No. 684,568. Patented Oct. 15, 1901.

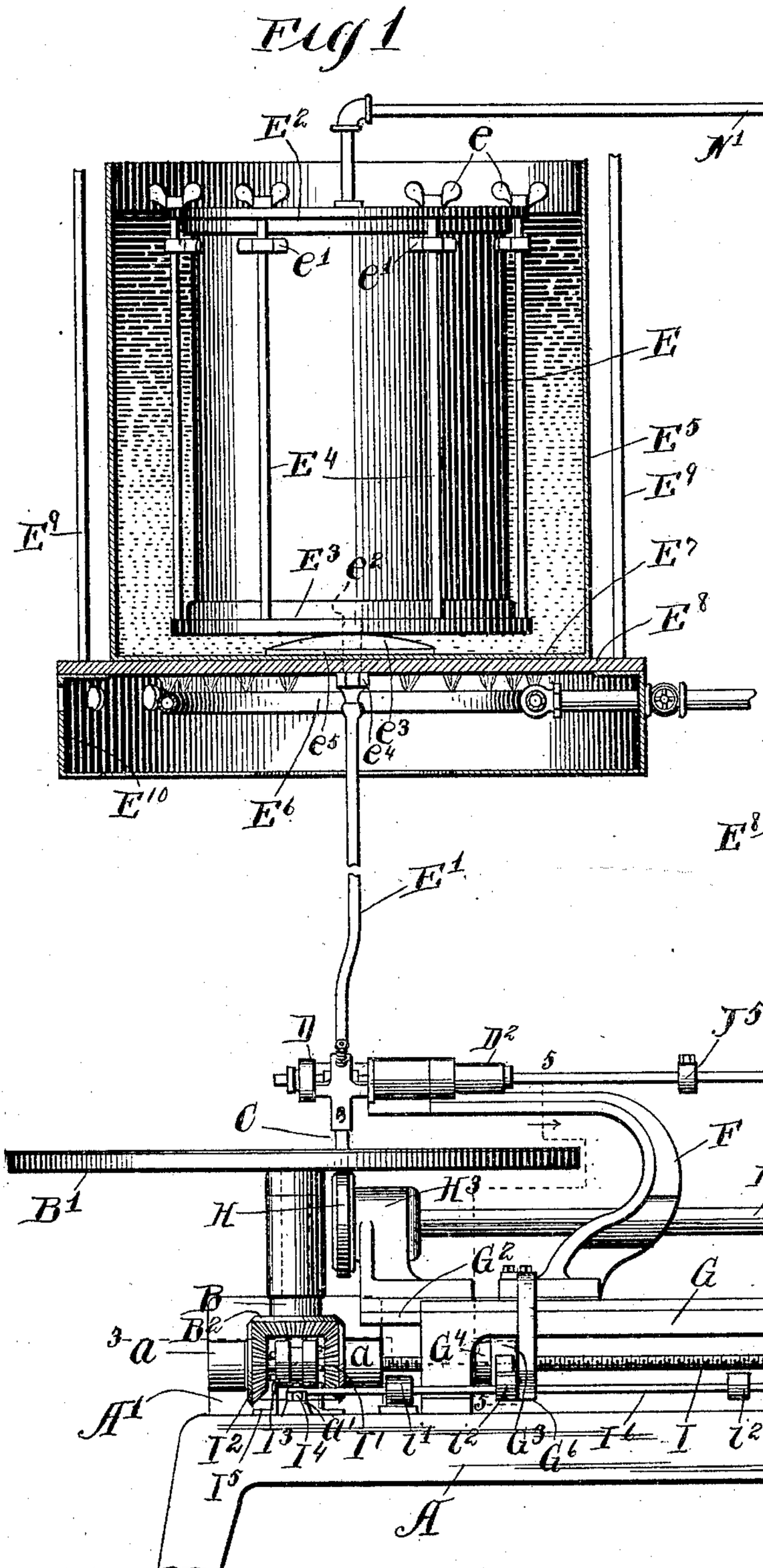
F. N. GARDNER & A. B. CADMAN.

MACHINE FOR MAKING ABRADING DISKS.

(Application filed Nov. 30, 1900.)

(No Model.) 4 Sheets—Sheet 1.

Fig 1



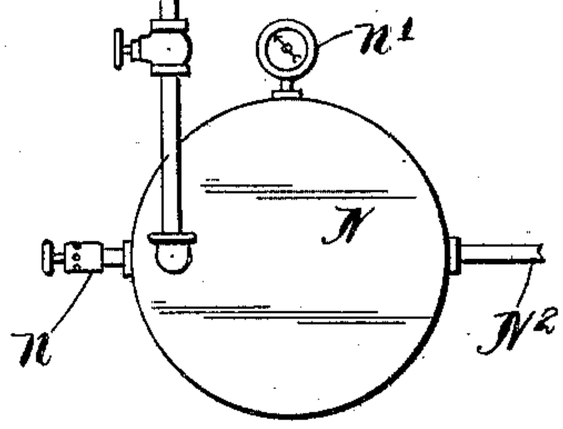
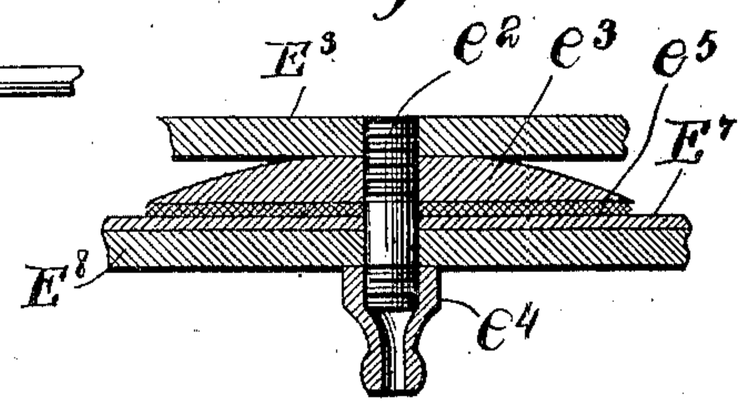


Fig 1a



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(No Model.) 4 Sheets—Sheet 2.

Fig 2.

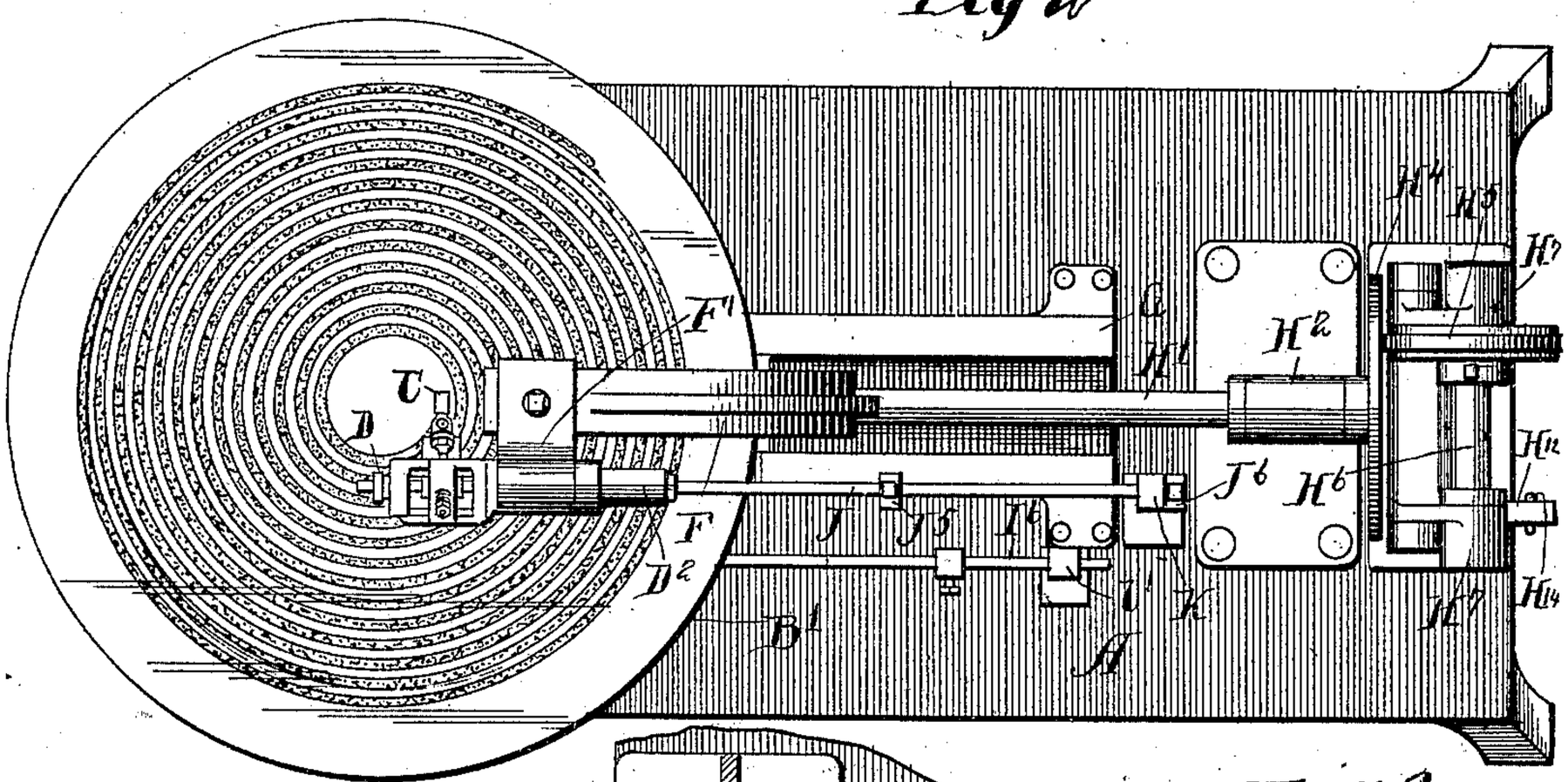


Fig 3.

