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2,091,815

MACHINE FOR DIMENSIONING AND SORTING MACHINED ARTICLES

Filed Sept. 13, 1934

3 Sheets-Sheet 1

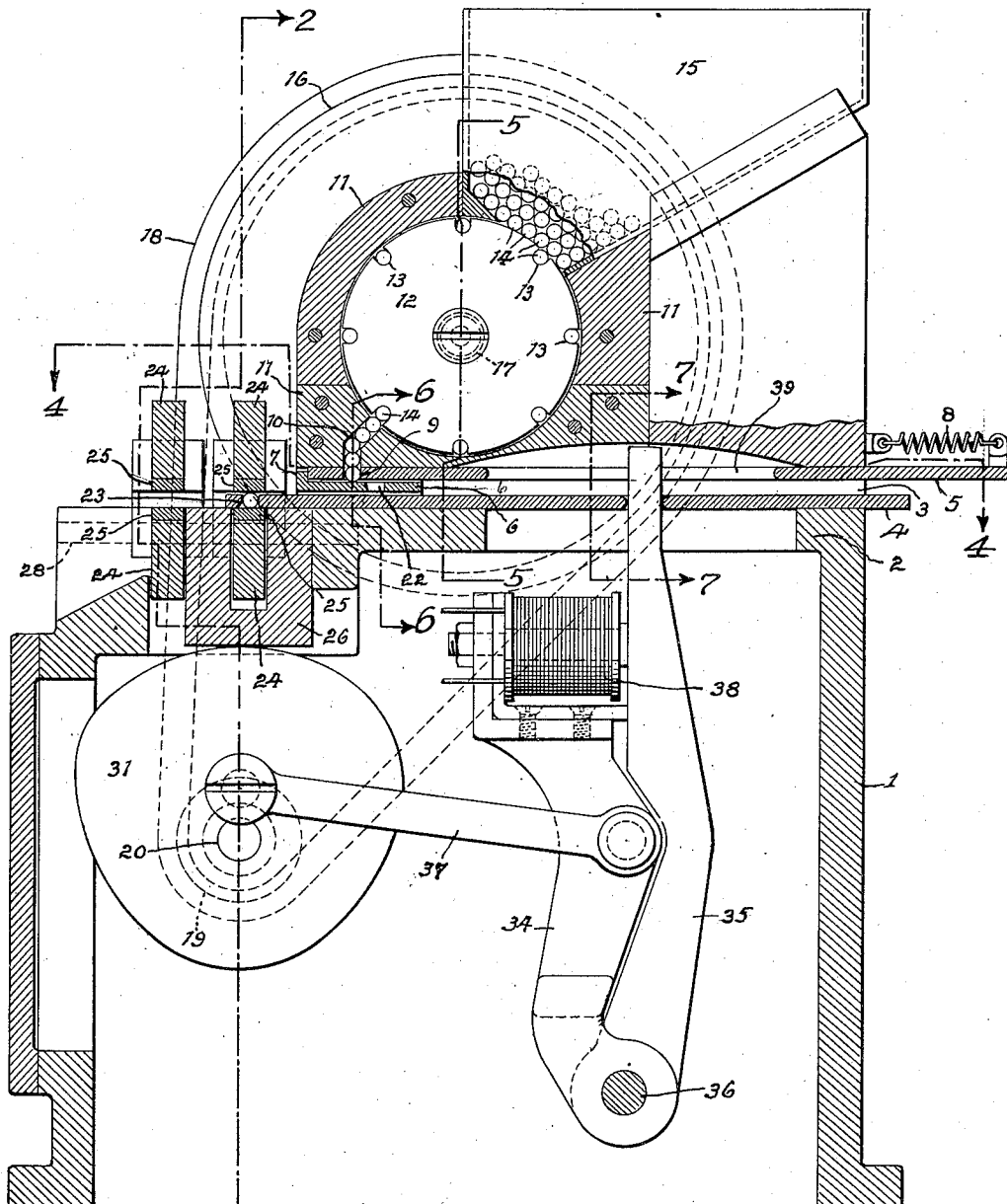


Fig. 1.

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Fig. 2.

