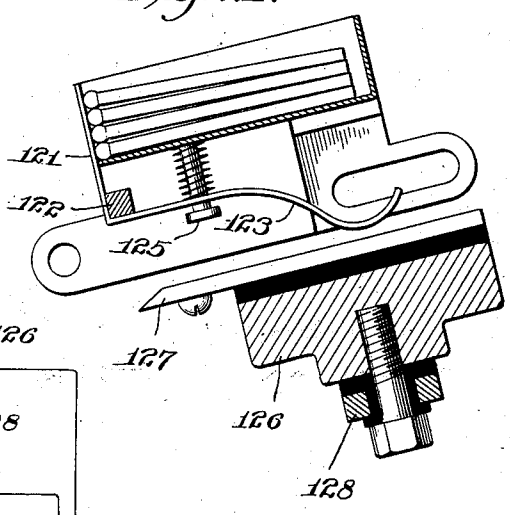



Fig. 21.




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly,

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

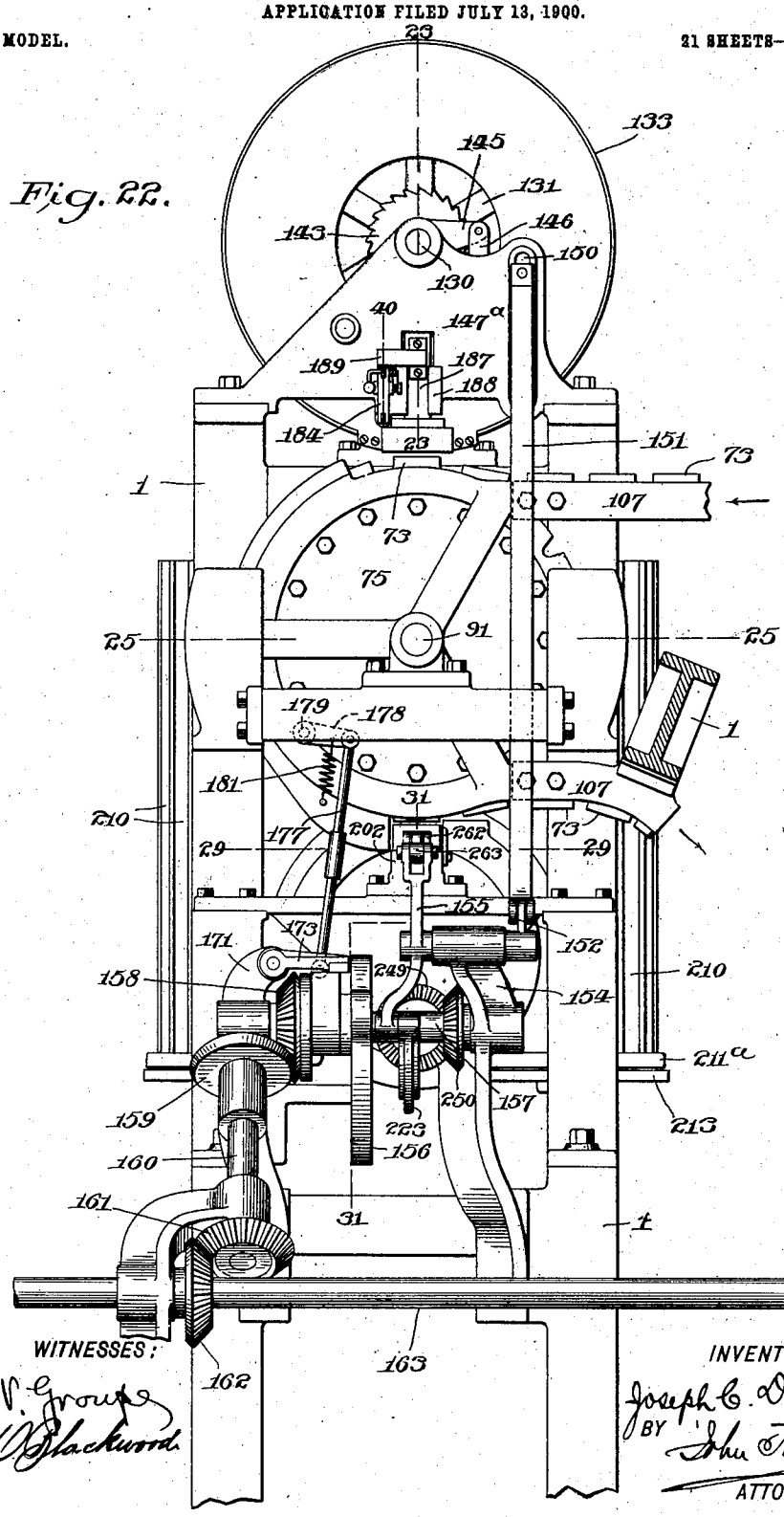
J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 13.

Fig. 22.




WITNESSES:

A. V. Groves

H. C. Blackwood

INVENTOR

Joseph C. Donnelly

BY John P. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 14.

Fig. 23.

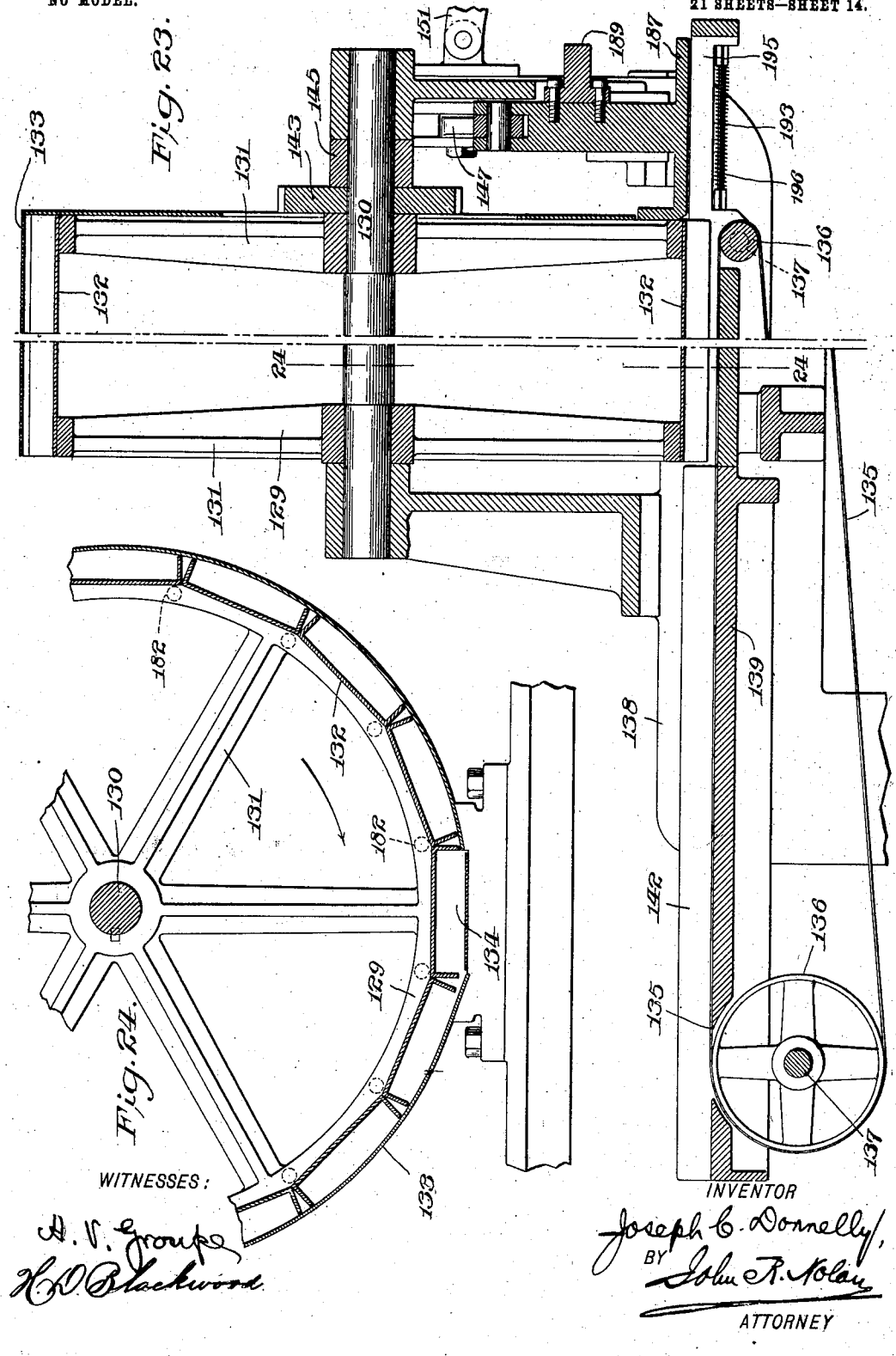



Fig. 24.

WITNESSES:

H. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly,

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 15.

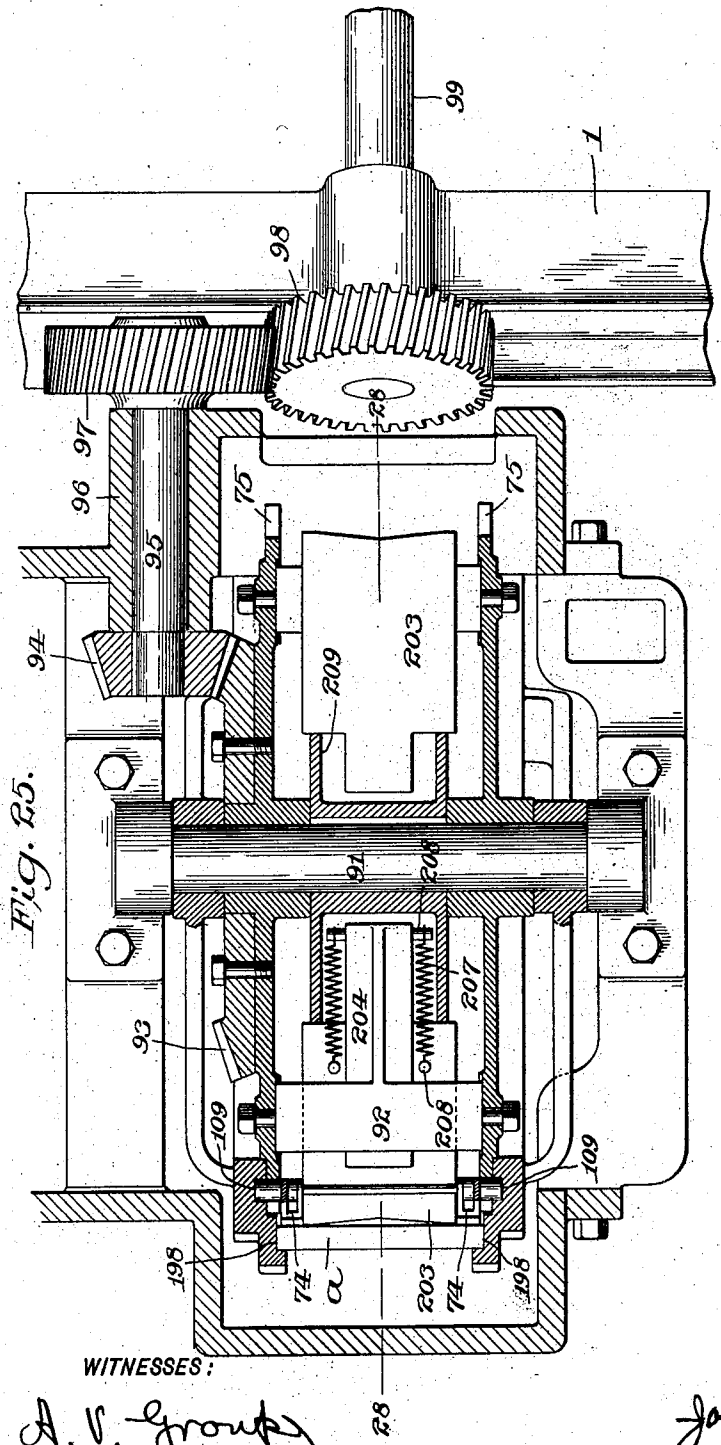



Fig. 25.

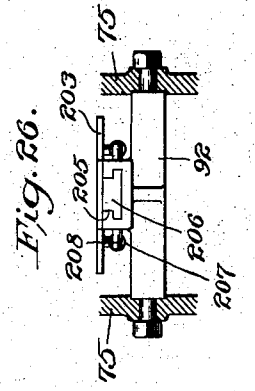



Fig. 26.

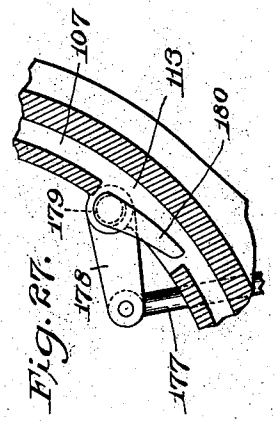



Fig. 27.

WITNESSES:

A. V. Grout

H. C. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

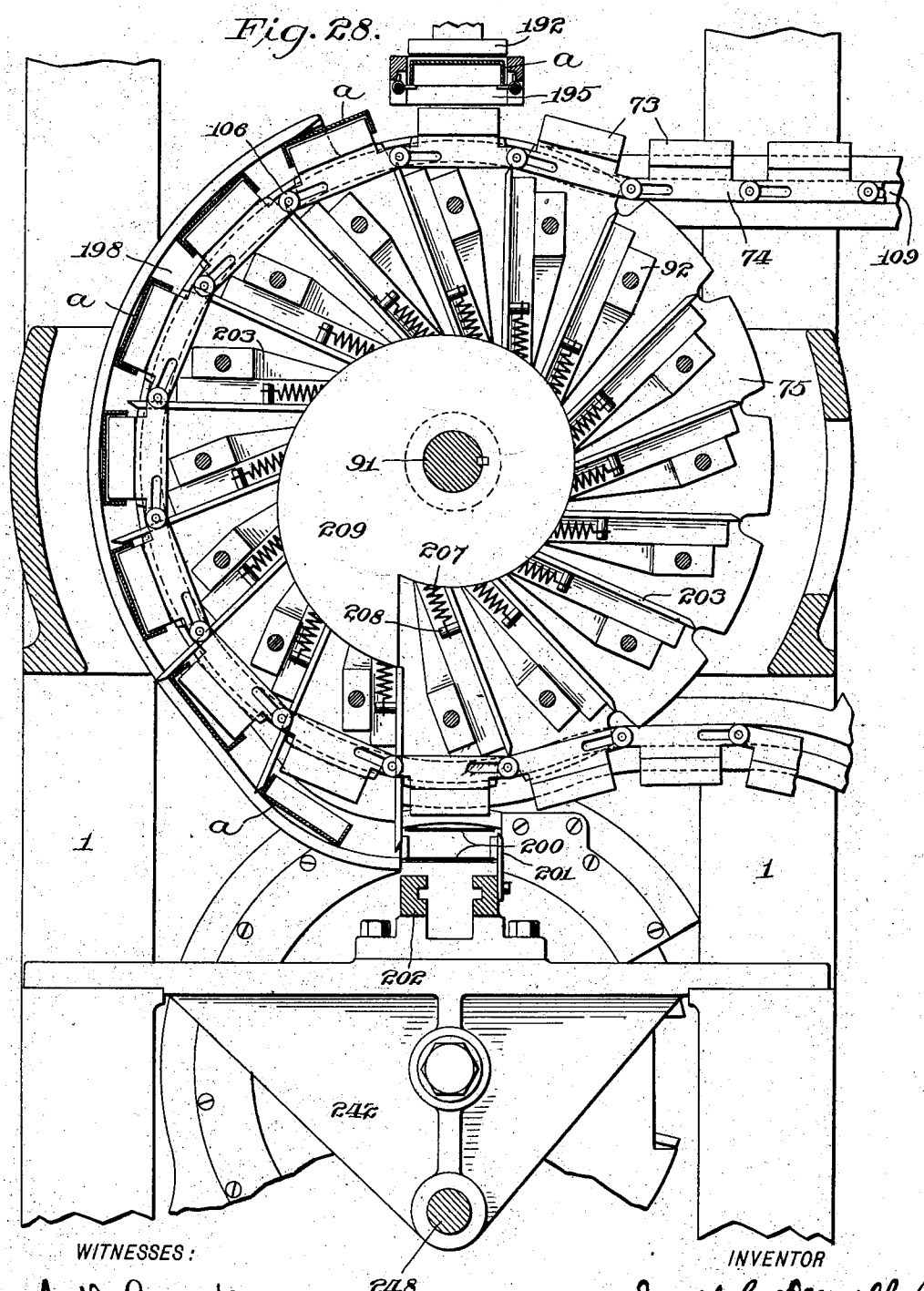
J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 16.