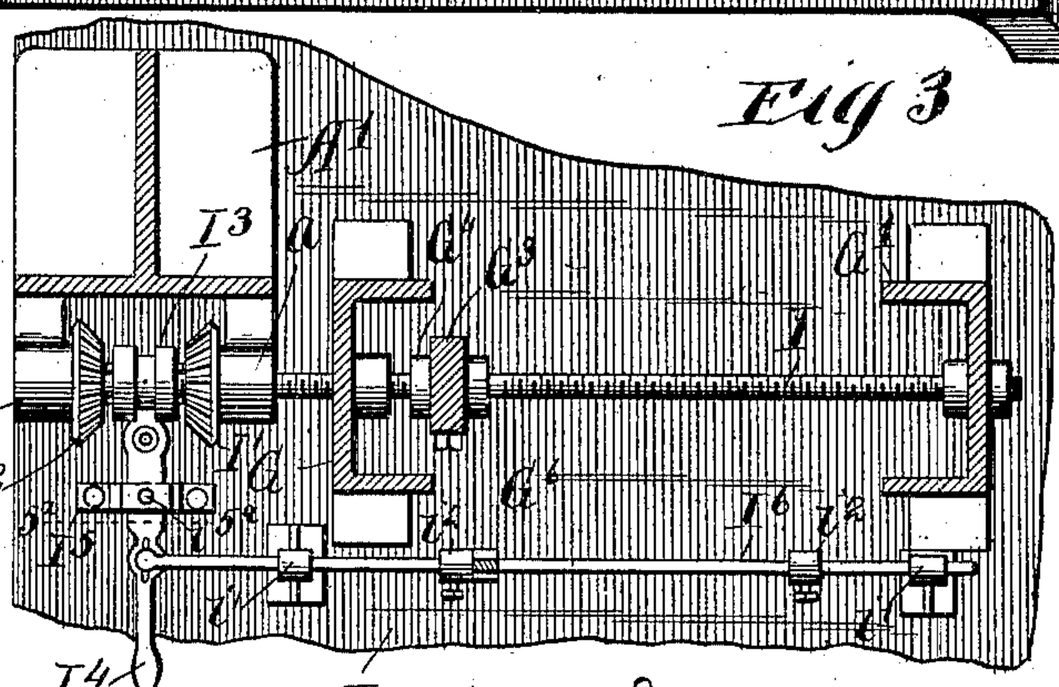


Fig 4.

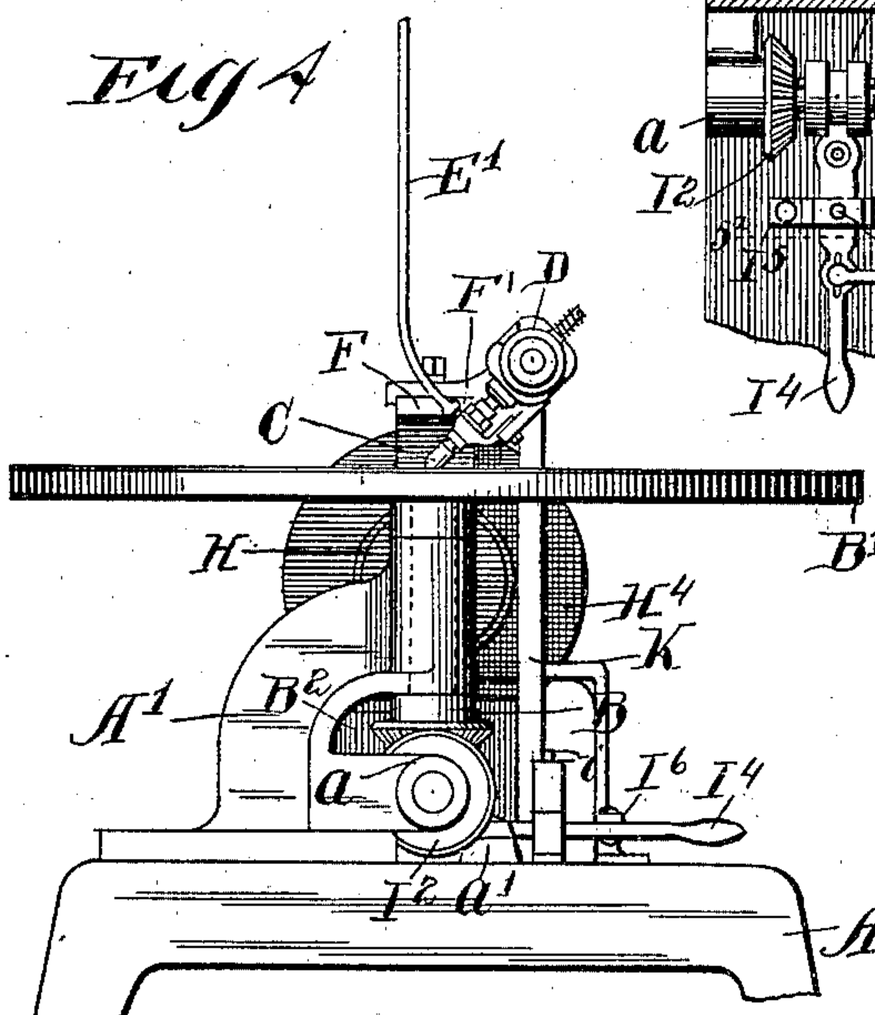


Fig 5.

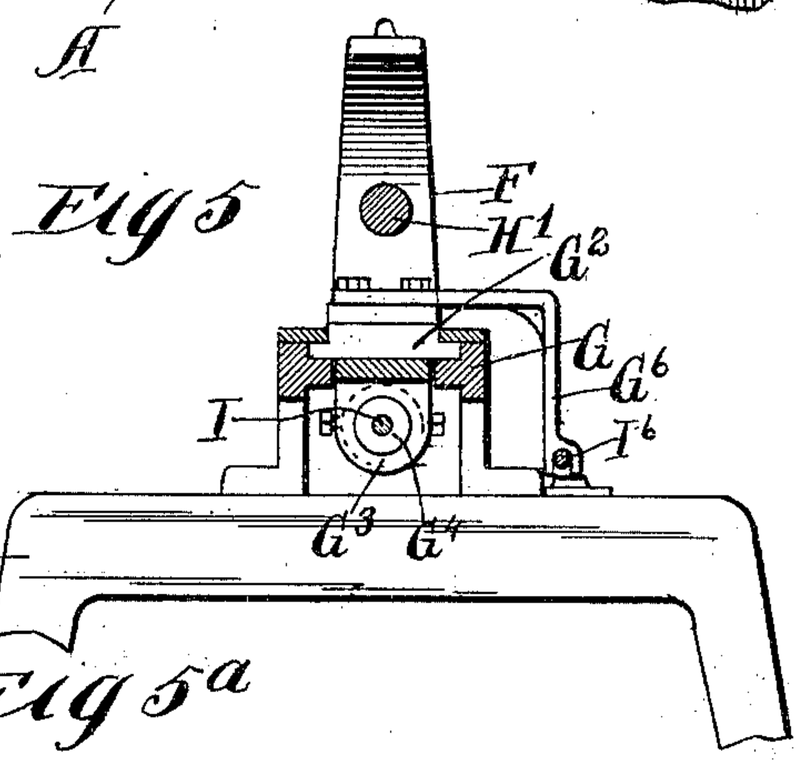
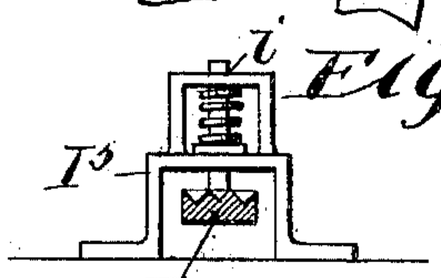


Fig 5a.