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3 Sheets-Sheet 3

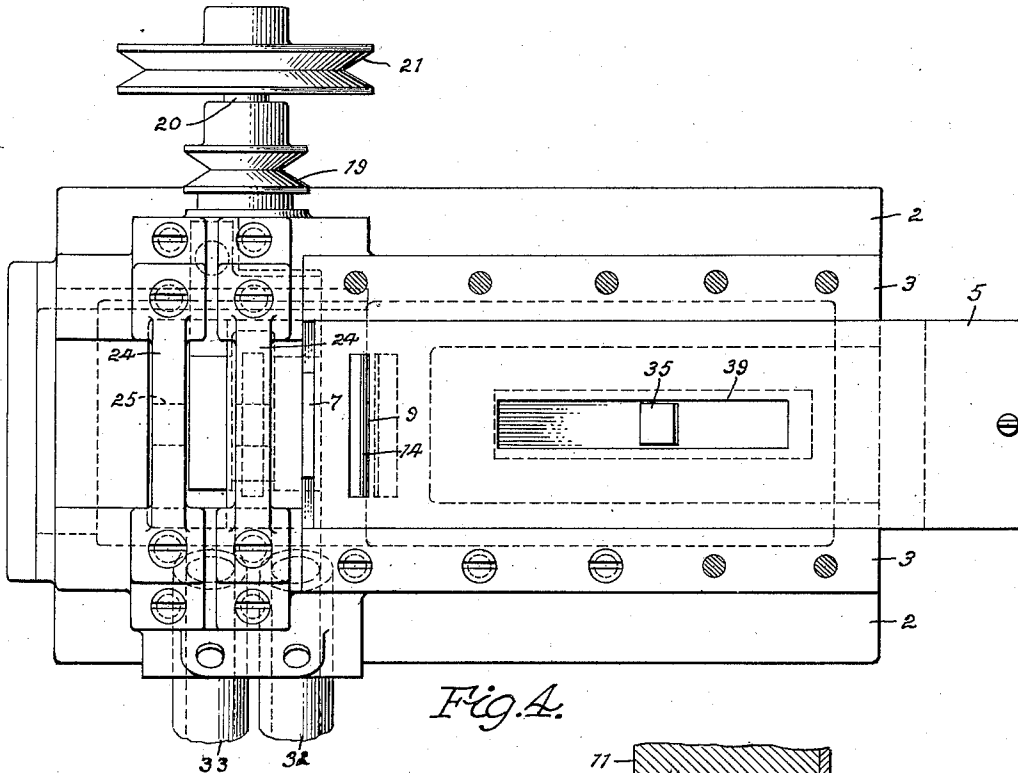


Fig. 4.

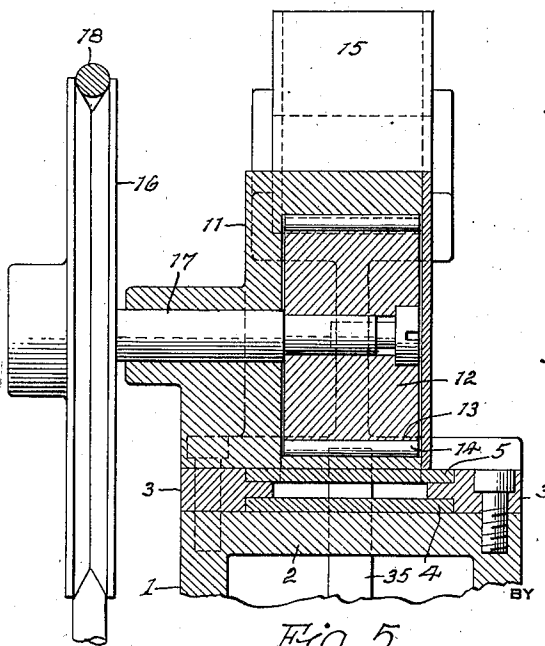


Fig. 5.

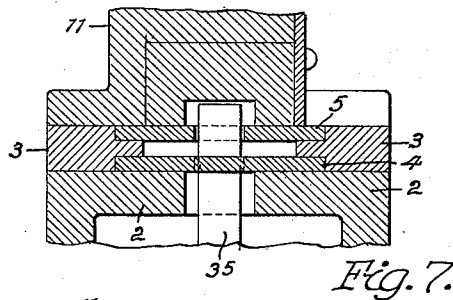


Fig. 7.