Fig. 28.




WITNESSES:

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INVENTOR

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 17.

Fig. 30.

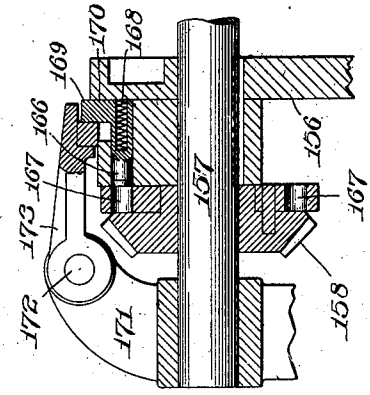
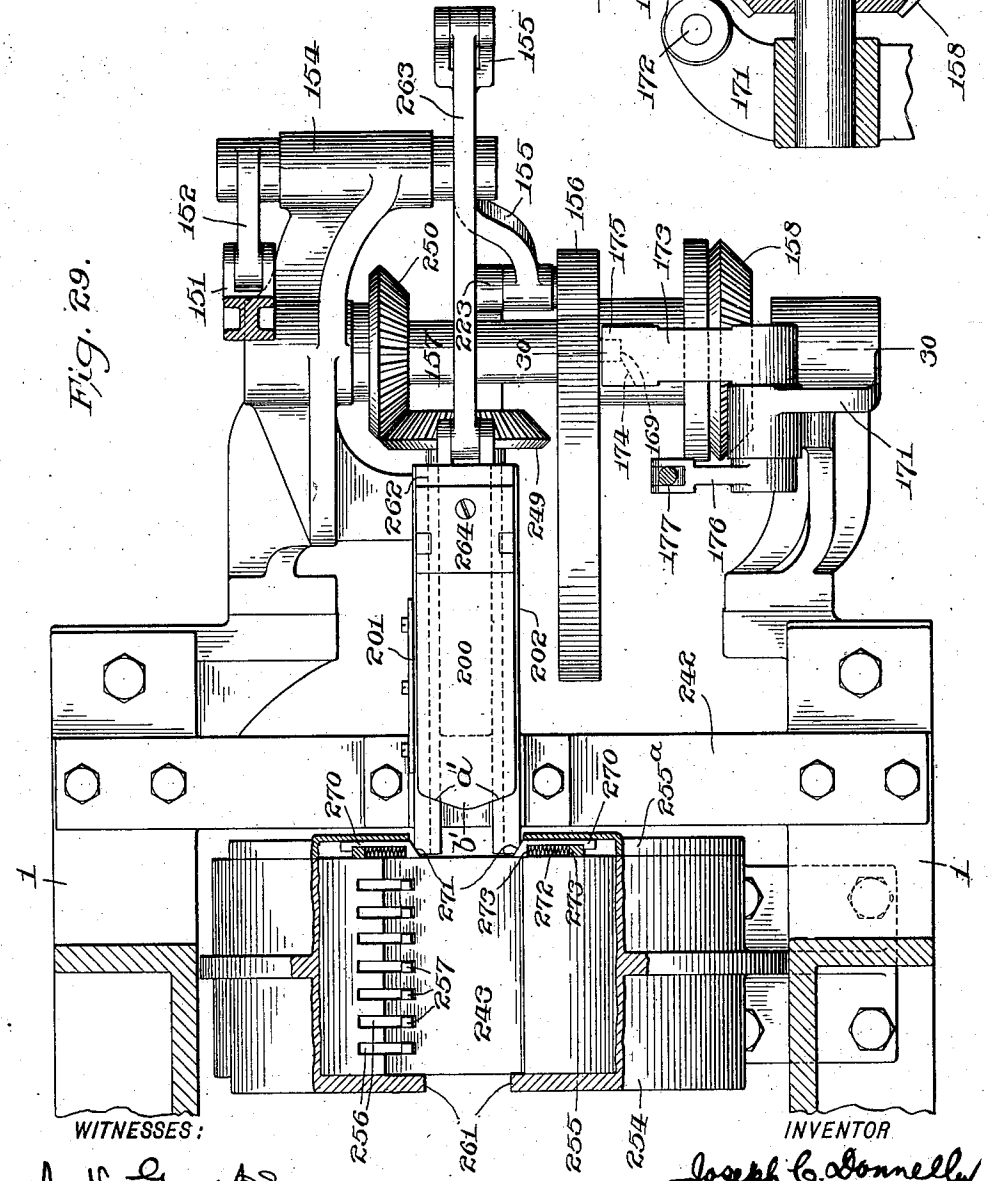



Fig. 29.




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 18.

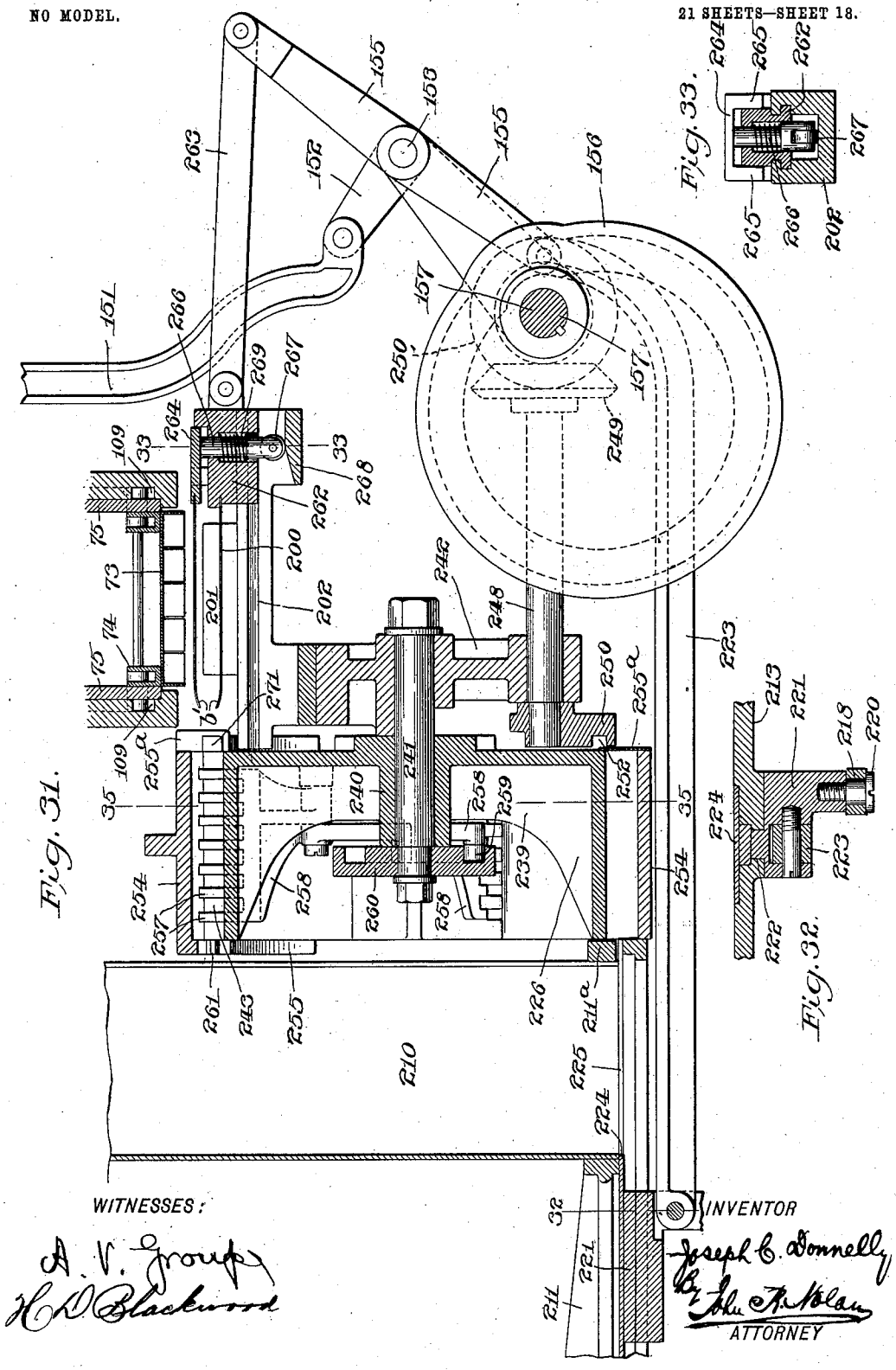


Fig. 31.



Fig. 33.



Fig. 32.

WITNESSES:

A. V. Groupe

H. D. Blackwood

INVENTOR

Joseph C. Donnelly

By John A. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 18, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 19.

Fig. 34.

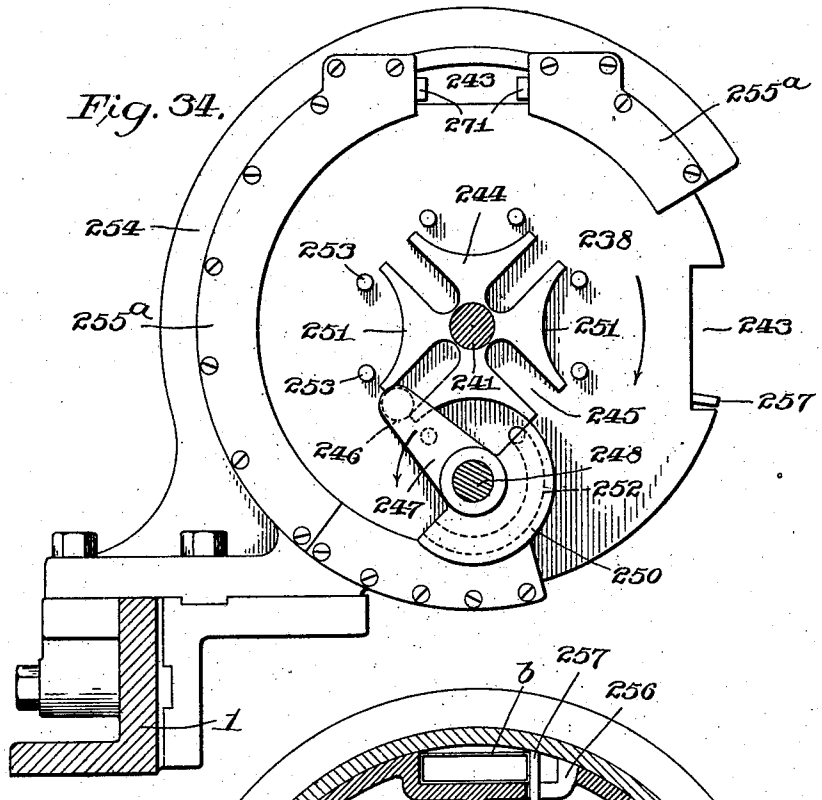
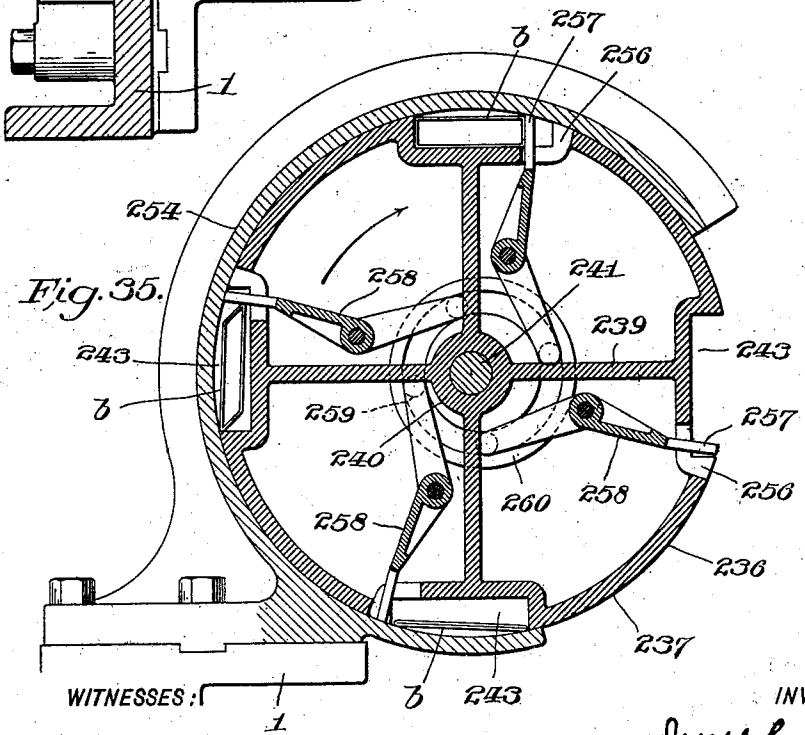



Fig. 35.




WITNESSES:

A. V. Groupe

H. D. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 20.

Fig. 36.