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(No Model.) 4 Sheets—Sheet 3.

Fig 6

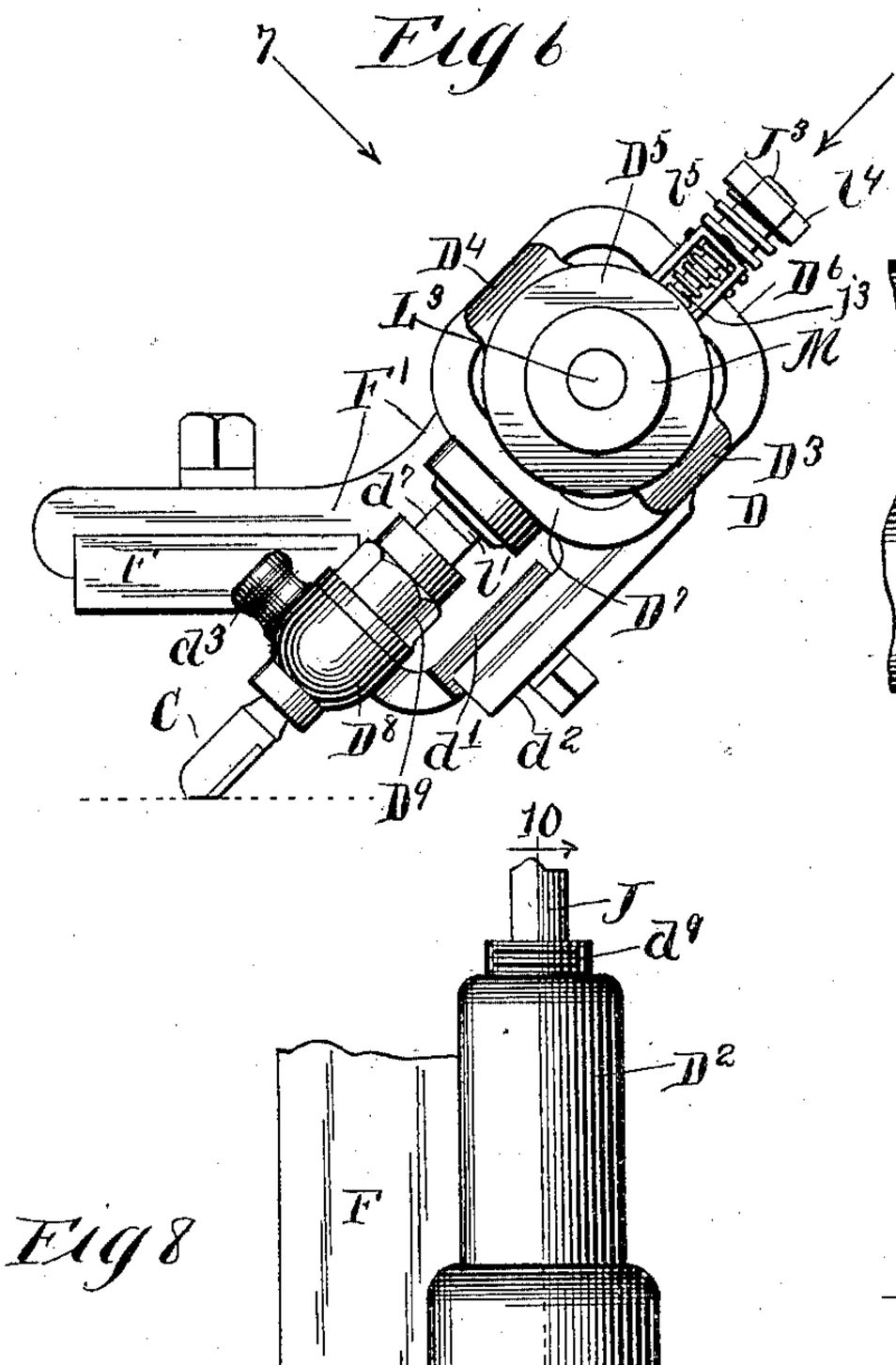


Fig 7

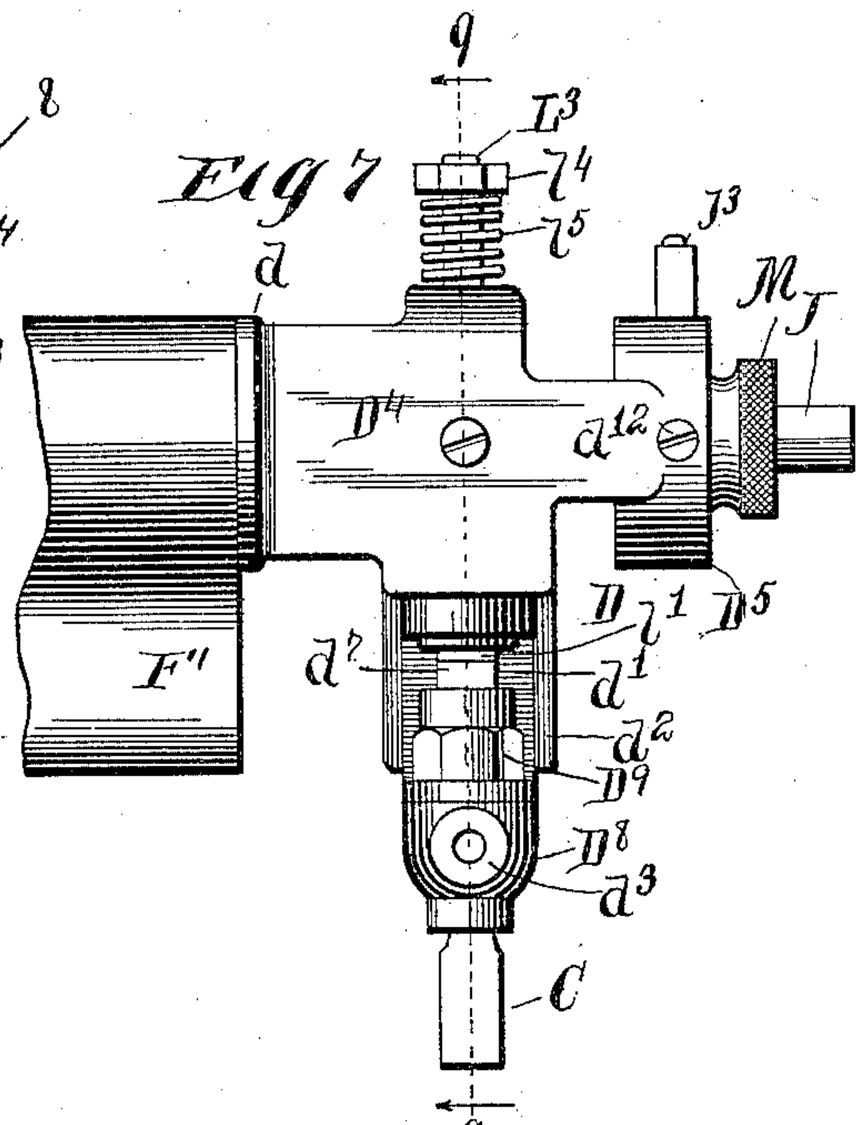


Fig 8

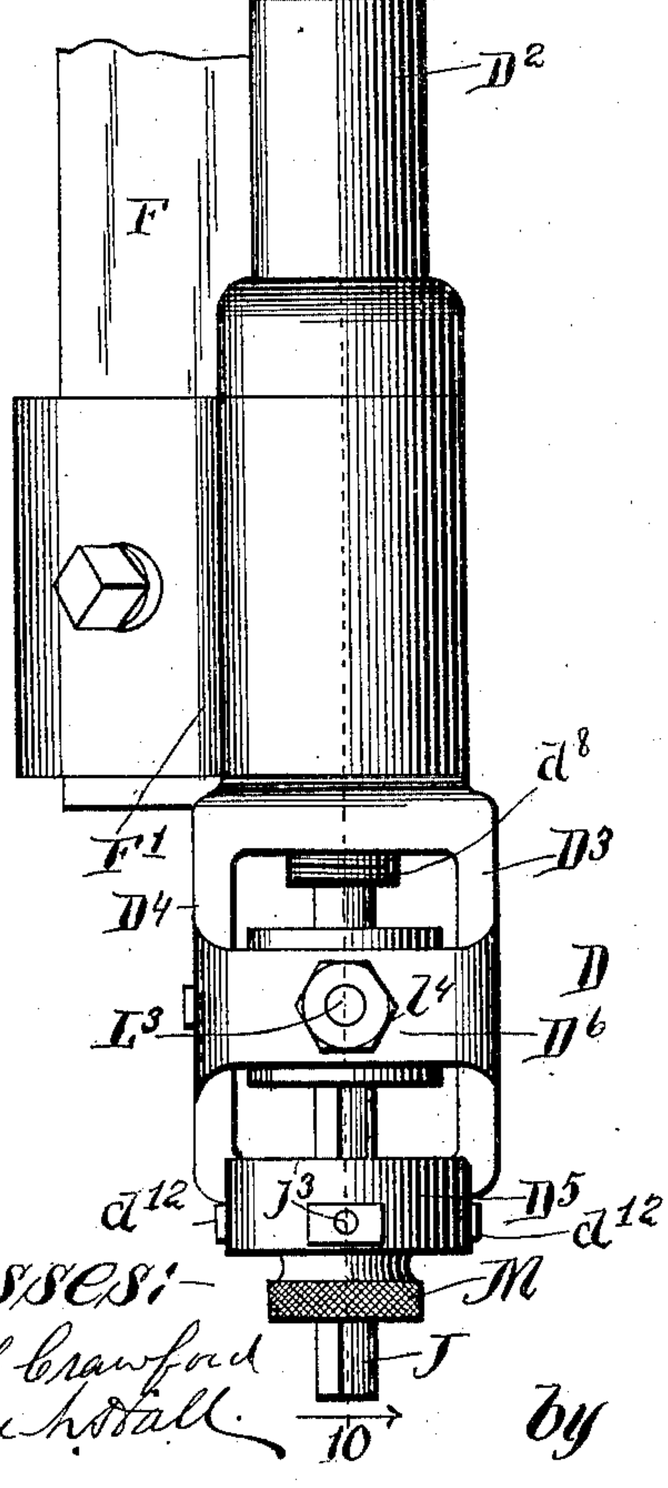
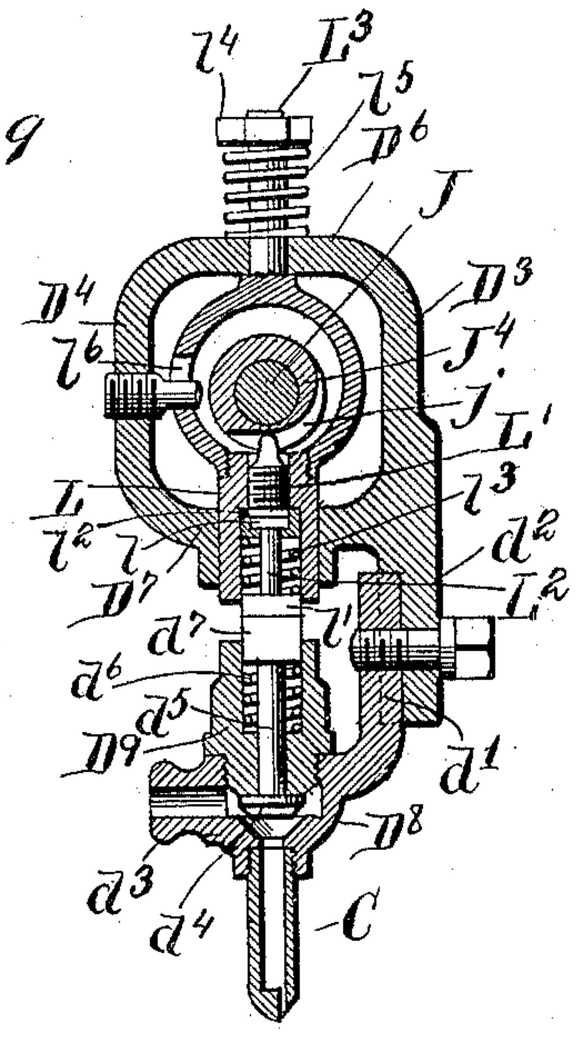


Fig 9



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MACHINE FOR MAKING ABRADING DISKS.

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(No Model.) 4 Sheets—Sheet 4.