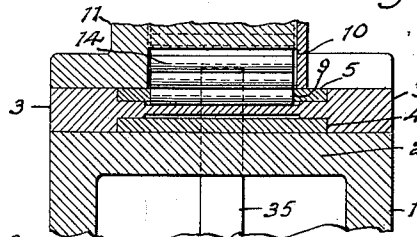


Fig. 6.

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MACHINE FOR DIMENSIONING AND SORTING MACHINED ARTICLES

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a corporation of Michigan

Application September 13, 1934, Serial No. 743,858

18 Claims. (Cl. 209—82)

This invention relates to means for dimensioning and sorting machined articles, and one of the objects of the present invention is to provide a machine for automatically handling and sorting roller bearing or other rolls, according to certain dimensional limits, the machine being constructed to facilitate such dimensional determination and sorting accordingly, by automatically feeding the articles into the machine, gauging or templating each article, and automatically sorting out those which are within certain dimensional limits from those which are outside those limits.

A further object is to embody in such a machine, means for feeding the articles through the gauge or gauges with just sufficient force to pass the article freely through its gauge when that article is within the dimensional limits set by that gauge, but which force will be automatically limited by the resistance, offered by a slightly oversized article, to passage through the gauge.

It is also an object to provide an arrangement of gauges or templates whereby the gauge of the article between certain high and low limits may be determined by providing a series of such gauges having openings of different dimensions, whereby if an article be of too great a dimension to pass freely through the first gauge it will be rejected, and if it passes therethrough but is of too great dimension to pass through the second gauge, it will be retained as coming within such limits, and if it passes through said second gauge it will be rejected as of too low a gauge.

It is also an object to provide a continuously driven machine, with means for intermittently feeding rolls or similar articles to the gauges or templates, together with feeding means for feeding the rolls through the gauges and driving means for said feeding means, said feeding and driving means being connected by electrically controlled means operative to release the driving means upon increase of resistance to the passage of a roll through a gauge, whereby the application of excessive force to force the roll through its gauge is avoided and application of such power is immediately discontinued upon such increased resistance and the roll is released.

A further object is to provide a machine for the purpose which is of simple construction, efficient in operation and embodies certain other new and useful features, all as hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawings in which

Figure 1 is a vertical section substantially upon

the line 1—1 of Fig. 2, of a machine illustrative of an embodiment of the present invention;

Fig. 2 is a vertical section substantially upon the line 2—2 of Fig. 1;

Fig. 3 is a sectional detail of the roll ejecting mechanism;

Fig. 4 is a sectional plan view substantially upon the line 4—4 of Fig. 1;

Fig. 5 is a sectional detail upon the line 5—5 of Fig. 1;

Fig. 6 is a sectional detail upon the line 6—6 of Fig. 1; and

Fig. 7 is a sectional detail upon the line 7—7 of Fig. 1.

As shown in the drawings, 1 indicates a suitable supporting frame having a substantially flat top or table 2, provided with horizontal ways 3 for a pair of horizontally reciprocable spaced apart feed plates 4 and 5 with an intermediate plate 6 fixed to said ways and positioned between said feed plates 4 and 5 adjacent their inner ends, said plate 6 being formed with an upstanding rib 7 forming a stop to be engaged by the inner end of feed plate 5 and limit its inward movement effected by a spring 8 attached to its outer projecting end and to said frame, said spring being normally effective to hold said feed plate in engagement with said stop with a slot 9 in said feed plate in alignment with a roll feed passage 10 formed in a block or casing 11 above, said casing 11 being secured to said ways 3 upon the table 2 and formed with a cylindrical bore in which is mounted a cylindrical feed drum 12 formed with spaced apart peripheral notches or recesses 13 into which the rolls 14 or other machined articles drop as these recesses pass the mouth of a hopper 15 supported upon the casing 11 and into which hopper a supply of the rolls is placed.