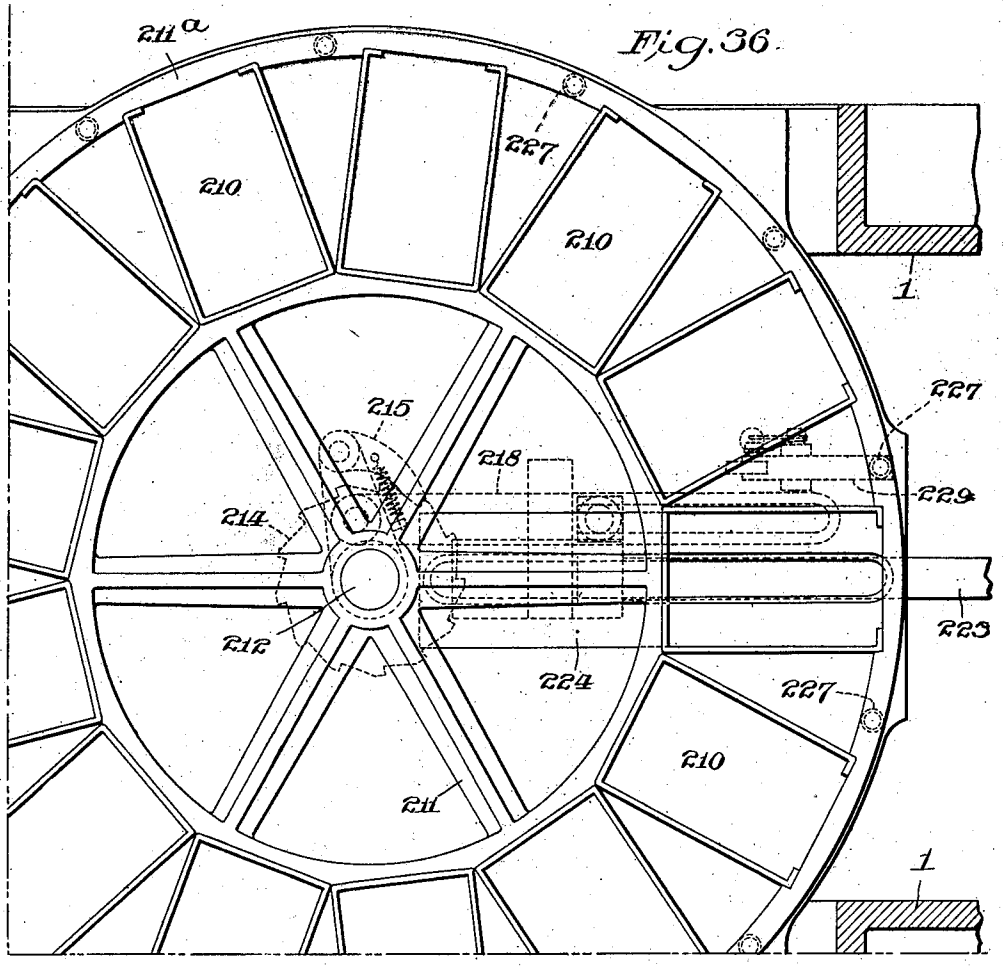
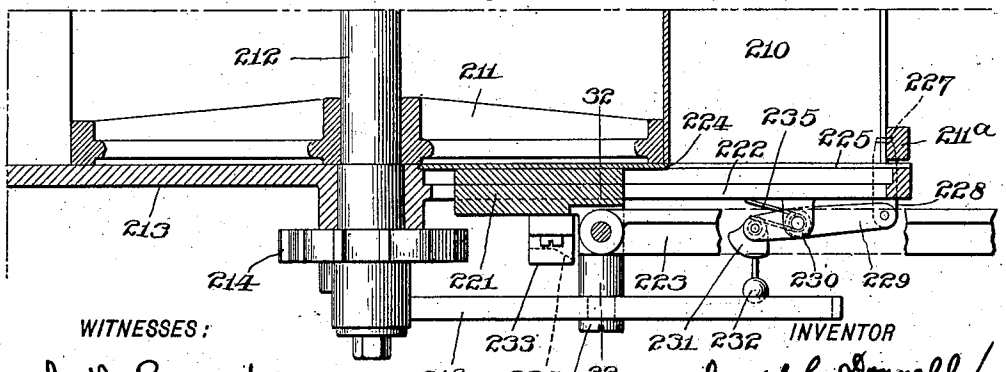



Fig. 37.




WITNESSES:

A. V. Groupe

H. O. Blackwood.

INVENTOR

Joseph C. Donnelly.

BY Chas. R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. PATENTED OCT. 13, 1903.

J. C. DONNELLY.

APPARATUS FOR BOXING MATCHES.

APPLICATION FILED JULY 13, 1900.

NO MODEL. 21 SHEETS—SHEET 21.

Fig. 38.

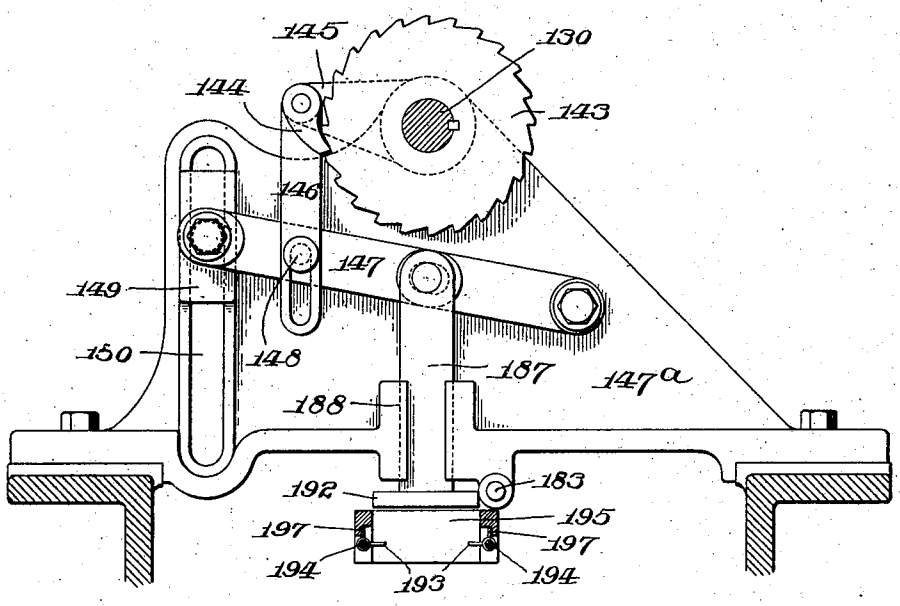



Fig. 39.

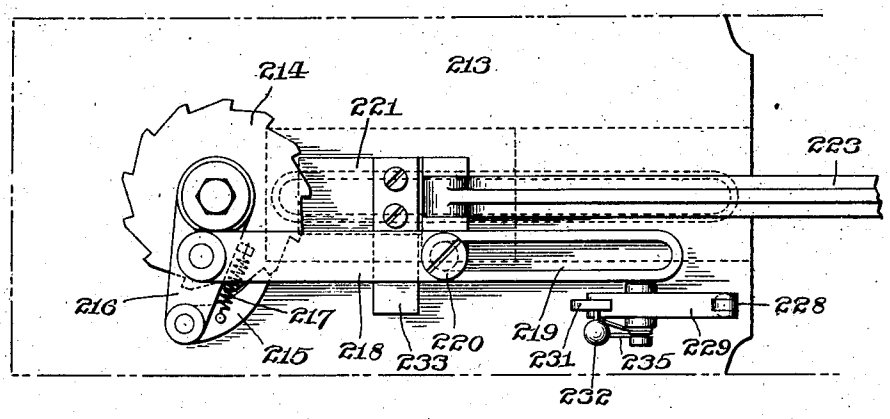
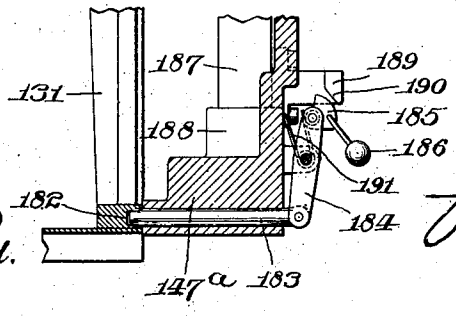



Fig. 40.




WITNESSES:

A. V. Groupe

H. W. Blackwood.

INVENTOR

Joseph C. Donnelly

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 741,467. Patented October 13, 1903.

# UNITED STATES PATENT OFFICE.

JOSEPH C. DONNELLY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE DIAMOND MATCH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ILLINOIS.

## APPARATUS FOR BOXING MATCHES.

SPECIFICATION forming part of Letters Patent No. 741,467, dated October 13, 1903.

Application filed July 13, 1900. Serial No. 23,533. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH C. DONNELLY, a citizen of the United States, residing in the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Boxing Matches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to machines for boxing matches, having reference more particularly to a machine in which the matches are supplied to temporary holders and transferred therefrom to match-trays which when filled are introduced to shucks or covers.

In the present embodiment of my invention the apparatus is arranged in relation to a match-making machine so as to receive the matches as rapidly as they are produced.

The invention as generally stated comprehends a construction and organization of temporary holding mechanism, mechanism for delivering the matches to and among the temporary holders, mechanism for supplying trays to said holders and for filling said trays with the contents of the holders, and mechanism for supplying shucks and for introducing the filled trays thereto, together with various other mechanisms and combinations of mechanisms, all constructed, arranged, and adapted to coöperate to perform automatically and efficiently the various functions in the operation of assembling matches in the tray and shuck form of box, as will be hereinafter fully set forth.

In the drawings, Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a plan thereof, the match-carrier, the match-punching mechanism, and the match-feeding device being omitted. Fig. 3 is a transverse section as on the line 3 3 of Fig. 2, the punching mechanism being shown. Fig. 4 is a sectional elevation of the punching mechanism enlarged, showing the upper portion of the feeding device by means of which the matches punched from the carrier are directed to and distributed among the trains of temporary holders. Fig. 5 is a vertical section as on the line 5 5 of Fig. 4. Fig. 6 is a sectional detail as on the line 6 6 of Fig. 4. Fig. 7 is an under side view of the puncher-head. Fig. 8 is a plan of the upper frame of the match-feeding device. Fig. 9 is a section as on the line 9 9 of Fig. 8, including the overlying match-carrier. Fig. 10 is a section as on the line 10 10 of Fig. 8, including the match-carrier and the coacting portion of the puncher-head. Fig. 11 is a side elevation of the tubular match-feeding device and its connections. Fig. 12 is a development of the match-feeding device. Fig. 12$^a$ is a sectional detail as on the line 12 12 of Fig. 12. Fig. 13 is a vertical section through the shaking mechanism and its adjuncts as on the line 13 13 of Fig. 2. Fig. 14 is a detail of pawl-and-ratchet mechanism for actuating the chain of temporary holders, the view being taken from the opposite side of Fig. 13. Fig. 15 is a longitudinal section as on the line 15 15 of Fig. 13. Fig. 16 is a transverse section as on the line 16 16 of Fig. 13. Fig. 17 is an elevation of one of the trackways by which the chain of temporary holders is guided and supported, the course of the chain being indicated by a broken line. Fig. 18 is a sectional detail as on the line 18 18 of Fig. 17. Fig. 19 is a perspective view of a fragment of the chain of temporary holders. Fig. 20 is a vertical section through one of the holders equipped with a contact making and breaking device, showing the electric circuit controlled thereby, the holder being empty and the circuit being completed, so as to energize the electromagnet included in said circuit. Fig. 21 is a similar view showing the relative positions of the contact devices when the holder is supplied with matches. Fig. 22 is an elevation of the mechanisms through which the temporary holders are impelled and by which the contents of said holders in their traverse are introduced to match-trays and the filled trays applied to covers or shucks. Fig. 23 is a vertical section through the rotary tray-hopper, the tray-feeding belt therefor, and adjuncts as on the line 23 23 of Fig. 22. Fig. 24 is a vertical section of a portion of said hopper as on the line 24 24 of Fig. 23. Fig. 25 is a partial horizontal section as on the line 25 25 of Fig. 22. Fig. 26 is a detail of a tray-pushing

blade and its guide. Fig. 27 is a sectional detail of the track or guide for the chain of temporary holders, showing the device with which the said chain coacts for the purpose of controlling the operations of the tray and shuck mechanisms. Fig. 28 is a vertical section as on the line 28 28 of Fig. 25, including the overlying tray-support and plunger and the underlying receiving-jaws between which the filled tray is inserted. Fig. 29 is a horizontal section as on the line 29 29 of Fig. 22. Fig. 30 is a sectional detail as on the line 30 30 of Fig. 29, illustrating the clutch mechanism controlled by the device shown in Fig. 27. Fig. 31 is a vertical section as on the line 31 31 of Fig. 22. Fig. 32 is a sectional detail as on the line 32 of Figs. 31 and 37. Fig. 33 is a similar detail as on the line 33 33 of Fig. 31. Fig. 34 is an elevation of the shuck receiving and opening mechanism. Fig. 35 is a vertical section as on the line 35 35 of Fig. 31. Fig. 36 is a partial plan view of the rotary shuck-hopper. Fig. 37 is a vertical section through the lower portion of the said hopper and its actuating mechanism. Fig. 38 is an elevation of the pawl-and-ratchet mechanism for actuating the rotary tray-hopper. Fig. 39 is an under side view of pawl-and-ratchet mechanism for actuating the rotary shuck-hopper. Fig. 40 is a sectional detail of lock mechanism for the tray-hopper as on the line 40 of Fig. 22.

A is a progressively-driven carrier from which the matches are punched.

B is the punching mechanism.

C is a series of trains of temporary holders into which the matches are discharged from the carrier and in which holders the matches are jarred and arranged in parallelism, and D is a series of tubes by means of which the matches are conducted from the carrier to the holders of the respective trains.

E is a series of mechanisms for applying match-receiving trays to the temporary holders and for applying shucks or covers to the filled trays, so as thereby to complete the boxing of the matches.

The apparatus herein illustrated has been especially, though not exclusively, designed for use in connection with that type of match-making machines in which the splints are cut row by row from blocks of wood and stuck into corresponding rows of perforations in a progressively-driven carrier, by means of which they are conducted through the different stages of treatment requisite to their completion as matches, the punching mechanism being located at a suitable station in the path of the carrier and being adapted during the traverse of the latter to eject the advancing rows of matches therefrom.

In the match-making machine illustrated in my Letters Patent of the United States No. 565,674, dated August 11, 1896, and in my pending application, Serial No. 649,572, filed August 26, 1897, a duplex block-feeding mechanism is employed to feed the blocks diagonally toward the cutters from both sides of the machine, so as to meet at the middle of the rows of cutters and directly below the median line of the carrier. Hence the splints in one half of the carrier are severed from the block delivered from one side of the machine and the splints in the other half are severed from the block fed from the opposite side of the machine. Therefore if one of the feeding mechanisms be idle and the other working that portion of the carrier above the latter will be supplied with splints.

The particular punching mechanism herein set out forms the subject of a pending application for patent, Serial No. 11,919, filed by me April 7, 1900, and may be briefly described as follows, reference being had to Figs. 4, 5, 6, 7, and 10 of the drawings.

1 is the main supporting-frame of the structure, and 2 the main shaft, which is driven from a suitable source of power.

4 4 are parallel rails bolted on the frame and adapted to support and guide the carrier below the punching mechanism. Upon this frame are also supported end heads 7, carrying boxes in which is journaled a transverse shaft 8. This shaft is geared with and positively driven by the main shaft in any suitable manner. In the present instance a vertical shaft 11 is journaled in boxes on one side of the main frame and is provided at its respective ends with bevel-wheels 17, that gear with corresponding wheels 19 20 on the shafts 2 and 8, respectively. The shaft 8 is also geared through a suitable gear-train with the carrier, so as to positively impel the latter. For this purpose there are affixed on the respective ends of the shaft 8 pinions 21, that gear with spur-wheels 22, keyed on stud-shafts 26, journaled in the end heads, each of the latter shafts being provided with a pinion 27, which gears with a spur-wheel 34, fixed on a shaft 36, journaled below the carrier. On the latter shaft is a pinion 37, which coacts with two laterally-disposed pinions 38, that gear with the rack 39 on the carrier, and thus continuously impel the latter.

Mounted in horizontal guideways 41 in the end heads are slide-blocks 42, in which are fitted eccentrics 43 on the shaft 8, to the end that said blocks will be reciprocated horizontally during the rotation of such shaft. These blocks are provided on their upper and lower edges with vertical extensions 44, bearing lateral studs or rollers 45, which are fitted to vertical guideways 46 in the end members 47 of a cross-head or punch 48, which lies directly above the path of the carrier. In each end member is a horizontal guideway 49, to which is fitted a block 50, the length of which is slightly less than that of the guideway. In this block is a circular orifice 51, in which is seated an eccentric 52 on the shaft 8, to the end that during the rotation of the latter the block, and therewith the cross-head or punch, will be raised and lowered, such vertical movement of the cross-head or punch plus

the horizontal movement imparted thereto by the slide-blocks 42 causing the cross-head to describe an elliptical path, or substantially so.

On the lower edge of the cross-head are two rows of studs 53, which extend from opposite sides of the carrier to the median line thereof. One of these rows is in advance of the other, and they are each so disposed as to correspond in number and position with one-half of a transverse row of perforations in the carrier and are adapted to register therewith. The parts are so timed that during the passage of the carrier the cross head or punch will descend and force its studs into the perforations progressively with the movement of the carrier, so as to eject the opposing matches from the latter, and during the continued movement of the carrier the cross-head or punch will ascend and retract the studs progressively with such movement. In the succeeding descent of the cross-head or punch its studs will similarly register with the next succeeding rows of perforations in the carrier and likewise eject the matches therefrom, and so on continuously.