Fig 10

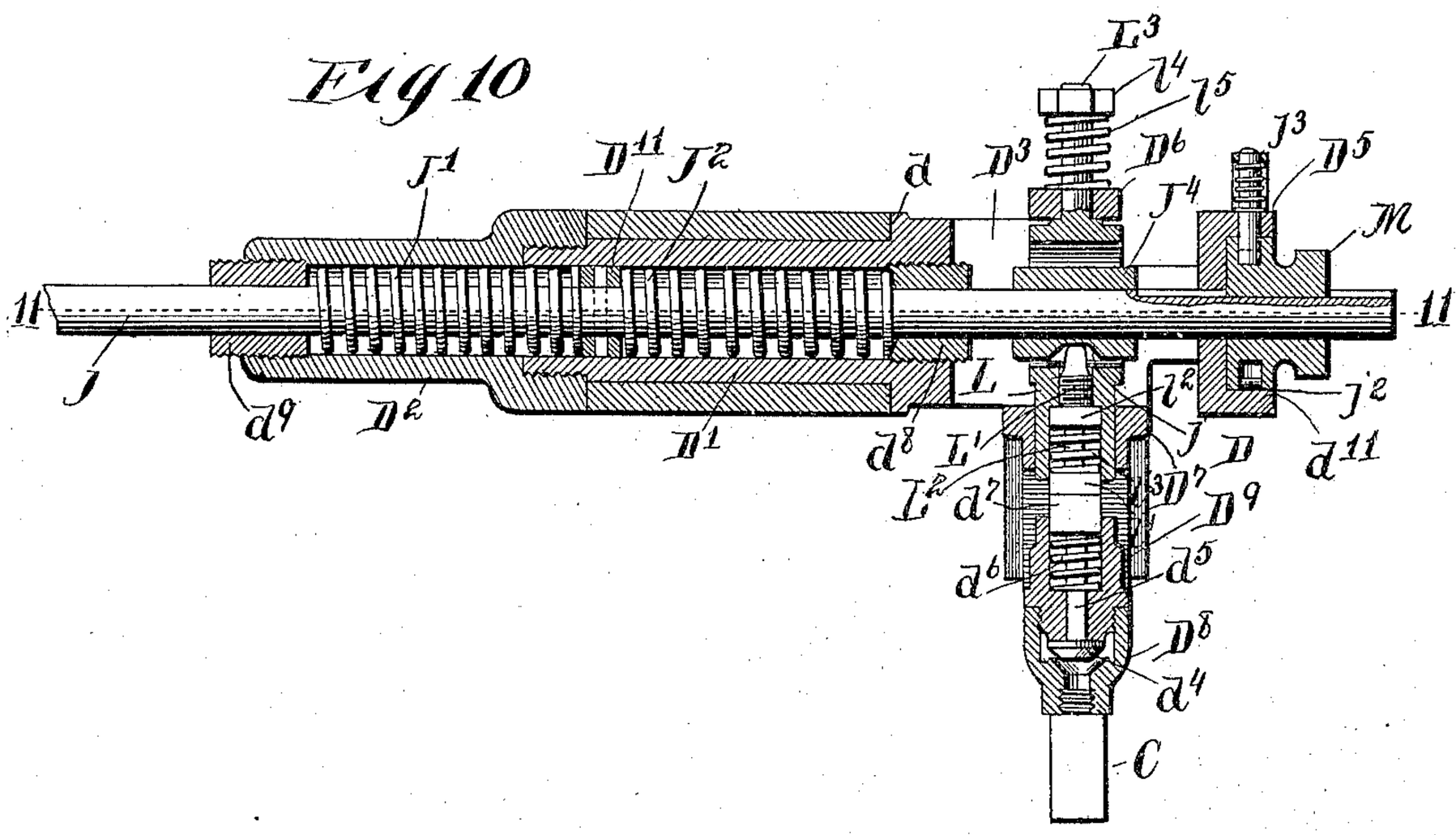


Fig 11

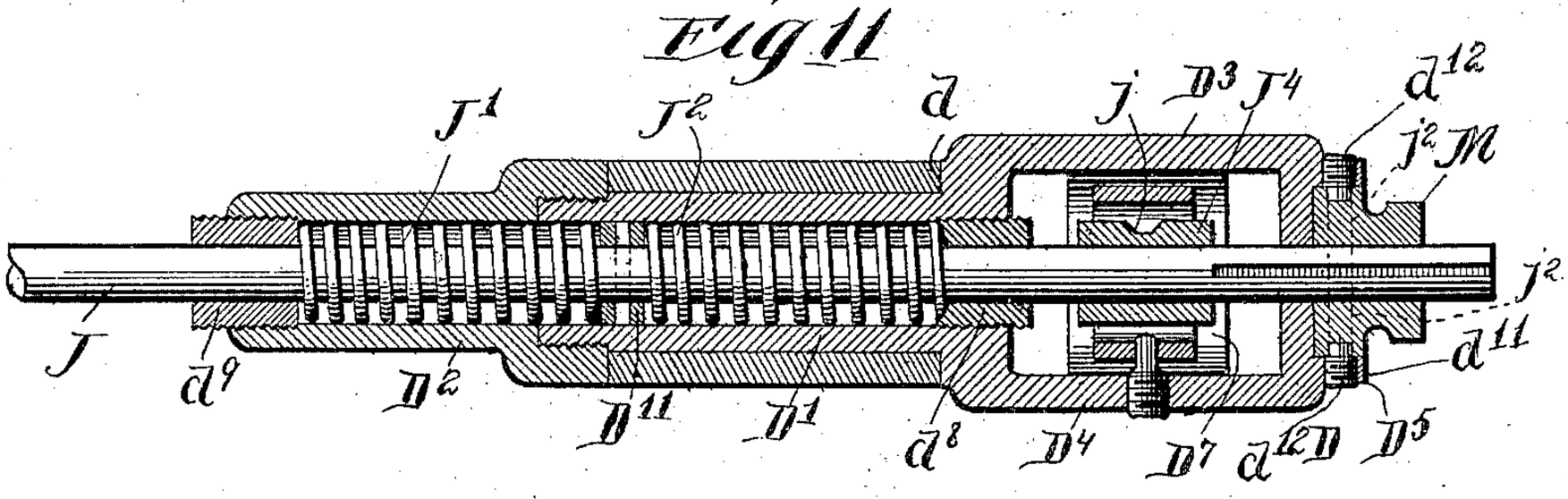


Fig 12

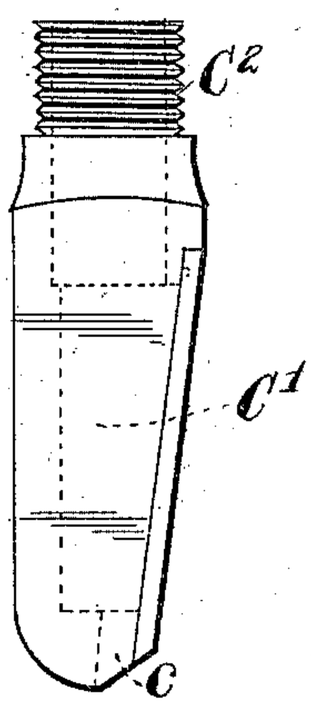


Fig 14

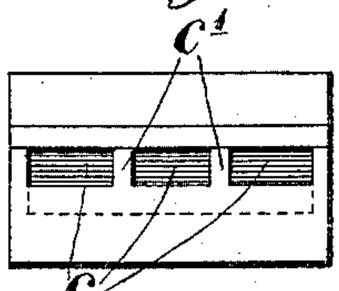
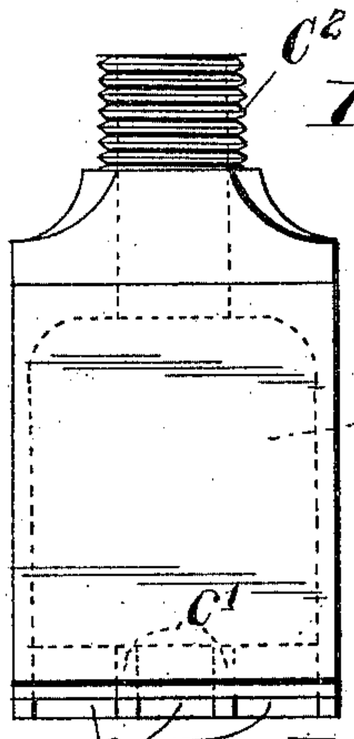


Fig 13



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UNITED STATES PATENT OFFICE.

FREDERICK N. GARDNER AND ADDI BENJIMAN CADMAN, OF BELOIT, WISCONSIN, ASSIGNORS TO CHARLES H. BESLY, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING ABRADING-DISKS.

SPECIFICATION forming part of Letters Patent No. 684,568, dated October 15, 1901.

Application filed November 30, 1900. Serial No. 38,148. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK N. GARDNER and ADDI BENJIMAN CADMAN, of Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Machines for Making Abrading-Disks; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel machine for effecting one step in the process of manufacturing grinding or abrading disks of that kind consisting of a sheet or disk of paper or like material, on one face of which is applied abrading material, such as emery or pulverized corundum, in a continuous line or strip arranged generally in a spiral form, with the turns or convolutions thereof parallel with each other, and which is made to adhere to the disk by means of glue or like adhesive substance previously applied to the disk. Said strip is disposed on the sheet or disk in a manner to provide between the turns or convolutions of the strip clearance-grooves or depressions of a width to accommodate the grindings of the disk.

The machine here shown is designed to apply the glue to the disk in a spiral line or strip preparatory to applying the corundum thereto.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of a machine for carrying out our invention, showing some of the parts in section. Fig. 1^a is a fragmentary sectional detail of the discharge-pipe of the glue-pot and associated parts. Fig. 2 is a plan view of the machine. Fig. 3 is a horizontal fragmentary section on line 3 3 of Fig. 1. Fig. 4 is an end view of the machine as seen from the front end of the machine. Fig. 5 is a fragmentary vertical section on the line 5 5 of Fig. 1. Fig. 5^a is a vertical section on line 5^a 5^a of Fig. 3. Fig. 6 is an end view of the nozzle-supporting device and the valve-actuating mechanism for said nozzle. Fig. 7 is a view of said nozzle-supporting device and valve-actuating mechanism looking in the direction indicated by the arrow in connection with Fig. 6. Fig. 8 is a partial plan view of said parts looking in the direction indicated by the arrow on Fig. 6. Fig. 9 is a transverse section taken on line 9 9 of Fig. 7. Fig. 10 is a longitudinal section on line 10 10 of Fig. 8. Fig. 11 is a longitudinal section on line 11 11 of Fig. 10. Figs. 12, 13, and 14 are details of a modified form of nozzle which supplies the glue to the disk.