In the present machine there are four sets of boxing mechanisms and a corresponding number of trains of temporary holders for receiving the matches and delivering them to the respective mechanisms, and the tubes or conductors between the said holders and the match-carrier (or other source of match-supply) are so constructed and arranged as to distribute the matches uniformly, or practically so, among the several trains of holders.

Referring to the match-distributing mechanism, 54, Figs. 4, 8, 9, 10, 11, and 12, represents a frame transversely supported directly beneath the cross-head or punch and below the path traversed by the intervening match-carrier, and 55 represents a series of frames corresponding in number with and supported adjacent to the respective trains of temporary holders. In the upper frame is a series of vertical orifices 56, which are disposed directly below the overlying transverse rows of perforations in the match-carrier. In the present instance the series of orifices are divided into two equal rows, one of which is slightly in advance of the other, as seen in Fig. 8, to the end that during the onward traverse of the carrier one half of the advancing rows of perforations therein will pass above one of the rows of orifices, while the other half will pass above the other row of orifices. Hence as the matches are ejected row by row from the carrier they will fall into the orifices in the underlying frame.

Leading from each row of orifices in the frame 54 is a corresponding series of tubes 57, which are divided into four sets, in each of which in this instance there are five tubes. These sets diverge toward the respective frames 55, adjacent to the trains of holders, and are fitted to inclined chambers or orifices 58 in said frames to the end that as the matches are delivered to the orifices in the upper frame such matches will be directed by the tubes into the lower frames and delivered thereby to and among the several trains of temporary holders.

The tubes leading from the forward row of orifices in the upper frame 54 are arranged in advance of those leading from the rearward row, and it is to permit this arrangement of the tubes and the avoidance of abrupt bends therein that the matches in the respective sides of the carrier are ejected in different vertical planes.

The upper frame 54 of the feed device above described has a pivotal sliding connection with the main frame, while the lower frames 55 of said device have pivotal connections with a series of inclined bars 108 on reciprocating frames, below explained, whereby during the operation of the latter frames the said feed device is agitated so as to insure the descent of the matches and obviate liability of their clogging the tubes. In the present instance, as seen in Fig. 11, the frame 54 is provided at or near its ends with vertically-slotted lugs $54^a$, into the slots of which extend pins $54^b$ on brackets $54^c$, extending from transverse tie-bars of the main frame, thus affording the sliding pivotal connection above mentioned. Each of the lower frames 55 is provided with laterally-projecting trunnions $55^a$, fitted to bearings $55^b$ on each of the inclined bars 108 of the reciprocating frames.

In order to assist the matches in their descent through the tubes, I preferably, though not essentially, utilize a downward air-blast. To this end an air-trunk 59 is arranged along the frame 54 and the latter is provided with a series of ducts 60, which afford communication between the trunk and the orifices 56 in the frame. (See Figs. 8 and 10.) The trunk is connected by means of a pipe 61 with a suitably-disposed blower 62. (See Fig. 1.)

It has been found that there are more perfect splints cut from the body of each of the blocks than at and near the ends thereof, and as the imperfect splints are ejected from the carrier as soon as they leave the sticking mechanism it follows that in a machine embodying the duplex block-feeding mechanism there are less matches at and near the edges of the carrier and at and near the middle thereof than at and adjacent to the middle of each half of the carrier. Accordingly the orifices in the upper frame as well as the tubes leading therefrom are so sized and positioned as to receive and distribute as uniformly as possible the successive rows of matches punched from the carrier.

In the present instance the extreme end orifices of each row are of a size to receive three matches each, several adjacent orifices are of a size to receive two matches each, and the remainder are of a size to receive a single match each. As the mouths of the tubes correspond in size with the orifices and as the tubes are directed in equal sets to and among

the series of trains of holders, it will be seen that substantially a uniform distribution of matches to the several trains is accomplished. It will also be seen that even if the splints be introduced to one side only of the carrier through the inaction of one of the cutting mechanisms a uniform distribution of such splints to the several trains will be effected.

Inasmuch as the temporary holding mechanisms are identical in construction and arrangement with each other, and as the boxing mechanisms likewise correspond with each other, it will only be necessary herein as respects the holding and boxing mechanisms to describe in detail one of each set.

Referring to the temporary holding mechanism, the main frame 1 is provided with inclined side members 63, in and between which is mounted a correspondingly-inclined reciprocable frame. The latter comprises two longitudinal side bars 64, arranged adjacent to the respective members of the side frame and connected together at their respective ends by transverse shaft 65, which are fitted to bearings in said members. These bearings comprise inclined slots 66, in which the frame is reciprocable within defined limits. The bearing ends of the shafts are preferably provided with antifriction-rollers 67. The upper end of each of the side bars 64 is connected by means of a pitman 68 with an eccentric 69 on a driven shaft 70 and is thereby positively reciprocated. In the present instance this shaft is provided at one end thereof with a bevel-wheel 71, which coacts with a similar wheel 72 on the vertical shaft 11 above referred to.

As before observed, there are in the machine herein illustrated four trains of temporary holders. These trains are arranged in parallelism with each other, or substantially so, and are adapted to be simultaneously shaken or jarred by the vibrations of the reciprocating frame. They are also designed to be singly or collectively impelled toward the respective boxing mechanisms as the conditions of operation may determine, as will be hereinafter explained. The temporary holders of each train comprise a series of shallow rectangular boxes 73, each of which is slightly smaller in its external dimensions than the internal dimensions of the match-tray, so that the latter inverted may be applied to the holder in a manner to embrace the ends and sides of such holder and cover the open top thereof. The holders of each train are supported at or near their respective ends upon an endless conveyer 74 of novel construction, which turns about a pair of sprocket-wheels 75, located at the station where the trays are applied, and about a pair of similar wheels 76, mounted on the lower shaft 65 of the reciprocating frame. On the upper shaft 65 of this frame is a pair of like wheels 77, which coact with the upper traveling portion of the conveyer. The pair of sprocket-wheels on each of the shafts 65 is affixed to a sleeve 78, which is freely rotatable on its shaft 65. On one of the sprocket-wheels of each pair is affixed a bevel-wheel 79, with which coacts a pinion 80 on the adjacent end of an inclined shaft 81, which has its bearings in suitably-located boxes 82 on the reciprocating frame, to the end that said shaft 81 will be bodily reciprocated by the latter and the pinions 80 remain in gear with the wheels 79, sleeved on the shafts of said frame. Affixed to one end of the sleeve on the lower shaft 65 is a ratchet-wheel 83, with the teeth of which is adapted to engage a pawl 84, carried by one arm of a bell-crank lever 85, which is keyed to said shaft. The other arm of this lever is connected by means of a pitman 86 with an eccentric 87, mounted on a shaft 88, which has its bearings in boxes in the main frame. This shaft is equipped with a worm-wheel 89, which coacts with a worm 90 on the main shaft and is driven thereby. (See Figs. 1, 2, 13, and 14.) Thus the pawl-carrying lever is continuously oscillated during the operation of the machine, and therefore if the pawl be in engagement with the ratchet-wheel the latter, and, perforce, the sleeve and sprocket-wheels, will be intermittently operated, and the conveyer, with the holders thereon, will be correspondingly actuated.

Provision is had whereby the pawl may be rendered active and inactive in respect to the ratchet-wheel, as and for a purpose which will be presently explained.

The sprocket-wheels 75, about which turn the upper portion of the conveyer, are loosely mounted on a horizontal shaft 91, fixed on the main frame. These wheels comprise two peripherally-notched heads or disks maintained a suitable distance apart and in parallelism by cross-pieces 92. On the face of one of the disks concentrically therewith is bolted or otherwise affixed a bevel-gear 93, with which coacts a pinion 94 on one end of a short horizontal shaft 95. This shaft has its bearings in a box 96 on the main frame. On the other end of this shaft is affixed a skew-gear 97, which coacts with a similar gear 98 on the upper end of an inclined shaft 99, which is supported below and parallel to the reciprocating frame. This inclined shaft has its bearings in suitably-disposed boxes 100 on the main frame. On the lower end of this shaft is a broad-faced pinion 101, with which engages a pinion 102, fixed on the shaft 81, above described. Hence during the operation of the latter shaft the shaft 99 is positively driven thereby and the motion is transmitted therefrom through the intermediate gearing to the sprocket-wheels 75 to rotate the latter in concert with the sprocket-wheels on the shafts of the reciprocating frame and this irrespective of the axial reciprocation of the gear 102 on the gear 101. (See Figs. 13, 15, 25, and 28.)

The particular construction of conveyer herein illustrated embodies two endless chains 74, (shown in detail in Fig. 19,) arranged in

parallelism with each other and maintained a suitable distance apart by traverse rods or bars 103. These chains are identical in construction, save that one is right and the other left handed. Each chain comprises a series of links which are pivotally connected at their ends by the rods in such manner that the links may have independent relative movement longitudinally of the chain. In the present instance each of the links is struck up from a piece of sheet metal into substantially U form and is provided at its respective ends with lugs or extensions 104, one of which is on the outer and the other on the inner member of the link. The inner lug is simply pierced for the passage of the rod, while the other lug is longitudinally slotted therefor, so that when the ends of two adjoining lugs are brought together the rod may be passed therethrough in a manner to pivotally connect the links and at the same time permit their relative longitudinal or telescopic movement within prescribed limits. A washer 105 is fitted upon the rod intermediate the adjacent lugs of the connected links. The end of the rod is extended outwardly beyond the links and is provided with an antifriction-roller 106, which is adapted to be engaged by the teeth of the sprocket-wheels 75, 76, and 77 and also to enter trackways in laterally-disposed guide-frames 107, between which the train of temporary holders is laterally guided and supported during its traverse. Referring to Figs. 15, 16, and 17 of the drawings, it will be seen that these frames include inclined bars 108, provided with tracks 109, in which the correspondingly-inclined portion of the conveyer 74 is guided and supported as it moves upward toward the distributing-tubes, the lower portions of said bars terminating in curved portions 110, in the tracks of which the conveyer is guided and supported as it approaches and rounds the lower sprocket-wheels 76. These inclined bars are supported by the shafts 65 of the reciprocating frame through brackets or arms 111, loosely supported on the sleeves 78 on said shafts. Thus the bars 108 are actuated by and with the reciprocating frame. The guide-frames also include horizontal and curved members 112 113, respectively, which are affixed to the main frame and constitute, in effect, a continuation of the inclined bars 108. These members are also provided with trackways 109, in which the conveyer is guided and supported as it approaches and rounds the upper sprocket-wheels 75. The inclined bars 108 are connected with the fixed members 112 by an overlapping joint, as indicated at 113, so as to permit the reciprocations of the inclined sections without interrupting the continuity of the trackway. (See Fig. 18.) A temporary holder is supported upon the horizontal limbs of the opposite pair of links of the two chains, such holder serving, in conjunction with the cross-bar, to maintain the chains in parallelism. The holders are so disposed that when the links are telescoped the former will be moved into side-to-side contact with each other, so as to close the intervening spaces, and that when the links are moved in an opposite direction the holders will be laterally separated from each other. The holders are thus moved into contact with each other as they approach and pass up the incline, upon which the matches are discharged from the supply-tubes, so that the matches during the longitudinal shaking of the holders will as the upper holders are supplied slide down upon and progressively fill the lower holders as the latter are being carried upward. The continual shaking and jarring of the holders during their upward traverse will cause the matches to settle in the successive holders.

The movement of the holders into lateral contact is accomplished as they round the sprocket-wheels 76 at the lower end of the reciprocating frame, the curvature of the guide-frame 110 adjacent to these wheels being eccentric to the latter, so that while the rollers on the links of the conveyer enter the guide-frame with the links drawn apart, yet said rollers as they engage the teeth of the sprocket-wheels are directed gradually toward the bases of the latter until, finally, as the conveyer approaches the upper portion of such sprocket-wheels the holders are moved into lateral contact with each other. The holders are thus maintained in contact until they pass the mouths of the feed-tubes, whereupon they are gradually separated by the sprocket-wheels 75, the notches or spaces in which are distanced correspondingly with the spaces between the rollers of the links when the latter are in their open or extended position.

Bearing upon the lower or return portion of the conveyer, so as to keep it constantly taut, is a tension-frame comprising a wheel 114, the shaft 115 of which is carried by rock-arms 116, fulcrumed on the main frame. The wheel 114 is maintained upon the conveyer under yielding pressure by means of a strong retracting-spring 117, one end of which is conveniently secured to the tension-frame and the other end to the bed of the machine.

To insure the proper disposition and alinement of the matches in the temporary holders, I arrange adjacent to and longitudinally of the upper inclined portion of the train a series of parallel metallic strips 118, which are bolted or otherwise rigidly secured at their respective ends to the main frame. In the present instance there are four of these strips to each train arranged at regular intervals apart and disposed to lie within and thus divide into longitudinal spaces the series of holders traveling up the incline toward the feeding-tubes. The side walls of the respective holders are provided with vertical slots or kerfs 119 to receive the spacing-strips and permit the onward passage of the train. (See Figs. 16 and 19.) These strips extend above the trays of the holders, so as to afford side supports for the matches as they slide down

upon and progressively fill the inclined holders, the spaces between such strips and also between the same and the side bars 108 being, in effect, continuations of the respective tubes of the feed device above described.

In order that the traverse of a train or trains shall be automatically stopped in the event of the supply of matches thereto being exhausted or otherwise checked, I provide a novel means for independently controlling the driving-pawls 84 for the respective conveyers. Accordingly a normally broken electric circuit 119 is arranged adjacent to each of the trains of holders, and certain holders are constructed to effect the completion of the circuit when they or any of them are not supplied with matches. In this circuit is an electromagnet 120, which is supported immediately above the pawl on an extension of the bell-crank lever 85, to the end that when the circuit is completed the magnet, being energized, will attract the pawl thereto, and thus withdraw the latter from engagement with its ratchet-wheel. In the present instance the forward wall of certain holders in the train—say every eighth holder—comprises a vibratory section 121, which is carried by a cross-head 122, pivoted in and between the underlying pair of links of the conveyer. The section is provided with a spring-controlled arm 123, that extends under the holder and curves downwardly therefrom. This arm is maintained normally depressed by the action of a spring 124, encircling a pin 125, which depends from the holder through said arm. When the arm is in this normal or depressed position, the section 121 is inclined slightly into the body of the holder, as seen in Figs. 19 and 20. Supported on a cross-bar 126, just below the path traversed by the upper inclined train of holders, is a contact-plate 127, with which one of the conductors of the circuit is electrically connected. The other conductor is connected with a bus-bar 128, which is bolted to and insulated from the series of cross-bars 126, said bar affording a common electric connection between the several magnets and the source of electric energy.

The position of the contact-plate in relation to the path of the holders is such that when the arm 123 is in its normal or depressed position its lower end bears upon the contact-plate 127, thus completing the electric circuit with the effect mentioned. Such is the condition of the arm when the holder is empty; but when the same is supplied with matches the weight of the matches presses the pivoted section of the holder outward, so as to raise the arm above the plane of the contact-plate. (See Fig. 21.) In that case the pawl remains in engagement with its ratchet-wheel and effects the actuation thereof.

Referring to the tray-feeding mechanism, 129 is a rotatable hopper mounted on an intermittently-rotatable shaft 130, located above and parallel with the shaft 91, above described. This hopper comprises a pair of parallel wheels 131, connected about their peripheries by a series of channel-pieces 132, the interior of each of which is equal in width to a match-tray, or substantially so, and is of a length sufficient to receive a series of trays end to end. In the present instance these channel-pieces comprise rectangular metal plates bent into proper shape and affixed side to side to the peripheries of the wheels and parallel to their axis of rotation. Encircling the series of channels is a circular guard-plate 133, which is interrupted at its lower portion by a longitudinal slot or opening 134 of a width equal to that of one of the channels.

The match-trays, end to end, are fed to the several channels, and the hopper is thus kept supplied with trays. As the hopper is intermittently rotated the channels are advanced successively to the slot or opening 134, and a tray is expressed endwise from each of the channels as it registers with such slot or opening. The means herein shown for thus feeding to and expressing from the hopper the match-trays includes an endless conveyer 135, preferably a belt or apron, which extends directly below said slot or opening. This conveyer is supported on suitably-disposed pulleys 136, whose shafts 137 are journaled in bearings in a horizontal frame 138. On this frame is a table 139, on which the upper portion of the belt is supported as it travels toward the rotary hopper. One of these shafts is provided with a pulley 140, Fig. 1, which is driven from a suitable source of power. The outer portion of the table sustains a stationary hopper 141, by means of which the trays, top downward, are fed upon the belt and carried in train toward the rotary hopper, such trays being guided in their path by lateral flanges 142 on the table. The inverted trays are advanced endwise into the lowermost channel of the rotary hopper while the latter is at rest, the leading tray being moved bodily through and beyond said channel. As the hopper is intermittently rotated the trays contained in said channel are carried upward thereby, another channel is brought above the belt 135, and another tray or trays is or are fed to the latter channel, one being expressed therefrom and the others being carried upward, as in the preceding operation. This operation is repeated for each channel of the rotary hopper. Hence the channels are kept supplied with trays, and in each dwell of the hopper the leading tray in the lowermost channel is moved outward therefrom.

The preferred mechanism for impelling the rotary tray-hopper is as follows, reference being had more especially to Figs. 22, 23, 29, 30, 31, and 38 of the drawings: 143 is a ratchet-wheel affixed to the shaft 130, and 144 is a pawl coacting with said wheel and being carried by a rock-arm 145, loosely mounted on the shaft. This arm is connected by means of a link 146 with a lever 147, fulcrumed on a bracket $147^a$ on the main frame, to the end

that when said lever is oscillated the pawl will be actuated to impel the ratchet-wheel and its connections. A pin-and-slot connection 148 is provided between the link and the lever, so as to afford certain lost motion between the link and lever for a purpose below explained. The free end of the lever 147 is connected with a vertically-movable cross-head 149, fitted to a suitable slot or guide-way 150 in the bracket, the cross-head being in turn connected with the upper end of a vertical bar 151, which is connected at its lower end with an arm 152 on a rock-shaft 153. This shaft is supported in a bracket 154, affixed to the main frame, and carries a lever 155, under the influence of a cam 156, whereby during the rotation of the latter the lever and its connections are oscillated, thus effecting the vertical reciprocations of the cross-head 149 and, perforce, the operation of the lever 147. Cam 156 is keyed on a shaft 157, equipped with a bevel-wheel 158, which coacts with a similar wheel 159 on the upper end of a diagonal shaft 160. On the lower end of the latter is a bevel-wheel 161, which gears with a corresponding wheel 162 on a shaft 163, from which latter the motion is transmitted to the wheel 158 on shaft 157. The shaft 163 is geared with and driven by the main shaft 2 through the medium of the shaft 88, above described, the latter having on one end thereof a bevel-gear 164, which coacts with a similar gear 165 on the shaft 163. (See Figs. 1, 2, and 3.) Thus the wheel 158 is positively driven. Provision is had whereby it may be rendered fast and loose on the shaft 157 at predetermined intervals, thus causing a corresponding action and inaction of said shaft and the cam thereon. To this end the bevel-wheel 158 is loosely mounted on the shaft 157 adjacent to the hub of the cam 156, and said hub is provided with a reciprocable coupling-pin 166, that may be periodically engaged with and disengaged from lateral sockets 167 in said wheel. Contained within the pin is a spring 168, which tends normally to project the pin into engagement with the socketed wheel. On this pin is a spud 169, which extends through a vertical slot 170 in the hub of the cam and affords a means whereby the pin may be retracted from the wheel to release the latter. Supported in a bracket 171, rising from one of the bearings of the shaft 157, is a rock-shaft 172, on one end of which is supported an arm 173, whose free end overhangs the spud 169 on the coupling-pin and carries on its under side a cam-surface 174 and shoulder 175, which are so disposed that when the arm 173 is down, as illustrated, said spud, during the rotation of the connected wheel and cam, rides against the said cam-surface and is forced outward thereby in a manner to disengage the pin 166 from the socket in the wheel, and thus permit the latter to turn loosely on the shaft 157. When the pin is thus retracted, the spud thereon takes against the shoulder on the arm 173, and thereby stops the movement of the cam 156. If the arm be raised to free the spud, the pin 166 bears yieldingly against the opposing face of the wheel 158 until a socket in the latter reaches the pin, whereupon the pin registers with such socket and relocks the cam and wheel together. If the arm 173 be again lowered, the pin will be withdrawn, as before, to uncouple the wheel and cam. Thus the said cam and, perforce, its shaft 157 make a complete revolution for each reciprocation of the arm 173. The operation of this arm is effected by actuation of its rock-shaft 172, on one end of which is an arm 176, which is connected by means of a link 177 with a rock-arm 178 on the exterior of that portion of the trackway 113 traversed by the rollers 106 on the conveyer 74 as the latter rounds the sprocket-wheels 75, above described. This rock-arm is carried by a stud-shaft 179, journaled in the wall of said trackway. On the inner end of this shaft is an arm 180, which lies within the trackway in the path of the said rollers 106, to the end that the latter in their traverse will successively abut against the arm 180 and raise it, with the arm 178, in a manner to lift the link 177 and, perforce, the arms 173 176 on the lower rock-shaft 172. The arm 178 is maintained normally depressed by a spring 181, secured thereto and to the adjacent track-frame, and therefore as each roller clears the opposing arm 180 the latter resumes its normal depressed position. (See Figs. 22 and 27.) The purpose of the operation just described will be hereinafter referred to with more particularity.

When the cam 156 is uncoupled from the gear 158, it follows that the shaft 157 and its connections are quiescent, but when the cam and gear are coupled together said shaft and cam are positively rotated. At certain periods in the rotation of the cam the arm 155, engaged therewith, is actuated in a manner to rock the shaft 153 and effect the operation of the bar 151 and the pawl-and-ratchet mechanism above described for the intermittent actuation of the rotary tray-containing hopper.

During the depression of the bar 151 and its connected lever 147 the pin in the latter for a portion of its stroke travels idly in the slot of the link 146 before depressing the latter and effecting the coöperation of the pawl and ratchet for the advancement of the tray-hopper. During this idle period and also during the upward stroke of the bar 151 and its lever-and-link connections the hopper is at rest. Then it is that one of the peripheral channels of the hopper is in position to receive and discharge the inverted trays. At this stage the hopper is temporarily locked. For this purpose I form around the edge of the rim of one of the wheels 131 a series of sockets 182, corresponding in number and position with the channels, and arrange in the bracket $147^a$, adjacent to such rim, a horizontally-reciprocable bolt 183, which is movable into and from

the successive sockets at regular intervals. This bolt is carried by the longer arm of a lever 184, which is fulcrumed on a lug on the face of said bracket. On the other arm of the lever is pivoted a sector 185, which is maintained in a normal position by a depending weight 186 or the like. Loosely pivoted to the lever 147 is the upper end of a plunger 187, which is fitted to guides 188 in the bracket 147ª, so as to be vertically reciprocable by actuation of said lever. On the outer face of this lever is a block 189, provided with a cam-surface 190 in the path of said sector. A suitably-disposed spring 191, acting upon the lever 184, tends to maintain the bolt 183 normally in engagement with the socketed wheel 131. When the lever 147 is in its raised position, the bolt is in register with one of the sockets in the rim of the wheel, so as to lock the latter in place, but as said lever is being depressed the cam-surface 190 on the block 189 coacts with the sector in its path, and thereby moves the same, with its connected lever-arm, inward, thus withdrawing the bolt from the socket. Thereupon the pin on lever 147 abuts against the lower portion of the slotted link 146 and effects the operation of the pawl 144 upon the ratchet-wheel 143 in a manner to rotate the hopper one step. This done the bolt registers with the then-opposing socket in the rim of the hopper-wheel and locks the hopper in place. In the upward stroke of the lever 147 the sector escapes the opposing cam-block in its path and resumes its normal position, in readiness for a succeeding operation.

As each tray is discharged from the lowermost channel of the rotary hopper it is yieldingly supported immediately above one of the filled temporary holders 73 on the conveyer 74 and below the vertically-movable plunger 187, to the end that the latter in its descent will force the inverted tray upon and about the underlying holder. The lower end of the plunger has formed on or secured to it a plate 192, that bears upon the tray. In virtue of the lost motion between the lever 147 and the link 146 the plunger forces the tray upon the underlying temporary holder before the ratchet is actuated by the pawl.

In the present instance the yielding support for the tray immediately above the filled temporary holder comprises a pair of leaves 193, rotatably mounted on parallel shafts 194, which are supported in the side members of a slotted portion 195 of the main frame. These leaves are disposed to receive and support the lower lateral edges of the tray as it is ejected from the rotary hopper. The leaves are each maintained in this normal position by a spring 196, which encircles the shaft and is secured at its ends to the shaft and leaf, respectively. On a hub of each of the leaves is a stud 197, which abuts against the opposing portion of the frame to limit the upward movement of the leaf. Obviously when the plunger acts upon the tray the leaves yield to the pressure to permit the passage of the tray to the underlying filled holder, and when the plunger ascends the leaves resume their normal position to support the next-succeeding tray. The inverted trays *a*, Fig. 28, are thus applied successively to the filled temporary holders and carried by the latter to a position in which said trays, supplied with matches, are ejected from the holders and slid into shucks.

As before stated, the temporary holders are separated from each other by the engagement of the conveyer-rollers with the peripheral sockets in the disks or wheels 75, such engagement being effected and maintained by the concentric portions 113 of the lateral trackways to which the rollers are fitted. The track-frames have each formed thereon, adjacent to the concentric portions 113 of the trackway, another trackway 198, which extends from a point directly in advance of the station where the inverted tray is applied to the holder to a point below the sprocket-wheels 75 and adjacent to a pair of tray receiving and clamping jaws, below described. The trackway 198, excepting at the lower portion thereof, which is deflected downward, as indicated at 199, lies adjacent to and concentric with the trackway 113. Thus it will be seen that as the holders with the trays thereon travel around the sprocket-wheels 75 the ends of the trays enter the adjacent trackways 198 and are supported thereby. While the trays are traversing the concentric portions of the trackways 198 they are maintained upon their respective holders; but when they reach the lower depressed portions of said trackways they are gradually withdrawn from the holders, yet supported by the trackways. As they are thus being withdrawn the trays are assuming their upright position—that is, top upward—and in consequence the matches contained in the respective holders are transferred by gravity into the underlying trays. The trays during and after their withdrawal from the holders are advanced in their trackways and moved therefrom into the tray-receiving jaws 200 and against an abutment which comprises a plate 201, affixed to a stationary guide-frame 202, below described. For this purpose there are interposed between the two sprocket-wheels 75 a series of sliding members, which just prior to the passage of the trays to the depressed portions of the trackways are projected outward in position to take against the rear of said trays in succession and push them bodily from the trackways into the receiving-jaws, whereupon the blades are retracted. In the present instance said members comprise plates 203, which are arranged at intervals apart between the two wheels or heads, the tie-bars 92 of which are T-shaped, as seen in Fig. 25. In the central members 204 of these bars are formed longitudinal ways 205 for the reception of guide-blocks 206 on the plates 203. These plates are mov-

able tangentially to the shaft 91, or substantially so, being retracted by springs 207, which are secured to studs 208 on the plates and tie-bars, respectively. The inner ends of these plates bear against a spiral-like cam 209, affixed to the shaft 91, so that in the rotation of the plates they will be longitudinally reciprocated by the opposing actions of the cam and springs. The tangential arrangement of the blades insures a direct bearing of each blade against the opposing side of the filled match tray as the latter is being introduced to the jaws and also permits the blade immediately upon the stoppage of the tray against the abutment 201 to move quickly upward in a vertical path, and thus escape the tray. The highest portion of the cam is of course in the vertical plane occupied by each of the blades at this period, so as to permit the requisite inward movement of the blade. The filled match-trays are thus successively delivered to the jaws, and the latter are constructed and arranged to grasp each tray presented thereto and carry it into a shuck or cover *b*, Fig. 35, supported in line therewith. The precise character of these jaws and of their supporting and operating parts will hereinafter appear.

The shuck supplying and controlling mechanism will now be considered, reference being had to Figs. 31, 32, 34, 36, 37, and 39 of the drawings. The shucks are contained in a rotary hopper comprising a circular series of vertical compartments 210, which are supported and carried by spiders 211, mounted on a vertical shaft 212. These compartments are each constructed by a rectangular casing open at both ends and preferably slotted longitudinally on its outer side, each compartment being of sufficient dimensions to receive a pile of collapsed or flattened shucks and permit them to be projected one by one from its lower end when the compartment is brought to a suitable discharge portion in the table 213, upon which the hopper turns. This table affords a bottom for the compartments, which latter are revolved intermittently to bring them successively to the discharge portion in the table. The compartment-casings are preferably provided at their lower ends with an encircling ring 211ª, which serves to tie them rigidly together. On the lower end of the shaft 212 is affixed a ratchet-wheel 214, with the teeth of which coacts a pawl 215, carried by a rock-arm 216, loosely mounted on said shaft. The pawl is held normally in engagement with the ratchet-wheel by a suitably-disposed spring 217. Pivoted to the rock-arm is a longitudinally-slotted link 218, into the slot 219 of which depends a pin 220 from a cross-head 221, which is fitted to a guideway 222 in the table 213, so as to be movable horizontally toward and from the discharge portion of the table, whereby as the cross-head approaches the end of its forward stroke the pin will abut against the opposing end of the slot, and thereby advance the link and effect the action of the pawl upon the ratchet-wheel. The cross-head is connected by means of a bar 223 with the cam-actuated lever 155, whereby said bar is under the control of the cam 156 and is reciprocated thereby in concert with the latter. On the cross-head 221 is formed or secured a plate 224, which is fitted to a depression 225 in the table and is reciprocable beneath and from the hopper-compartment located at the discharge portion of the table. This plate is of substantially the same width and length as the lower end of the compartment and is adapted in its forward stroke to abut against the opposing lowermost shuck in the pile and push it into an adjacent shuck-opening device 226. As the hopper-compartments are advanced one by one to the discharge portion of the table the lowermost shuck of each pile is ejected by the plunger into the said opening device.

As a simple and efficient means whereby the hopper shall be temporarily locked when each compartment thereof is moved to the discharging-station I provide the ring 211ª with a series of sockets 227, corresponding in number and position with the compartments, and arrange at a suitable point in the table a vertically-reciprocable bolt 228, which is movable into and from the successive sockets at regular intervals. The bolt is carried by the longer arm of a lever 229, which is fulcrumed on a lug 230, depending from the table. On the other arm of the lever is pivoted a sector 231, which is maintained normally depending by a weight 232 or the like. On the lower side of the cross-head 221 is a block 233, provided with a cam-surface 234 in the path of said sector. A suitably-disposed spring 235 acting upon the lever tends to maintain the bolt normally raised. When the cross-head is in its retracted position, the bolt is in register with one of the sockets in the hopper-ring 211ª, so as to lock the hopper; but as said cross-head is being advanced to eject the opposing shuck the cam-surface 234 coacts with the sector, and thereby raises the same and its lever-arm, thus withdrawing the bolt from the socket. Thereupon the pin 220 abuts against the end of the slotted link 218 and effects the operation of the pawl upon the ratchet-wheel in a manner to rotate the hopper one step. This done the bolt registers with the opposing socket in the ring 211ª and locks the hopper in place. In the return stroke of the cross-head the sector escapes the underlying cam-block and resumes its normal position in readiness for a succeeding operation.