As shown in said drawings, and referring more particularly to Figs. 1 to 5, inclusive, A designates the base-plate of the machine, which is provided with suitable supporting-legs and at one end with a standard A′, rising therefrom. Within said standard is mounted a rotative shaft B, which carries at its upper end a horizontal disk or plate B′, which latter supports the sheet or disk to which the abrading material is to be applied.

C designates a glue-discharging nozzle, which is located above the disk and has a bodily movement in a direction toward and from the center thereof. Said nozzle may have one or more discharge-orifices. The nozzle is attached to and moves with a head D, which head is constructed to support a valve and valve-actuating mechanism, by which a supply of glue to the nozzle is controlled.

E designates a glue-pot located above the level of said nozzle and connected with the head and therethrough with the nozzle by means of a flexible pipe E′. The glue-pot is connected with an air-pressure device to control the discharge of glue therefrom, and said pot is made air-tight, so that the required pressure may be maintained therein. The head D is supported on the outer end of an upwardly and laterally curved arm F. Said arm F is supported at its lower end upon a stand G, located below the level of the disk B′, and the arm is movable toward and from the disk B′ in a path located in the plane of the central axis of said disk, so that when moved it will carry the nozzle C thereon toward and from the center of the disk. Rotary movement is given to the disk B′ through the medium of a friction-wheel H, which is

affixed to a rotative shaft H′, mounted at one end in the upper end of a standard H^2 and at its other end in a bracket H^3, supported upon the stand G. Said shaft H′ is rotated through the medium of a friction driving mechanism consisting of a disk H^4, fixed rigidly to the shaft, and a friction-disk H^5, which rotates on an axis perpendicular to the axis of the shaft H′ and is adapted to engage at its periphery the face of the disk H^4. Said disk H^5 is mounted on a rotative shaft H^6 and is adjustable endwise on said shaft, so that it may engage the disk H^4 at varying distances from its center, and the speed of the shaft H′ may be thereby changed as desired. The shaft H^6 is mounted in the upper ends of arms H^7, which are pivoted at their lower ends to swing toward and away from the disk H^4, and the disk H^5 is held yieldingly against the disk H^4 by means of spiral compression-springs H^8, connected at their outer ends with said arms H^7 and at their inner ends with the standard H^2. The shaft H^6 may be driven through the medium of a pulley located outside of one of said arms H^7. One of the arms H^7 is provided with a rigidly-projecting part or arm H^{12}, which is adapted to be connected by a rod H^{14} to a foot lever or treadle, (not shown,) by which the disk H^5 is moved away from the disk H^4 to stop the machine.