236 is a drum comprising a rim 237, an end head 238, a series of radial webs or arms 239, and a central hub 240. The hub is loosely mounted on a stationary shaft 241, supported on a bracket 242 on the main frame at right angles to the axis of the rotatable shuck-hopper above described and below and laterally of the sprocket-wheels 75. In the rim 237 is

formed a series of transverse channels or pockets 243 at regular intervals apart, which channels or pockets by intermittent rotation of the drum are designed to be brought successively in line with the discharging portion of the hopper. In the present instance there are four channels or pockets in the drum, and hence the drum moves a quarter-revolution in each step. Any appropriate mechanism for intermittently rotating the drum may be employed.

I have illustrated herein an efficient means whereby the drum is not only impelled from pocket to pocket, but also temporarily locked in each position to which it is turned, as follows, in this connection reference being made to Figs. 29, 31, 34, and 35: Formed on or affixed to the head of the drum, concentric therewith, is a plate 244, provided with four radial slots or sockets 245, adapted to be successively engaged by a stud 246 on a rotating arm 247. This arm is affixed to a shaft 248, having its bearings in the brackets 154 and 242 on the main frame, which shaft is equipped with a bevel-wheel 249, gearing with a similar wheel 250 on the periodically-driven shaft 157, above described, whereby during the operation of the latter the arm 247 is positively rotated. In a part of its revolution the stud 246 registers with one of the slots 245 in the plate 244, and thereby turns said plate and, perforce, the drum a quarter-turn, thereupon clearing the slot and turning idly the remainder of the revolution until it reëngages the next opposing notch or socket for a succeeding movement. The arm 247 is provided with a sector 250, the periphery of which is concentric with the axis of the arm. The edges 251 of the plate between the sockets are hollowed out to afford sufficient clearance for the sector during the idle movement of the stud. On the inner face of the sector is a semicircular groove 252, which during such idle movement engages a suitably-disposed stud 253 on the head of the drum, and thereby temporarily locks the latter in place. A series of studs 253 are arranged adjacent to the respective edges of the slots in position to be successively engaged by said groove during the idle movements of the arm.

Partially incasing the rim of the drum is a segmental frame 254, which affords a temporary wall for the series of pockets 243 during the rotation of the drum. This frame has formed on or secured to its respective ends plates 255 $255^a$, which serve as end walls for such pockets during a part of their rotation. The drum is provided at the leading side of each pocket with a series of slots 256, into which extend a corresponding series of fingers 257 on the outer arm of a rock-lever 258. This lever is fulcrumed on the inner side of the end head 238 of the drum, the other arm thereof being provided with a stud 259, which is fitted to a face-cam 260, fast on the stationary shaft 241, whereby during the rotation of the drum the rock-lever is oscillated and the fingers thereon caused to swing within and transversely of the pocket.

When one of the pockets has been set adjacent to the discharging portion of the hopper-table, the collapsed or flattened shuck is pushed endwise into said pocket by the reciprocating plate 224. At this stage the fingers are clear of the interior of the pocket. In the succeeding movement of the drum the shuck thus deposited in the pocket is carried upward thereby, another pocket being in turn moved into position to receive a succeeding shuck from the hopper, and so on continuously. As the drum rotates the fingers are gradually swung into the shuck-containing pocket, thereupon bearing against the opposing folded edge of the shuck and causing the latter to assume its open position. The movements of the fingers are so controlled by the cam that as each pocket reaches its highest horizontal position the shuck is entirely open, the fingers supporting the proximate vertical side of the shuck, as indicated in Fig. 35.

The open shuck is in horizontal alinement with the spring-jaws 200, above alluded to, to the end that said jaws may be moved longitudinally into and from the shuck, and the filled match-tray in the grasp of the jaws thus be inserted in the shuck. Upon the retraction of the jaws from the tray and shuck the drum is advanced one step, the pocket containing the filled match-box being moved to the open part of the casing. In this movement the fingers are being gradually retracted from the side of the box, which, being unsupported, is discharged from the drum.

As the drum is intermittently rotated the pockets therein are successively brought into the path of the spring-jaws 200, and the operation just described repeated.

The plates 255, adjacent to the open side of the drum, are provided at or near their upper portion with a pair of suitably-disposed projections 261, which afford end stops for the shucks and trays as the latter are being pushed into the shucks.

As before remarked, the jaws are so constructed and arranged in respect to the trackways 198 that as each filled tray is discharged from the latter it is pushed between the jaws in position to be grasped thereby. These jaws comprise two thin plates, preferably of elastic material, of sufficient length to extend at their forward or free ends slightly beyond the interposed tray and of sufficient width to cover and protect the heads of the matches contained in the tray and to clamp or lock said matches against accidental displacement. The free ends of the jaws are made very thin, and they are rounded or tapered, as at $a'$, and turned inward, as at $b'$. (See Figs. 29 and 31.) These jaws are directed to and in line with the uppermost shuck-containing pocket of the drum, to the end that when the jaws are projected forward they will enter the opposing shuck and introduce the filled tray thereto. The inwardly-curved leading ends of the jaws

present inclined surfaces to the edges of the shuck, and thus facilitate the entrance of the jaws and tray to the latter. These ends being extremely thin and yielding will straighten out during the retraction of the jaws, and thus not disturb the matches in the tray. The jaws are carried by a cross-head 262, which is slidingly fitted to a suitably-located guide-frame 202 on the bracket 242 and is connected by means of a link 263 with the upper arm of the rocking lever 155, whereby during the operation of the latter the cross-head is reciprocated toward and from the drum, so as to introduce the jaws to the open shuck in its path. The lower jaw is affixed directly to the cross-head, while the upper jaw is supported by a vertically-movable plate 264 on the latter, so as to be movable up and down in respect to the lower jaw, said plate being preferably provided with depending guide-pins 265, which are fitted to vertical guide-grooves 266 in the cross-head. In the present instance the plate is provided with a depending pin 266, which extends freely through and below the cross-head, being provided on its lower or free end with an antifriction-roller 267, which, when the cross-head is retracted, bears upon a cam-piece 268 at the outer end of the guide-frame 202 and thereby maintains the plate and its jaws raised. Confined within the cross-head is a spiral spring 269, which, encircling the pin, acts to maintain it normally depressed. When the jaw is raised through the instrumentality of the cam 268, there is ample space between the two jaws to permit the free passage of the filled match-tray therebetween. When, however, the jaws are being advanced toward the pocketed drum, the pin clears the cam, and in consequence the upper jaw is moved down upon the tray, so as to clamp it in place and insure its transference into the opposing open shuck contained in the pocket of the drum. The jaws clamp the tray and its contained matches during the entire insertion of the tray into the shuck. In the return movement of the cross-head the jaws, being very light and yielding, are withdrawn from the tray, thus leaving the latter incased by the shuck. As the cross-head reaches its original position the pin rides upon the cam in its path, thus raising the upper jaw and maintaining it in position for a repetition of the operation above described upon a succeeding tray.

In order to obviate any liability of the jaws in their return movement retracting the tray from the shuck into which it has just been slid, I mount on the plates 255[a] a pair of spring-actuated bolts 270 with beveled ends 271, which project slightly into the path of the tray as it is being introduced to the shuck. The tray in its passage to the shuck abuts against the opposing ends of the bolts and presses them aside, and upon clearing the bolts they resume their normal position to afford a return barrier for the tray. The bolts are fitted to recesses in the plates 255[a] and are maintained normally projected by contained springs 272, which abut against shoulders 273 on the bolts and in the recesses respectively.

The four sets of boxing mechanisms are conveniently arranged in the relation shown in Figs. 1, 2, and 3—that is, two on each side of the machine—and the parallel trains of temporary holders are of relatively different lengths to extend to their respective boxing mechanisms. The inclined shafts 160 from the respective boxing mechanisms are geared with the shaft 163, so as to be simultaneously driven thereby, and, as above described, the gearing between said inclined shafts and the respective shafts 157 is under the influence of the respective conveyers of the temporary holders, so as to effect the action and inaction of the shafts 157 and the mechanisms controlled thereby.

The operation of the apparatus may be briefly described as follows: At the outset the tray-hopper is supplied with inverted trays and the shuck-hopper with piles of collapsed shucks. Power being applied to the main shaft, the inclined frame is longitudinally reciprocated or jarred through the eccentric and pitman connections, thereby correspondingly jarring the upper inclined portions of the several trains of temporary holders. The matches are ejected from the carrier by the punching mechanism and distributed by means of the tubes to and through the temporary holders. As the latter are jarred the matches slide down the same and progressively fill the divisions of the holders, the continual shaking or jarring causing the matches to settle within the holders. The trains of temporary holders travel upward toward and past the tubes, the holders of each train being moved into contact as they round the lower portion of the reciprocating frame and being maintained in contact until they pass the tubes. Said trains are independently driven by the action of the pawl-and-ratchet mechanisms on the sleeves 75, which carry each lower pair of sprocket-wheels 76 on the reciprocating frame. The pawls are continuously actuated by the eccentric and pitman connections, which are actuated from the main shaft. So long as the holders of the respective trains are supplied with matches the pawls are in engagement with their respective ratchet-wheels and the trains are being impelled; but should the supply of matches to the holders of any of the trains be stopped or exhausted the normally broken electric circuit will be completed by an empty holder of that train in a manner to occasion the energization of the magnet adjacent to the pawl of the train, in consequence of which said pawl will be disengaged from its ratchet-wheel and the advance of the train will cease. The stoppage of the train will also cause the stoppage of the boxing mechanism with which the train coöperates. So long as the trains are being impelled their respective boxing mechanisms

are in operation, for the reason that each of such mechanisms is driven from its shaft 157, and the operation of such shaft is controlled by the moving conveyer, the lateral rollers of which successively abut against and move the arm 180 in a manner to raise and lower the cam-bearing arm 173 and to effect thereby the coupling and uncoupling of the cam 156 to and from the adjacent continuously-driven gear 158. The trays, bottom downward, are delivered by the belt to the channels of the respective tray-hoppers, the latter being intermittently rotated by their pawl-and-ratchet mechanisms through their connections with the cams 156 on the respective shafts 157. In each dwell of the hoppers trays are moved therefrom upon the yielding supports above the filled temporary holders, and such trays are then pressed down upon the underlying holders. The trays thus applied are carried around by the holders and are removed therefrom as the trays approach an upright position, the matches in said holders thus being transferred to the trays. The filled trays are pushed by the rotating blades into a position between the jaws, whereupon said blades are retracted from the trays. Meanwhile the shucks from the hoppers have been supplied to the pocketed drum, and the latter through their connections with the shafts have been turned sufficiently to present open shucks to the trays thus held in the jaws, said shucks having been gradually opened by the action of the fingers thereagainst during the intermittent movement of the drum. The jaws embracing the trays are advanced so as to clamp the latter and carry them into shucks in line therewith. The jaws are then retracted, leaving the trays inclosed within the shucks in the pocketed drums. Thereupon the drums are each advanced one step and the filled match-boxes therein moved to the discharge portions of the respective casings. Thus the several mechanisms operate in proper time to effect automatically and efficiently the assembling of the matches in the temporary holders, the application of the inverted trays thereto, the removal of said trays supplied with the matches, and the introduction of the filled trays to the covers or shucks.

I claim—

1. In a machine for boxing matches, the combination with a source of match-supply, of an inclined match-holder below the same, a feed device leading from said source of supply to the holder and having its discharging portion inclined similarly to said holder, so as to deliver the matches lengthwise thereto, and means for impelling said holder in the direction of the inclination and progressively past the discharging portion of the feed device.

2. In a machine for boxing matches, the combination with a source of match-supply, of an inclined match-holder below the same, a feed device leading from said source of supply to the holder and having its discharging portion inclined similarly to said holder, so as to deliver the matches lengthwise thereto, means for impelling said holder in the direction of the inclination and progressively past the discharging portion of the feed device, and means for agitating said feed device.

3. In a machine for boxing matches, the combination with a source of match-supply, of an inclined match-holder below the same, a feed device leading from said source of supply to the holder and having its discharging portion inclined similarly to said holder, means for impelling said holder in the direction of the inclination and progressively past the discharging portion of the feed device, and means for agitating said holder and feed device.

4. In a machine for boxing matches, the combination with a source of match-supply, of an inclined match-holder below the same, a series of feed-tubes leading from said source of supply to the holder, and having their discharging portions inclined similarly to said holder, means for impelling said holder in the direction of the inclination and progressively past the discharging portions of the feed-tubes, and means for agitating the said holder and feed-tubes.

5. In a machine for boxing matches, the combination with a source of match-supply, and means extending downwardly and forwardly therefrom for receiving and feeding the matches lengthwise, of a chain of laterally-adjacent match-holders into which the matches are delivered, and means for impelling said holders toward and past the said feeding means, and in a direction opposite to the movement of the matches as they are discharged from the latter.

6. In a machine for boxing matches, the combination with a source of match-supply, of a series of tubular feeders leading from the same and having their discharging portions in an inclined plane, a series of open holders arranged adjacent to each other in an inclined plane similarly to and below the discharging portions of the feeders, and means for progressively impelling said holders in the direction of the inclination and toward and past the discharging portions of the feeders.

7. In combination with a source of match-supply, a series of open-top holders, means for supporting and impelling the same, a tubular feed device interposed between the source of supply and the path of the holders, means for agitating the holders while the latter are being supplied with matches, and a yielding connection between said means and the feed device whereby the feed device is also agitated.

8. In a machine for boxing matches, the combination with a source of match-supply, a series of trains of holders, and means for actuating the latter, of independent diverging sets of feeders leading from such source of

supply to the paths of the respective trains, said sets having inlet-openings of varying sizes.

9. In a machine for boxing matches, the combination with a source of match-supply, of a feed device extending downwardly and laterally therefrom, an inclined chain of holders, and means for advancing the same in the direction of the inclination and toward and past the said feed device.

10. In a machine for boxing matches, the combination with a source of match-supply, of a feed device extending downwardly and laterally therefrom, an inclined train of holders, and means for advancing the same toward and past the said feed device, whereby the matches as they are discharged from the latter, may slide down upon and progressively fill the advancing holders.

11. In a machine for boxing matches, the combination with a source of match-supply, of a feed device extending downwardly and laterally therefrom, an inclined train of holders, means for advancing the same in the direction of the inclination and toward and past the said feed device, and means for shaking or jarring said holders during their advancement.

12. In a machine for boxing matches, the combination with a match-carrier and means for punching the matches therefrom, of a series of feed-tubes which receive the freed matches, an inclined train of holders, and means for advancing the same in the direction of the inclination and toward and past the mouths of the feed-tubes, whereby the matches are freely discharged into the holders.

13. In a machine for boxing matches, the combination with a source of match-supply, of a feed device extending downwardly and laterally therefrom, an inclined train of holders, means for advancing the same in the direction of the inclination and toward and past the said device, whereby the matches are freely discharged into the holders, and means for inducing an air-current in said device.

14. In a machine for boxing matches, the combination with a source of match-supply, and a series of feed-tubes leading therefrom to different discharging-paths, of a series of inclined trains of holders, and means for impelling each of said series in the direction of its inclination and toward and past a discharging-path, whereby the matches are delivered from the tubes to the respective trains in a manner to slide down upon and fill the holders of the latter.

15. In a machine for boxing matches, the combination with a match-carrier, means for removing the matches endwise therefrom, and a series of feed-tubes divided into independent sets, substantially as described, which lead from the carrier to different discharging-paths, of a series of inclined trains of holders, and means for impelling each of the same in the direction of its inclination and toward and past a discharging-path of a set of feed-tubes, whereby the matches are distributed by said sets to and among the respective trains of holders.

16. In a machine for boxing matches, the combination with a match-carrier, means for removing the matches therefrom, a series of trains of holders, and means for actuating the same, of a series of tubes leading from said carrier to the paths of the respective trains of holders, the receiving portions of said tubes being of relatively different areas, substantially as and for the purpose described.

17. In a machine for boxing matches, the combination with a main frame or support, a source of match-supply, an endless series of match-holders, a jarring-frame on which said holders are supported, and means for actuating said latter frame, of a tubular feed device leading from the source of supply to the holders and pivotally connected at its respective ends with the main and jarring frames, whereby the said feed device is jarred concurrently with the holders.

18. In a machine for boxing matches, the combination with a main frame or support, a source of match-supply, a series of match-holders, a jarring-frame on which said holders are supported, and means for actuating said latter frame, of a feed device comprising upper and lower frame members with interposed guide-tubes, the upper member having a sliding pivotal connection with the main frame and the lower member being hingedly connected with the jarring-frame.

19. In a machine for boxing matches, the combination with a match-carrier, means for removing the matches therefrom, an endless train of connected holders, means for supporting and actuating the same to move a series of holders in contact at one time and to separate them at another time and a series of tubes constructed and arranged to deliver the matches freed from the carrier to the path of the series of contiguous holders.

20. In a machine for boxing matches, the combination of an inclined endless train of connected holders, a source of match-supply, feed devices leading therefrom to a point at or adjacent the summit of the inclined train, and means for impelling said train of holders in the direction of the inclination and progressively toward and past the feed devices, whereby the matches discharged from the latter flow into and along the advancing holders.

21. The combination with an endless chain of connected temporary holders, the connections whereof have provision for independent longitudinal movement, of means whereby the chain is actuated to move the holders adjacent to and apart from each other, and means for supplying matches to said holders when they are adjacent to each other.

22. The combination with a series of connected temporary holders, an endless carrier therefor, means whereby said carrier is actuated to move the holders adjacent to and apart from each other, means for supplying

matches to said holders when they are adjacent to each other, and means for applying match-trays to the filled holders when they are apart from each other.

23. The combination with a series of connected temporary holders, an endless carrier therefor, means whereby said carrier is actuated to move the holders adjacent to and apart from each other, means for supplying matches to said holders when they are adjacent to each other, means for applying match-trays to the filled holders when they are apart from each other, and means whereby trays with their match contents are removed from said holders.

24. The combination with a series of connected temporary holders, an endless carrier therefor, means whereby said carrier is actuated to move the holders adjacent to and apart from each other, means for supplying matches to said holders when they are adjacent to each other, means for applying match-trays to the filled holders when they are apart from each other, means whereby said trays with their match contents are removed from said holders, and means whereby shucks are applied to the filled trays.

25. In a machine for boxing matches, the combination with an endless carrier, a series of connected empty holders, and means for supplying matches thereto, of mechanism for advancing the empty holders to the said means in contact with each other, or substantially so, and for advancing the filled holders so as to separate them from each other, means for introducing trays to the filled holders, and means for introducing the filled trays to shucks.

26. In a machine for boxing matches, the combination with means for supplying matches, of an endless inclined train of connected holders, means for impelling said holders in the direction of the inclination and progressively past the supply means, whereby the matches stream down the ascending holders and progressively fill the same, means for agitating the holders during their traverse toward the said supply means, and means for applying trays to the filled holders when they have passed the said supply means.

27. The combination with an endless chain of connected temporary holders, the connections whereof have provision for independent longitudinal movement, of means whereby the same is actuated to move the holders adjacent to and apart from each other, means for supplying matches to said holders when they are adjacent to each other, and means for agitating or shaking said holders.

28. The combination with a series of connected temporary holders and an endless carrier therefor, of means whereby said carrier is actuated to move the holders adjacent to and apart from each other, means for supplying matches to said holders when they are adjacent to each other, means for agitating or shaking said holders, and means for applying match-trays to the filled holders when they are apart from each other.

29. The combination with a series of connected temporary holders, and an endless carrier therefor, of means whereby said carrier is actuated to move the holders adjacent to and apart from each other, means for supplying matches to said holders when they are adjacent to each other, means for agitating or shaking said holders, means for applying match-trays to the filled holders when they are apart from each other, and means whereby said trays with their match contents are removed from said holders.

30. The combination with a series of connected temporary holders, and an endless carrier therefor, of means whereby said carrier is actuated to move the holders adjacent to and apart from each other, means for supplying matches to said holders when they are adjacent to each other, means for agitating or shaking said holders, means for applying match-trays to the filled holders when they are apart from each other, means whereby said trays with their match contents are removed from said holders, and means whereby shucks are applied to the filled trays.

31. The combination of a series of temporary holders, a carrier therefor, means whereby said carrier in one part of its traverse is caused to carry said holders in an inclined plane, means whereby said carrier is actuated to move the holders adjacent to each other while ascending such plane, and at other times to separate said holders, and means for supplying matches to said holders while they are adjacent to each other.

32. The combination of a series of temporary holders, a carrier therefor, means whereby said carrier in one part of its traverse is caused to carry said holders in an inclined plane, means whereby said carrier is actuated to move the holders adjacent to each other while ascending such plane, and at other times to separate said holders, means for supplying matches to said holders while they are adjacent to each other, and means for applying match-trays to the filled holders when they are apart from each other.

33. The combination of a series of temporary holders, a carrier therefor, means whereby said carrier in one part of its traverse, is caused to carry said holders in an inclined plane, means whereby said carrier is actuated to move the holders adjacent to each other while ascending such plane, and at other times to separate said holders, means for supplying matches to said holders while they are adjacent to each other, means for applying match-trays to the filled holders when they are apart from each other, and means whereby said trays with their match contents are removed from said holders.

34. The combination of a series of temporary holders, a carrier therefor, means whereby said carrier in one part of its traverse is caused to carry said holders in an inclined

plane, means whereby said carrier is actuated to move the holders adjacent to each other while ascending such plane, and at other times to separate said holders, means for supplying matches to said holders while they are adjacent to each other, means for applying match-trays to the filled holders when they are apart from each other, and means whereby shucks are applied to the filled trays.

35. The combination of a series of connected temporary holders, the connections whereof have provisions for independent longitudinal movement, an endless conveyer for said holders, means for actuating said conveyer to move the holders into contact during a part of their traverse, and to separate them at another part of their traverse, and means for supplying matches to said holders when they are in contact.

36. The combination of a series of temporary holders, an endless conveyer therefor, means whereby said conveyer is supported and guided in an inclined plane during a part of its traverse, means whereby said conveyer is actuated to move the holders into contact during their traverse in such plane, and means for supplying matches to the holders while thus inclined.

37. The combination of a series of temporary holders, an endless conveyer therefor, means for actuating said conveyer to move the holders into contact during a part of their traverse, and to separate them at another part of their traverse, and means for supplying matches to said holders, together with the frame on which said conveyer is supported, and means for jarring said frame.

38. The combination of a conveyer comprising a series of links having provisions for independent longitudinal movement, temporary holders supported by said links, means for impelling said conveyer to move the holders into and out of contact with each other, at predetermined intervals, and means for supplying matches to the holders when they are in contact.

39. The combination of a conveyer comprising a series of links having provisions for independent longitudinal movement, temporary holders supported by said links, means for impelling said conveyer to move the holders into and out of contact with each other, at predetermined intervals, means for supplying matches to the holders when they are in contact, and means for applying match-trays to the holders when they are separated.

40. The combination of a conveyer comprising a series of links having provision for their independent longitudinal movement, temporary holders supported by said links, sprocket-wheels with which said links coact, means for supporting and actuating said wheels, and means whereby said links are gradually moved into engagement with the interdental spaces of the sprocket-wheels so as to effect the independent movement of the said links to advance the temporary holders into contact with each other, or substantially so, together with means for supplying matches to said holders when they are thus advanced.

41. The combination of a conveyer comprising a series of links having provision for their independent longitudinal movement, temporary holders supported by said links, sprocket-wheels with which said links coact, means for supporting and actuating said wheels, and curved guide devices arranged eccentrically to the sprocket-wheels and adapted to be engaged by the links of the conveyer as they round said wheels, whereby the said links are gradually moved into the interdental spaces of said wheels to effect the independent movement of the temporary holders into contact with each other, or substantially so, together with means for supplying matches to said holders.

42. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting-wheels in said frames for the said chain, means for actuating said wheels, a guide adjacent and eccentric to the wheels in the reciprocating frame, means whereby the chain is engaged with said guide and thereby gradually moved into the interdental spaces of the wheels so as to move the holders successively toward each other as they round said wheels and means for supplying matches to said holders.

43. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting-wheels in said frames for the said chain, means for actuating said wheels, guides for said chain on the main and reciprocating frames, and a sliding connection between said guides, together with means for supplying matches to the holders.

44. The combination with an endless chain of connected holders having provision for independent longitudinal movement, of means for impelling said chain, and means for independently moving the holders toward and from each other, means for supplying matches to the holders, and means for applying trays to the filled holders.

45. The combination with an inclined endless chain of holders having provision for independent longitudinal movement, of means for impelling said chain, and means for independently moving the holders toward each other as they pass to and up the incline, and for thereafter separating said holders.

46. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for actuating said chain, and means for supplying matches to the holders.

47. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for actuating said chain, means

for supplying matches to the holders, and means for applying trays to the filled holders.

48. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for actuating said chain, means for supplying matches to the holders, means for applying trays to the filled holders, and means whereby said trays with the contents of the holders are removed.

49. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for actuating said chain, means for supplying matches to the holders, means for applying trays to the filled holders, means whereby said trays with the contents of the holders are removed, and means whereby said trays with their contents are applied to shucks or covers.

50. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for impelling said chain, means for moving the holders into contact with each other, or substantially so, as they pass along the reciprocating frame, and means for supplying matches to the holders while they are upon the reciprocating frame.

51. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for actuating said chain, means for supplying matches to the holders, mechanism for applying match-trays to the filled holders, and means under the control of the chain for rendering the said mechanism operative and inoperative.

52. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, supporting means therefor on the respective frames, means for actuating said chain, means for supplying matches to the holders, mechanism for applying match-trays to the filled holders, mechanism whereby the trays with the contents of the holders are removed, mechanism for applying the filled trays to shucks or covers, and means under the control of the chain for rendering the said mechanisms operative and inoperative.

53. The combination with a series of trains of temporary holders, means for independently actuating the same, and means for filling said holders, of a corresponding series of tray-supplying mechanisms whereby inverted trays are applied to the holders of the respective trains, means for actuating said tray-supplying mechanisms and means under the control of said trains for determining the operation and inoperation of their respective tray-supplying mechanisms.

54. The combination with a series of trains of temporary holders, means for independently actuating the same and means for filling said holders, of a corresponding series of tray-supplying mechanisms whereby trays are applied to the holders of the respective trains, means for actuating said tray-supplying mechanisms, means whereby the trays are removed from said holders with the contents of the latter, a corresponding series of mechanisms for receiving the filled trays and introducing the same to shucks, a corresponding series of shuck-supplying mechanisms, actuating mechanisms for the latter, and means under the control of said trains for determining the operation and inoperation of the respective mechanisms for supplying the shucks and trays and for introducing the trays to the shucks.

55. The combination with a series of trains of holders, and means for operating the same, of means for supplying matches to said holders, mechanisms for applying match-trays to the filled holders of the respective trains, mechanisms whereby the trays with the contents of the holders are removed, mechanisms for feeding shucks, mechanisms for applying the filled trays to the said shucks, a driving-shaft and operative connections between the same and the said mechanisms respectively, each of said connections including means which is rendered active and inactive by the adjacent train of holders.

56. In a machine for boxing matches, the combination with a series of traveling temporary holders, mechanism for actuating the same, and means for supplying matches to said holders, of means under the control of the holders for automatically arresting the operation of the said actuating mechanism when the supply of matches to a holder or holders is deficient.

57. The combination with a conveyer, and means for actuating the same, of a series of temporary holders on said conveyer, means for filling said holders, and means for automatically arresting the movement of said conveyer when the supply of matches to a holder or holders is deficient or checked.

58. The combination with a conveyer, and means for actuating the same, including a pawl-and-ratchet mechanism, of a series of temporary holders on said conveyer, means for filling said holders, and means for automatically arresting the action of the said pawl-and-ratchet mechanism when the supply of matches to a holder or holders, is deficient or checked.

59. The combination with a conveyer, and means for actuating the same, of a series of temporary holders on said conveyer, means for filling the said holders, an electromagnetic stop-motion for automatically arresting the movement of said conveyer when the supply of matches to a holder or holders is deficient or checked.

60. The combination with a conveyer and means for actuating the same, including a

pawl-and-ratchet mechanism, of a series of temporary holders on said conveyer, means for filling said holders, a normally broken electric circuit, including an electromagnet adjacent to the pawl of said mechanism, and means whereby the said circuit is completed when the supply of matches to a holder or holders is deficient, whereby the said magnet is energized and the pawl moved out of action.

61. The combination with a conveyer, and means for actuating the same, of a series of temporary holders on said conveyer, one (or more) of which holders is provided with a movable portion carrying an electrical contact-piece, means for filling said holders and thereby changing the normal position of said movable portion and its contact-piece, a normally broken electric circuit in the normal path of said contact-piece and an electromagnet in said circuit adapted when the circuit is completed, through the medium of a contact-piece, to render the conveyer-actuating mechanism inoperative.

62. In a machine for boxing matches, the combination with a series of temporary holders, and means for advancing the same, of means for simultaneously partitioning a plurality of said holders in a direction parallel to their path of movement.

63. In a machine for boxing matches, the combination with temporary holders, and means for supporting and advancing the same, of a stationary strip extending into the path traversed by the holders, and adapted to partition the latter into compartments during a part of their traverse.

64. In a machine for boxing matches, the combination with temporary holders, and means for supporting and advancing the same, of a stationary strip extending into the path traversed by the holders, and adapted to partition the latter into compartments during a part of their traverse, and means for agitating said holders while they are thus divided.

65. In a machine for boxing matches, the combination with a source of match-supply, of a series of temporary holders arranged laterally adjacent to each other, means for supporting and impelling said holders, and means for temporarily partitioning said holders in planes parallel to their path of movement.

66. In a machine for boxing matches, the combination with a source of match-supply, of a series of connected temporary holders, the connections whereof have provision for independent longitudinal movement, means for supporting and impelling the said holders relatively to the source of supply and for independently moving the holders toward and from each other, and means partitioning the holders into compartments of less width than the length of a match, and extending above the tops of said holders.

67. The combination with a series of traveling temporary holders, and means for supporting and actuating the same, of a series of partition-plates extending into said holders longitudinally of and parallel with the path thereof, or substantially so.

68. The combination with a series of traveling temporary holders, and means for supporting and actuating the same, of a series of stationary partition-plates extending into said holders longitudinally of and parallel with the path thereof.

69. The combination with a chain of temporary holders, and means for supporting and actuating the same in an inclined path, of a series of partition-plates extending into said holders longitudinally of and parallel with the inclined path thereof.

70. The combination with a temporary holder having slotted walls, and means for supporting and actuating said holder, of a stationary partition-plate adapted to extend into the slotted walls of said holder during the traverse of the latter.

71. The combination with the main frame, a reciprocating frame, and means for actuating the latter, of an endless chain of holders, the adjacent walls of which are correspondingly slotted, supporting and driving mechanism for said chain, and a series of stationary partition-plates adapted to extend into the slotted walls of said holders during the traverse of the latter.