The construction by which the arm F is moved toward and from the disk B′ is in this instance made as follows: Said arm is attached at its lower end to a longitudinally-sliding carriage G^2, which fits and slides in the upper part of the stand G, as shown in Fig. 5, said carriage and stand having interfitting engagement to hold the former in place. Said carriage is provided with a rigid depending arm G^3, which is apertured at its lower end to receive an interiorly-screw-threaded collar G^4, the collar being made fast to the arm by means of a set-screw, as shown in Figs. 1 and 5.

I designates a rotative screw-shaft which receives motion from the shaft B and is journaled at one end in the rear leg G′ of the stand G and at its other end in bearing-arms *a*, projecting from the standard A′. Said rotative screw-shaft I is operatively connected with the shaft B of the disk B′ through the medium of a reversing-gear comprising beveled pinions I′ I^2, which are loosely mounted on said shaft and project between the bearing-arms *a*, a bevel-pinion B^2, mounted on the lower end of the disk-shaft B and meshing with the pinions I′ I^2, and a clutch collar or ring I^3, which is non-rotatively mounted on the shaft I between the beveled pinions I′ I^2. The proximate faces of the pinions I′ I^2 and the clutch-collar I^3 are provided with interlocking projections and recesses, and said collar is adapted to be moved into engagement with either one of said pinions and lock the same to the shaft, at which time the other pinion rotates freely on the shaft. The clutch-collar is actuated by means of a lever I^4, pivoted on a block *a*′ to swing in a horizontal plane and engaging at its inner end a groove in said collar. With this construction when power is applied to rotate the disk B′ said disk will, through the shaft B and pinion B^2 at the end thereof, transmit rotary motion through either one of the pinions I′ I^2 thereof which is locked in the shaft by the clutch mechanism described to the screw-shaft I and cause movement of the slide G^2 and arm F, connected therewith, thereby moving the glue-discharging nozzle inwardly or outwardly with respect to the disk, depending on the direction of the rotation. Said lever I^4 vibrates in a guide-loop I^5, attached to the bed-plate, as shown in Figs. 3, 4, and 5^a, and said loop is provided with a spring-pressed pin *i*, as shown in Fig. 5^a, adapted to engage either one of three depressions or notches in the upper surface of the lever to hold the lever at either limit of its throw, with the clutch engaged with one of the pinions I′ I^2, or in an intermediate position, with the clutch disengaged from both pinions. Said notches have sloping sides, so as to permit the lever to be swung without first raising the pin, while at the same time holding the lever against accidental displacement. Desirably said lever is automatically swung from either limit of its movement to its intermediate position at the time the nozzle reaches the end of its travel in either direction, and thereby stop rotation of the shaft I and parts actuated thereby. A convenient construction for effecting this result is made as follows: I^6 designates an endwise reciprocatory rod which slides in guide-lugs *i*′ *i*′ on the bed-plate and is disposed parallel to the path of travel of the carriage G^2 at one side thereof. Said rod is pivotally connected at one end with the lever I^4 and is provided at laterally-separated points thereon with collars i^2 i^2, adapted to be severally engaged by a laterally-extending arm G^6, affixed to the carriage G^2 or a part moving therewith. Said collars i^2 are adjustable longitudinally on the rod and are adapted to be set on the rod in position to be struck by the arm G^6 at the time it is desired to stop the travel of the nozzle at either limit of said travel. Such engagement of the arm with the collars i^2 acts only to move the clutch into its intermediate position, and when movement of the nozzle in the opposite direction is desired the clutch will be given further movement by hand.

It will be observed that by reason of the fact that the nozzle and disk are connected by positively-operating gear connections the relation of the rotative and radial velocities of the disk and nozzle, respectively, will always be maintained, notwithstanding the variations of speed of the disk. It follows, therefore, that the distances between the turns or convolutions of the spiral strip of glue applied by the nozzle will remain constant.

If the disk B′ be given a constant rate of speed in its rotation and the nozzle C be moved radially inwardly and outwardly at a uniform speed, the glue discharged from said nozzle would not be uniformly applied to the sheet supported on said disk, it being obvious that in such case the outer part of the disk would have a greater surface speed than the inner part, and the glue would be applied to said outer part less thickly than at the inner part. Means are therefore provided for imparting to the disk B′ a variable speed, whereby the surface of the disk located immediately beneath the nozzle will always move at such velocity with respect to the radial travel of the nozzle as to apply the glue uniformly to the disk. As one means of accomplishing this result the friction-pulley H is movable endwise on the shaft H′, and the bearing-bracket H^2, in which said pulley is mounted, is attached to the carriage G^2, to which the lower end of the arm F, carrying the nozzle, is attached. The pulley H is therefore moved radially toward and from the center of the disk in contact with the lower surface thereof and imparts a variable velocity thereto, said velocity decreasing as the pulley moves toward the circumference of the disk. The pulley H is located vertically beneath the nozzle C and by reason of their connection with the slide G^2 retain this vertical relation throughout their radial movement. It will be seen, therefore, that the part of the disk located vertically beneath the nozzle C is always moved at the same surface speed, so that the glue discharged from said nozzle is applied uniformly to the sheet supported on the disk.

The head D has swiveling connection with the arm F in a manner to permit it and the nozzle carried thereby to be swung upwardly away from the disk when it is desired to place a sheet upon the disk or remove it therefrom. Said head also supports a valve and valve-actuating mechanism which control the flow of glue through the nozzle. Said head and the means by which it is supported are made as follows: D′ D^2 designate two tubular sections of a two-part sleeve which have screw-threaded connection end to end, one end of the part D′ fitting within the adjacent end of the part D^2. Said sections D′ D^2 are of uniform diameter throughout, constituting, in effect, a single sleeve. Said two-part sleeve is connected with the arm F through the medium of a laterally-extending bearing-bracket F′, the bracket fitting loosely over the part D′ of said sleeve between the enlarged end of the part D^2 and an enlargement or shoulder *d* at the opposite end of the part D′. To the outer end of said two-part sleeve is attached the head D, (see Figs. 6 and 9,) which is of open construction and consists of laterally-separated vertically-disposed members D^3 D^4, an end member D^5, and two transverse members D^6 D^7, located between the ends of the head and extending between said side members at the upper and lower edges thereof. The nozzle C has screw-threaded engagement at its upper end with a casing D^8, which latter is provided with an arm *d*′, by which it is connected with a downwardly-projecting lug or arm d^2 on the side member D^3 of the head. Said casing is provided with a nipple d^3, with which the lower end of the flexible pipe E′, leading from the glue-pot, is attached. d^4, Figs. 9 and 10, designates a conical valve located within said casing D^8 and adapted to engage a seat in said casing to close the orifice with which the nozzle C is connected. Said valve is provided with a stem d^5, which passes outwardly through a hollow sleeve D^9, forming part of said casing, said sleeve having screw-threaded connection with an aperture in the main part of the casing which is located opposite to the aperture with which the nozzle C is engaged. Said valve is held normally opened by means of a spiral expansion-spring d^6, located within an enlarged part or recess in the outer end of the sleeve D^9 and bearing at one end against the bottom of the said recess and at its outer end against a head d^7 on the outer end of the stem. Means are provided for automatically closing said valve at the time when the nozzle reaches either limit of its movement, it being of course desirable to stop the flow of the liquid glue at this time. The construction by which such automatic closing of the valve is effected is made as follows: J, Figs. 1, 2, 9, and 10, designates an endwise-reciprocatory rod, which is mounted at one end in the upper end of the standard K and at its other end in the head D. Said rod projects at its outer end slightly beyond the head. The rod has guiding engagement in the two-part sleeve with hollow plugs d^8 d^9, which latter have screw-threaded engagement with the opposite ends of the sections D′ D^2 of the two-part sleeve. Within said sections of the two-part sleeve and surrounding the rod are located spiral expansion-springs J′ J^2, which are interposed between the plugs d^8 d^9, respectively, and a collar D^{11}, attached to the rod midway of the sleeve, and which permit the rod to move endwise in either direction, while tending to hold it yieldingly in its intermediate or central position. Attached to the actuating-rod J at the outer end of said two-part sleeve is the cam-block J^4, which is attached to the sleeve, so as to move therewith, and provided with a V-shaped cam-notch *j* on one side thereof. Surrounding said cam-block is a yoke or ring having guiding projections or stems L and L^3, the former of which passes through a bearing-aperture in the lower transverse member D^7 of the head and the latter through an oppositely-located bearing-aperture of the upper transverse member D^6 of the head. Said yoke or ring is provided with a projection L′, adapted for engagement with the cam-block, and is held yieldingly engaged with the cam by means of a spring l^5, surrounding the stem L^3 and interposed between the head and a nut or collar l^4 on the outer end of the stem. The

part L of the yoke constiutes a plunger, which is adapted for operative connection with the valve-stem. The plunger is depressed to close the valve by moving the block endwise and bringing an unnotched part thereof in contact with the projecting part L′ of the plunger. The same result may be secured by rotation of the block. As herein shown, said operative connection is a yielding one and is made as follows: Said plunger is made tubular and is provided centrally thereof with a pin L^2, having on its inner end a head *l*, adapted for engagement with the part L′ of the plunger, and at its other end with a head *l′*, which engages the head d^7 of the valve-stem. Said pin L^2 is surrounded at its end adjacent to the head *l* by a sliding ring l^2, having an annular flange which incloses the head *l* thereof and adapted for engagement with an annular internal shoulder in the bore of the plunger. l^3 designates a spiral expansion-spring surrounding the pin and interposed between said ring and the head *l′* of the pin and acts to hold the ring against the head *l* thereof. When the projection L′ of the plunger L engages the deepest part of the cam-notch, a space is left between the head *l* of the pin L^2 and said part L′ of the plunger, and when said cam-block is moved to bring an unnotched part thereof in contact with said projection of the plunger it first depresses the plunger L against the action of the spring l^3 until the part L′ is brought against the head *l* of the pin, when further movement of the plunger acts directly through the pin and the valve-stem to close the valve.