72. The combination with a series of temporary holders, and means for supporting and impelling the same, of a rotary hopper having a series of peripheral chambers, means for rotating said hopper, means whereby trays are supplied thereto, and removed therefrom in proximity to the path of the temporary holders, and means whereby the trays thus removed are applied to the temporary holders in succession and carried onward thereby.

73. The combination with a temporary holder, of an outwardly-yielding support above the same, means for imposing an inverted tray on said support, and means for depressing such tray upon the said temporary holder.

74. The combination with a series of temporary holders, and means for supporting and advancing the same, of an outwardly-yielding tray-support located above the path traversed by said holders, and means for successively delivering inverted trays upon the temporary holders as they pass below the said support.

75. The combination with temporary holders, and means for supporting and impelling the same, of a hopper having a series of peripheral chambers, means for rotating said hopper, a conveyer extending below the path of said chambers and adapted to deliver trays thereto, and to eject trays therefrom in proximity to the path of the temporary holders, and means whereby the trays thus removed are applied to the temporary holders in succession.

76. The combination with temporary holders, and means for supporting and impelling the same, of a hopper having a series of pe-

ripheral chambers, means for intermittently rotating said hopper, locking and releasing mechanism therefor, means whereby trays are supplied to and removed from said chambers, and means whereby the trays thus removed are applied to the temporary holders in succession.

77. The combination with temporary holders, and means for supporting and impelling the same, of a hopper having a series of peripheral chambers, a shaft for said hopper, pawl-and-ratchet mechanism for intermittently rotating said hopper, a cam, means for supporting and actuating the same, operative connections between said cam and the said pawl-and-ratchet mechanism, means whereby trays are supplied to and removed from the chambers of the hopper, a plunger, and means whereby the same is operated in relation to the said pawl-and-ratchet mechanism to apply the removed trays to the temporary holders in succession.

78. The combination with temporary holders, and means for supporting and impelling the same, of a hopper having a series of peripheral chambers, a shaft for said hopper, pawl-and-ratchet mechanism for intermittently rotating said hopper, a lever connected with the pawl, a cam, means for supporting and actuating the same, operative connections between said cam and lever, and means whereby trays are supplied to and removed from the chambers of the hopper, together with a plunger connected with said lever and adapted to act upon the removed trays to apply the same to the temporary holders in succession.

79. The combination with temporary holders, and means for supporting and impelling the same, of means for applying inverted trays to the holders in succession, and a trackway in which the trays thus applied are supported and guided for a portion of their traverse on the holders, and by which trackway such trays as they approach an upright position are withdrawn from the holders.

80. The combination with an endless series of connected temporary holders, and means for supporting and impelling the same, of means for applying inverted trays to the holders in succession, a trackway in which the trays thus applied are supported and guided for a portion of their traverse on the holders, and means on the trackway whereby the trays are ejected from the trackway.

81. The combination with an endless series of connected temporary holders, and means for supporting and impelling the same, of means for applying inverted trays to the holders in succession, a trackway in which the trays thus applied are supported and guided for a portion of their traverse on the holders, means on the trackway whereby the trays are ejected from the trackway, and means whereby the trays thus ejected are applied to shucks or covers.

82. The combination with temporary holders, and means for supporting and impelling the same, of means for applying inverted trays to the holders in succession, a trackway in which the trays thus applied are supported and guided for a portion of their traverse on the holders, a series of reciprocable devices, means whereby they are projected toward and from the rear of the trays in the trackway, and means whereby said devices are advanced in concert with the temporary holders.

83. The combination with heads or disks, a shaft therefor, and means for rotating said heads or disks, of a chain of temporary holders adapted to turn upon said heads or disks, means for applying trays to said holders, means whereby the trays are removed therefrom, a series of arms or blades interposed between said heads or disks, and means whereby said arms or blades are projected and retracted in respect to the trays so as to act against and advance the latter when they are removed from the temporary holders.

84. The combination with heads or disks, a shaft therefor, and means for rotating said heads or disks, of a chain of temporary holders adapted to turn upon said heads or disks, means for applying trays to said holders, means whereby the trays are removed therefrom, a series of arms or blades interposed between said heads or disks, a cam on the said shaft, and springs to maintain the said arms or blades in engagement with the cam, whereby during the rotation of said arms or blades, they are projected and retracted in respect to the trays so as to act against and advance the latter when they are removed from the temporary holders.

85. The combination with heads or disks, a shaft therefor, and means for rotating said heads or disks, of a chain of temporary holders adapted to turn upon said heads, or disks, means for applying trays to said holders, means whereby the trays are removed therefrom, a series of arms or blades interposed bewteen said heads or disks tangentially to the shaft, or substantially so, a spiral cam on said shaft, and springs to maintain the said arms or blades in engagement with the cam, whereby during the rotation of said arms or blades they are projected and retracted in respect to the trays so as to act against and advance the latter when they are removed from the temporary holders.

86. The combination with a pair of tray-holding jaws, one of which is of sufficient width to extend across and inclose the open top of a tray, and means for longitudinally reciprocating the jaws and for relatively moving them toward and from each other, of means for inserting a match-tray between said jaws, and means for supporting a cover or shuck in the longitudinal path of the jaws and the tray therebetween.

87. The combination with a reciprocating support, of two coacting jaws, means for longitudinally reciprocating said support, means for closing the jaws during their forward

stroke and for opening them during their return stroke, means for inserting a match-tray between the jaws when open, and means for supporting a cover or shuck in the longitudinal path of the jaws and the tray therebetween.

88. The combination with a reciprocating support, of two coacting jaws, a cam, means for supporting and actuating the same, operative connections between said cam and the support, whereby the latter and the jaws are longitudinally reciprocated, means for closing said jaws during their forward stroke and for opening them during their return stroke, means for inserting a match-tray between the jaws, when open, and means for supporting a cover or shuck in the longitudinal path of the jaws and the tray therebetween.

89. The combination with a hopper adapted to contain a pile of collapsed shucks, and means for ejecting the shucks successively therefrom, of means for receiving the ejected shucks and for opening the same, said means including pressure devices reciprocative laterally in respect to the shucks, and means for applying match-trays to the open shucks.

90. The combination with a hopper having a series of compartments in which collapsed shucks are adapted to be contained and means for supporting and rotating said hopper, of means for ejecting the shucks successively from the compartments, means for receiving the ejected shucks and for opening the same, and means for applying match-trays to the open shucks.

91. The combination with a hopper provided with a series of compartments in which collapsed shucks are adapted to be contained, a shaft for said hopper, pawl-and-ratchet mechanism for intermittently rotating said hopper, a device for ejecting the shucks successively from the compartments, a cam, means for supporting and actuating the same, operative connections between the cam, the pawl-and-ratchet mechanism and the ejecting device, means for receiving the ejected shucks and for opening the same, and means for applying match-trays to the open shucks.

92. The combination with a pocketed carrier, of means for actuating the same, means for introducing collapsed shucks to the pockets of the carrier in succession, and means independently reciprocable in said pockets, for opening the shucks in said carrier.

93. The combination with a pocketed drum, of means for rotating the same, means for introducing collapsed shucks to the pockets of the drum in succession, and means for opening such shucks during the rotation of the drum.

94. The combination with a peripherally-pocketed drum, of means for rotating the same, means for introducing collapsed shucks to the pockets of the drum in succession, and devices extending into said pockets, and adapted during the rotation of the drum to bear against and open the shucks.

95. The combination of a peripherally-pocketed drum, a shaft on which it turns, means for rotating said drum, a cam on said shaft, levers pivoted to the drum and engaged with said cam, and devices on said levers extending into the pockets of the drum and adapted to be oscillated therein during the rotation of the drum.

96. The combination of a segmental frame, a pocketed drum mounted to turn therein, means for introducing collapsed shucks to the pockets of the drum in succession, and means extending into said pockets for opening the shucks during the rotation of the drum.

97. The combination of a pocketed drum, means for intermittently rotating and temporarily locking said drum, means for introducing collapsed shucks to the pockets of the drum in succession, and means for opening such shucks during the rotation of the drum.

98. The combination of a pocketed carrier, means for actuating the same, means for introducing collapsed shucks to the pockets of the carrier in succession, means independently reciprocable in said pockets for opening such shucks during the movement of the carrier, and means for introducing trays to the shucks thus opened.

99. The combination with intermittently-rotatable mechanism for receiving and opening collapsed shucks, of mechanism whereby match-trays are introduced to the open shucks.

100. The combination with intermittently-rotatable mechanism for receiving and opening collapsed shucks, of tray-holding jaws, and means for moving the same into and from the open shucks.

101. The combination with upper and lower clamping-jaws having relative movement toward and from each other, and being of sufficient length and width to clasp a tray and lock the contained matches throughout the length of the tray, and means for longitudinally reciprocating said jaws, of means for supporting a cover or shuck in the longitudinal path of said jaws, and the tray therebetween, whereby the tray, while it is clamped throughout its length by said jaws, is wholly introduced to said shuck, and stop devices for preventing the retraction of the tray from the shuck in the return stroke.

102. The combination with upper and lower clamping-jaws, having relative movement toward and from each other, and being of sufficient length and width to clasp a tray and lock the contained matches throughout the length of the tray, and means for longitudinally reciprocating said jaws, of means for supporting a cover or shuck in the longitudinal path of said jaws and tray therebetween, whereby the tray, while it is clamped throughout its length by said jaws, is wholly introduced to said shuck, and spring-controlled bolts for preventing the retraction of the tray from the shuck in the return stroke of the jaws.

103. The combination with a main frame, a reciprocating frame thereon and means for

reciprocating the latter frame, of sprocket-wheels mounted in said reciprocating frame, sprocket-wheels mounted in the main frame, mechanism for actuating said wheels, an endless conveyer coacting with said wheels and provided with match-holders, and tension mechanism acting upon the lower portion of said conveyer during its traverse.

104. In combination with means for supplying matches, an endless series of connected temporary holders, means for advancing the same in an inclined path to the delivery portion of the supply means so as to fill said holders progressively with a descending stream of matches, means for jarring the holders while they are being filled, means for intermittently moving the filled holders beyond the supply means, and means for applying a match-tray to each of the filled holders while it is at rest.

105. The combination with a source of match-supply, of an endless series of flexibly-connected temporary holders, the connections having provision for independent longitudinal movement, means for moving a plurality of said holders into contact with each other, means for advancing the contiguous holders to the source of supply, and means for subsequently separating said holders.

106. In means for introducing filled trays to shucks, upper and lower tray-clamping jaws having relative movement toward and from each other, and being of sufficient length and width to clasp a tray and lock the contained matches throughout the length of the tray, said jaws having their free extremities deflected inwardly.

107. In means for introducing filled trays to shucks, upper and lower tray-clamping jaws having relative movement toward and from each other, and being of sufficient length and width to clasp a tray therebetween and lock the contained matches throughout the length of the tray, said jaws having their free extremities tapered and deflected inwardly.

108. In means for introducing filled trays to shucks, upper and lower tray-clamping jaws having relative movement toward and from each other, and being of sufficient length and width to clasp a tray therebetween and lock the contained matches throughout the length of the tray, said jaws having their free extremities thinned and deflected inwardly.

109. The combination of upper and lower tray-clamping jaws having relative movement toward and from each other, and being of sufficient length and width to clasp a tray therebetween and lock the contained matches throughout the length of the tray, said jaws having inwardly-deflected flexible extremities, means for longitudinally reciprocating said jaws, means for introducing a filled tray between said jaws, and means for supporting a shuck or cover in the longitudinal path of said jaws.

110. The combination with means for supporting a shuck or cover, of a head reciprocable toward and from the same, means for reciprocating said head, a pair of flexible clamping-jaws on said head, and means for introducing a filled tray between said jaws, said jaws locking the matches in the tray and moving with the latter during the entire insertion of the tray in the shuck or cover.

111. The combination with a pair of reciprocating tray-holding jaws having inwardly-deflected flexible extremities, means for longitudinally reciprocating said jaws, and means for opening and closing said jaws, of means for inserting a filled match-tray between said jaws, means for supporting a shuck in the longitudinal path of said jaws, and means for preventing the withdrawal of said trays from the shuck during the retraction of the jaws.

112. The combination of a pair of oppositely-disposed flexible tray-holding jaws, of greater length than the tray therebetween, means for opening said jaws, means for inserting a filled tray between said jaws, means for closing the jaws upon the tray, means for longitudinally reciprocating said jaws to move the same with the interposed tray into an open shuck, and means for retaining the tray in the shuck during the retraction of said jaws.

113. In a match-box-filling machine, means for placing the matches in the match-tray, means for placing said tray into a tube, and means moving with the tray and in engagement with the matches the whole length of the tray for locking the matches in said tray during the entire insertion thereof into said tube, said locking means being adapted to enter the tube with said matches in the tray, whereby said matches will be locked in position in the tray during the entire insertion.

114. In a match-box-filling machine, means for placing the matches in a match-tray, means for inserting said tray into a tube, a locking device carried by said inserting means for holding the matches in said tray, and means for actuating said device.

115. In a match-box-filling machine, means for placing the matches in a match-tray, means for automatically delivering said tray to a tube, and means for automatically inserting said tray into said tube, and locking the matches in the tray during the entire insertion of the tray in a tube.

116. In a match-box-filling machine, means for inserting a match-tray into a tube, and means moving with the tray and in engagement with the matches the whole length of the tray and adapted to enter said tube for locking said matches in said tray during the entire insertion.

117. In a match-box-filling machine, means for holding the tube, a pusher for inserting said tray in said tube, and means on said pusher for holding or locking the matches in said tray.

118. In a match-box-filling machine, means

for inserting a match-tray into a tube, means for locking said matches in said tray during the entire insertion, and means for removing said locking means from said tube.

119. In a match-box-filling machine, means for holding the tube, means for filling the tray, means for inserting said tray in said tube, and means for holding the matches in the tray and moving with said tray during the entire insertion.

120. In a match-box-filling machine, means for filling the tray, means for holding the tube, a pusher, and a blade on said pusher adapted to lock the matches in said tray.

121. In a match-box-filling machine, an endless belt or conveyer situated at an incline, which incline is in the line of travel of the conveyer, means for operating the same, false boxes secured to said belt, means for continuously delivering matches into said false boxes, and means for placing the matches into a tray.

122. In a match-box-filling machine, an endless belt or conveyer, situated at an incline, which incline is in the line of travel of the conveyer, false boxes carried thereby, partitions in said false boxes, means for continuously delivering matches into said false boxes, which being at an incline will receive the overflow from the adjacent box, and means for removing the matches from said boxes, and placing the same into a tray.

123. In a match-box-filling machine, an endless belt or conveyer situated at an incline, which incline is in the line of travel of the conveyer, means for operating the same, false boxes carried by the same, and a shaker situated at an incline and adapted to deliver matches from one end thereof into said false boxes.

124. In means for inserting filled match-trays in shucks, a sliding member, a spring-blade thereon, and means for causing said blade to bear upon the top of a tray and clamp the same and the contained matches during the entire insertion of the tray in the shuck.

125. In a match-box-filling machine, an endless belt or conveyer, false boxes carried thereby, partitions in said false boxes, a feeder adapted to receive matches from a suitable source and continuously deliver the same into said boxes which being at an incline cause the overflow to be received in an adjacent box, which incline is in the line of travel and means for shaking or agitating said feeder.

126. In a match-box-filling machine, an endless belt or conveyer, false boxes carried thereby, partitions in said false boxes, and an inclined reciprocating feeder having a plurality of delivery portions adapted to deliver matches into said boxes.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

JOSEPH C. DONNELLY.

Witnesses:
LEWIS D. CASTOR,
ANDREW V. GROUPE.