It will be observed that the plunger L, the pin L^2 therein, and the stem d^5 of the valve constitute, in effect, a continuous operative connection between the cam-block J^4 and the valve to close the latter. The yielding connection afforded by the spring l^3 is provided in order to obviate the necessity of closely fitting said parts and at the same time insuring the proper closure of the valve. In order to prevent said plunger rotating about its axis, one of the arms of the yoke is provided with a guide-slot l^6, which is engaged by a set-screw passing through the side member D^4 of the head and projecting into said slot.

The endwise reciprocation of the rod J, and consequent closure of the valve through the action of the cam-block on the plunger L, is produced at each end of the travel of the nozzle C. For this purpose said rod is provided at longitudinally-separated parts with collars J^5 J^6, located on opposite sides of the standard K and one adapted for contact with the upper end of said standard when the nozzle is at one limit of its movement and the other adapted for contact with the opposite side of the standard when the nozzle is at the other limit of its movement. When either of said collars engages said standard, the rod is moved longitudinally against the tension of one of the springs J′ J^2 to bring the cam-notch *j* of the block J^4 out of line with the projection L′ of the plunger and said projecting part of the plunger against the unnotched part of said collar. This causes depression of the plunger and the closing of the valve. When the direction of motion of the nozzle and friction-pulley is changed by actuation of the shaft I, the collar J^5 or J^6, which has just been engaged by the standard J, moves out of contact with said standard, and the spring J′ or J^2, just placed under compression, acts to return the rod to its central position, with the cam-groove *j* of the block J^4 in line with the projection of the plunger L, so that the valve may again open.

In the operation of the machine the glue will be applied to one sheet during the radial travel of the nozzle from the center to the circumference of the disk, or vice versa. At the end of the travel of the nozzle in either direction the nozzle will be thrown upwardly from the disk by reason of its hinged connection with the arm F and the sheet to which the glue has been applied removed from the plate B′ and a blank sheet placed thereon, to which glue will be applied in the return travel of the nozzle.

Means are provided for closing the glue-controlling valve at the time when the nozzle is intermediate in its limits of movement, such closing means being employed when the machine is out of use and to stop the flow of glue at any point in the path of travel of the nozzle. The construction by which the said closure of the valve is effected is in this instance made as follows: The actuating-rod J is rotatively mounted in the head D and is held normally from turning therein by means of a collar M, Figs. 6, 7, 10, and 11, which is non-rotatively fixed to the rod outside of said head and is adapted to be locked to the head by means preventing angular movement thereon. The inner part of said collar is cylindric and is located in an annular recess in the end member D^5 of the head D, surrounded by an annular flange d^{11}, extending laterally from said head. Said collar is connected with said head by means permitting it to rotate about the axis of the rod J when the locking means are released, but which prevent lateral detachment of the collar from the head. The connecting means consist in this instance of set-screws d^{12}, passing through the flange d^{11} and entering an annular groove j^2 in the periphery of the part of the collar which is surrounded by said flange. The collar is splined to the shaft to permit the shaft to slide endwise thereon, the means for locking said collar from rotation about the axis of the rod consisting in this instance of a spring-actuated bolt j^3, which passes through the flange d^{11} of said end member of the frame and is adapted for engagement with sockets in the bottom of the annular groove j^2 of the collar. Two of said sockets are provided in the groove and are located oppositely to each other, one adapted to be

engaged by said bolt when the cam-notch *j* of the block J^4 is on the side of the rod adjacent to the valve and the other of which is adapted to be engaged by said bolt when the block is given a half-rotation and the cam-notch is rotated to the side of the rod remote from said valve.

The nozzle shown in the principal figures is provided with a single discharge-orifice and applies but a single spiral strip of glue.

In Figs. 12, 13, and 14 is shown a nozzle having three discharge-orifices and capable of applying three spirals of glue at one time. The nozzle therein shown consists of a hollow flat shell having an interior chamber C′, as indicated in dotted lines in Figs. 12 and 13, and provided with a hollow nipple C^2, which latter is screw-threaded for attachment to the valve-casing D^8, as shown in Fig. 9. Said nozzle is provided at its outer end with three discharge-orifices *c c c*, which communicate with the interior chamber C′ and are separated by partitions *c′*, of sufficient width to produce the desired spaces between the parts of the spiral. It will be understood that in this form of nozzle the speed of the nozzle toward and from the center of the disk will be proportionated to provide between the sets of spirals spaces equal to the spaces between the spirals of each set.

The air-pressure device provided to maintain a constant pressure within the glue-pot, so that the glue will be discharged therefrom in uniform quantities, consists of an air-storage tank N, suitably located with respect to the glue-pot and connected therewith by a valved pipe N′, which enters through the upper head thereof. Said storage-tank is provided with an induction-pipe N^2, adapted for connection with a suitable compressor. The tank is also provided with a blow-off or relief valve *n* and a pressure-gage *n′*.

The glue-pot E, Fig. 1, consists of an annular shell provided with top and bottom removable plates E^2 E^3, which are held in place by clamping-rods E^4. Said rods have screw-threaded engagement with the margin of the bottom plate E^3 outside of said shell and pass through the margin of the upper plate E^2 and provided on their upper ends with thumb-nuts *e*, by which the parts are clamped in place. Preferably the shell is provided with guide-loops *e′*, through which the clamping-rods pass to hold the same in place when the top-plate E^2 has been removed. This construction is provided to afford an air-tight receptacle.

In case it be desired to apply heat to the glue within the pot the following construction is used: The said pot is herein shown as located within a suitable shell or jacket E^5, which latter is adapted to be filled with water, within which the glue-pot is submerged, and said water is heated by means of a gas-burner E^6 of familiar construction located immediately beneath the bottom wall E^7 of the shell or jacket E^5. Said pot and jacket are supported on a horizontal plate E^8, which may be suspended from any suitable overhead support by means of rods E^9, as shown in Fig. 1. The pipe E′, leading from said pot to the discharge-nozzle, is connected at its upper end with a short rigid pipe e^2, Fig. 1^a, which passes through said plate, the bottom wall E^7 of the jacket, and the bottom plate of the pot. Said pipe has screw-threaded engagement with said bottom wall of the pot. As a means for providing a water-tight joint between said pipe and the water-jacket said pipe is screw-threaded and is provided with two clamping-nuts e^3 e^4, the former located above the bottom plate of the jacket E^5 and the latter below the supporting-plate E^8 and bearing against the lower surface thereof. Said nut e^4, as shown, has the form of a nipple, to which the pipe E′ is attached. Between the nut e^3 and the bottom wall or plate E^7 of the water-jacket E^5 is located a layer of suitable packing material e^5, as shown more clearly in Fig. 1^a, and which is compressed between said nut and bottom plate to prevent the passage of water between said parts. Said nut e^3 will desirably be made of suitable diameter to afford an extended packing-surface between said parts. The burner E^6 is protected from side draft of air by means of a casing E^{10}, connected with the supporting-plate E^8, said casing having therein suitable air-openings to provide the requisite quantity of air to the flame.

One of the principal advantages of the construction described is the ease and facility with which the feed of the glue from the discharge-nozzle may be regulated so as to produce uniform work. It will be obvious that different charges or batches of glue may differ appreciably in consistency, and therefore will not flow uniformly from the nozzle C. Such inequalities of flow may be corrected either by varying the pressure within the glue-pot or the velocity of the disk B′ or by their conjoint regulation. The pressure in the pot will be maintained at such a point that gravity will have little or no effect on the feed of the glue therefrom, so that practical uniformity of flow may be maintained, whether the pot be filled or almost empty.

We claim as our invention—

1. A machine for the purpose stated, comprising a rotative disk, and means for delivering liquid to a sheet on the disk embracing a discharge-nozzle, one of said parts namely, said disk or nozzle, having movement with respect to the other part in a direction to carry the nozzle toward and from the center of the disk.

2. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, one of which is movable with respect to the other in a direction to carry the nozzle toward and from the center of the disk, and means operating to deliver a uniform layer of glue through the nozzle to a sheet on the disk.

3. A machine for the purpose stated, com-

prising a rotative disk and a discharge-nozzle, one of which is movable with respect to the other in a direction to carry the nozzle toward and from the center of the disk, and means for imparting variable rotative speed to said disk.

4. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, one of which is movable with respect to the other in a direction to carry the nozzle toward and from the center of the disk, and means for imparting to the nozzle variable speed during such movement.

5. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, one of which is movable with respect to the other in a direction to carry the nozzle toward and from the center of the disk, and means imparting correspondingly variable speed to said disk and nozzle.

6. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, one of which is movable with respect to the other in a direction to carry the nozzle toward and from the center of the disk, and means for rotating the disk constructed to maintain a constant speed in that part of the surface of the disk in connection with which the nozzle is in operative relation at any time in its travel.

7. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, one of which is movable with respect to the other in a direction to carry the nozzle toward and from the center of the disk, said movement being accelerated as the nozzle moves toward the center of the disk and retarded as it moves outwardly therefrom, means for rotating the disk constructed to maintain a constant speed in that part of the surface of the disk in connection with which the nozzle is in operative relation at any time during its travel.

8. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, and means for rotating said disk and for imparting relative movement to said disk and nozzle.

9. A machine for the purpose stated, comprising a rotative disk, a discharge-nozzle movable toward and from the center of the disk, and a rotative friction-wheel engaging said disk and movable radially thereon in unison with the movement of said nozzle.

10. A machine for the purpose stated, comprising a rotative disk, a discharge-nozzle movable toward and from the center of the disk, and a rotative friction-wheel engaging the part of said disk opposite said nozzle and movable in unison with the nozzle.

11. A machine for the purpose stated, comprising a rotative disk, a discharge-nozzle, means for moving said nozzle toward and from the center of the disk, and means for reversing the direction of movement of said nozzle.

12. A machine for the purpose stated, comprising a rotative disk, a discharge-nozzle, a friction-wheel engaging the disk to rotate the same, a sliding carriage with which the friction-wheel and nozzle are connected to effect the movement of the same in unison toward and from the center of the disk, a rotative screw-shaft driven from the disk and connected with the carriage to move the same, and means for reversing the direction of rotation of the said shaft.

13. A machine for the purpose stated, comprising a rotative disk, a discharge-nozzle, a friction-wheel engaging the disk to rotate the same, a sliding carriage with which the friction-wheel and nozzle are connected to effect the movement of the same in unison toward and from the center of the disk, a rotative screw-shaft, laterally-separated bevel-pinions loosely mounted on said shaft, a shaft concentric with the disk provided with a bevel-pinion which meshes with the pinions of the screw-shaft, clutch mechanism for locking the loosely-mounted pinions severally to the screw-shaft, and operative connections between the carriage and screw-shaft.

14. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, and a valve for controlling the flow of glue through said nozzle.

15. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve controlling the flow of glue through said nozzle, said valve being normally open, and means for closing the valve at both limits of the movement of the nozzle.

16. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve controlling the flow of glue through said nozzle, said valve being normally open, means for closing the valve at both limits of the movement of the nozzle, and means for closing the valve at points between said limits of movement.

17. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry said nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough, and means for actuating said valve, comprising a rod operatively connected with the valve, and means whereby said rod is actuated from a stationary part of the machine.

18. A machine for the purpose set forth, comprising a rotative disk and a discharge-

nozzle, said parts being relatively movable in a direction to carry said nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough, and means for actuating said valve at each limit of movement of the nozzle, comprising a rod operatively connected at one end with the valve and movable therewith, and separated stop-shoulders on said rod adapted for engagement with a stationary part of the machine, said stop-shoulders being adjustable longitudinally of the rod.

19. A device for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry said nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough and having a stem extending transversely to the path of the nozzle, and means for actuating said valve, comprising a rod movable with the valve and having endwise-reciprocatory movement relatively thereto, a cam on the rod, a plunger movable transversely to the rod engaging said cam and acting on the valve-stem, and means for actuating said rod.

20. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough, and means for actuating said valve comprising a rod movable with the valve and having endwise-reciprocatory movement relatively thereto, a cam-block on the rod having on one side a cam-notch, a plunger for depressing the valves, having yielding contact with said cam-block, and means for actuating said rod, said cam-block being rotative about the axis of the rod to bring an unnotched part of the collar in contact with the plunger to hold the valve closed.

21. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a controlling-valve for said nozzle, and means for actuating said valve comprising a rod movable with the valve and having endwise-reciprocatory movement relatively thereto, a cam-block on the rod having on one side thereof a V-shaped cam-notch, a plunger movable transversely of the rod and which yieldingly engages said cam-block, means for reciprocating said rod, said rod having rotative engagement with its bearings whereby the unnotched face of the collar may be brought into engagement with the plunger, and means for locking said rod from rotative movement.

22. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough, a rotative head supporting the nozzle and affording movement thereof toward and from the surface of the disk, and means for actuating said valve.

23. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve movable with the nozzle to control the flow of glue therethrough, a rotative head supporting the said nozzle, and means for actuating said valve comprising a rod mounted concentrically with said head and movable with the valve and having endwise-reciprocatory movement relatively thereto, a cam-block on the said rod, a plunger mounted in the said head for actuating the valve, having yielding contact with said cam-block, and means for actuating said rod.

24. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough, a rotative head for supporting said nozzle to which the same is detachably secured, said valve being provided with an endwise-movable valve-stem and a spring holding the valve open, and means for actuating said valve comprising a rod movable with the valve, and having endwise-reciprocatory movement relatively thereto, a cam-block on the rod, and a plunger mounted in said head and having yielding contact with said cam-block, said plunger being provided with a part having spring-pressed contact with the stem of said valve.

25. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a valve movable with the nozzle for controlling the flow of glue therethrough, and means for actuating said valve, comprising a rod which is bodily movable with the valve and has endwise movement relatively thereto, a cam-block on the rod having on one side thereof a V-shaped cam-notch, two springs acting on the rod to maintain the said cam-block normally in its central position, a plunger for actuating the valve having yielding contact with said cam-block, and means for actuating said rod embracing stops on the rod adapted for engagement with a part of the machine-frame.

26. A machine for the purpose stated, comprising a rotative disk and a discharge-nozzle, one of said parts being radially movable in a direction to carry the nozzle toward and from the center of the disk, said nozzle being provided with a plurality of narrow horizontally-arranged discharge-orifices located side by side.

27. A machine for the purpose stated, com-

prising a machine-frame, a rotative disk mounted thereon, a sliding carriage having an arm which overhangs said disk, a rotative head mounted on said arm, a discharge-nozzle carried by said head and provided with a valve, means for automatically actuating said valve, means for giving reciprocatory motion to the carriage, and means for rotating said disk embracing a rotative friction-wheel engaging the disk and movable with said carriage.

28. A machine for the purpose stated, comprising a machine-frame, a rotative disk mounted thereon, a sliding carriage provided with an arm which overhangs said disk, a rotative head mounted on said arm, a discharge-nozzle mounted on said head and provided with a controlling-valve, means for automatically actuating said valve, means for rotating the disk comprising a friction-wheel which moves with the said carriage, and gearings for driving the said carriage through the medium of the disk embracing a reversing-gear, and means for automatically actuating the said reversing-gear.

29. A machine for the purpose set forth, comprising a rotative disk and a discharge-nozzle, one of said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a closed glue-pot in communication with said nozzle, and means for applying pressure to the glue within the pot.

30. A machine for the purpose set forth, comprising a rotative disk and a discharge-nozzle, one of said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a closed glue-pot in communication with said nozzle, means for applying pressure to the glue within the pot, and means for varying said pressure.

31. A machine for the purpose set forth, comprising a rotative disk and a discharge-nozzle, one of said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a closed glue-pot in communication with said nozzle, and means for applying heat to the glue within the pot.

32. A machine for the purpose set forth, comprising a rotative disk and a discharge-nozzle, one of said parts being relatively movable in a direction to carry the nozzle toward and from the center of the disk, a glue-pot communicating with the nozzle, a jacket surrounding the pot and adapted to contain water, and means for applying heat to said water.

In testimony that we claim the foregoing as our invention we affix our signatures, in presence of two witnesses, this 9th day of November, A. D. 1900.

FREDERICK N. GARDNER.
A. BENJIMAN CADMAN.

Witnesses:
CHAS. KENDALL,
L. W. KENDALL.