The feed drum 12 is continuously rotated by means of a pulley 16 on the outer end of the drum shaft 17 to the inner end of which said drum is secured, this pulley being driven by a belt 18 running over a second pulley 19 on a drive shaft 20 mounted in a suitable bearing on the lower part of the frame 1 some distance below the table 2, and the outer end of which drive shaft is provided with a drive pulley 21 by means of which power may be applied to drive the several moving parts of the machine. Rotation of the feed drum 12 thus feeds the rolls from said hopper and deposits them, one at a time, into the upper end of the feed passage 10 as a notch in the drum carrying a roll, comes into registry with the upper open end of said passage, keeping said passage filled with rolls which are held therein

by the lower roll in the aligned slot 9 in the feed slide 5, resting upon the fixed plate 6. This fixed plate is, however, formed with a roll slot 22, which is positioned out of alignment with the lower end of passage 10 and normally out of registry with the roll slot 9 in slide 5, and therefore by sliding slide 5 against the action of spring 8, said slot 9 and roll held therein are brought opposite the slot 22 and said roll will drop into said slot 22 to rest upon the upper surface of slide plate 4 until such time as said slide 4 is moved endwise to bring a roll slot 23 adjacent the end thereof, into registry with said slot 22, when it will drop into said slot 23 and be carried forward by the return movement of said slide 4.

This forward movement of slide 4, moves the roll held in said slot 23 along the upper surface of the table 2 toward the first gauge or template for testing or measuring the diameter or other measurement of the roll, said gauge as shown comprising a pair of bridge bars 24 spanning a slot or opening in the table 2 and rigidly secured at their ends to said table with a space between their adjacent side edge within notches in which edges are secured hardened blocks 25, the adjacent surfaces of which are very accurately spaced apart to fix the high gauge of a roll passed therebetween by the forward movement of the feed slide 4, that is, the distance between said blocks, fixes the maximum roll diameter acceptable, and therefore if the roll passes between these blocks with comparative freedom, this determines that it is not over size.

To determine whether or not the roll passed through the first gauge, is of lesser dimension than the low gauge limit, or minimum acceptable dimension, a second gauge of the same construction as the first, but having its blocks 25 set just slightly closer together, is spaced from said first gauge, and therefore if the slide 4 carries the roll through this second gauge with little resistance, it will show that the roll dimension is below low gauge and the roll will drop out of slot 23 as the slide is projected beyond the second gauge, and the roll will pass out of the machine as rejected.

If the roll being tested should be of high gauge, that is, of too great a dimension to pass through the first gauge without setting up but little resistance, this increased resistance will stop the slide 4, due to the construction of drive for said slide, presently to be described, and the roll will be positioned outside the gauge and upon the upper surface of a discharge member 26 of U-form in cross section to embrace the lower bridge bar 24 and extend upwardly at each side thereof to the plane of the table top. This discharge member is formed with a projecting arm 27 pivoted to the frame 1 at 28 and provided with a tail portion 29 engaged by a spring pressed plunger 30 normally tending to swing said member 26 downwardly and hold it in contact with the periphery of a cam 31 secured upon the inner end of the drive shaft 20, and therefore when said cam is turned to bring its low side in contact with said discharge member, said member will be swung downwardly and discharge the high gauge roll resting thereon, into a discharge chute 32 and out of the machine, to be retained and reground to proper dimension. Those rolls which pass through the first gauge but are of too great a dimension to pass freely through the second gauge, are stopped between said gauges and rest upon that portion of the discharge

member 26 which fills the space between said gauges and when said member is swung downwardly by the operation of the cam 31 will be discharged into a second chute 33 as being of proper dimension, they being between the high and low gauge limits. The rolls are thus automatically fed from the hopper, gauged, and then sorted into the three separate classes according to the gauge limits. The rolls may, however, be sorted into more than three classes by adding one or more gauge units to the series and extending the travel of the feed slide accordingly, also providing one or more additional discharge members or other suitable discharge means.

To move the slides 4 and 5 in proper timed relation to the rotation of the cam 31 and operation of the discharge member 26, a pair of arms 34 and 35 is pivotally supported at one end to swing freely upon a cross supporting shaft 36 located adjacent the lower end of the frame. A connecting rod 37 is pivotally attached at one end to said cam 31 eccentrically thereof and at its opposite end to the arm 34 intermediate the ends thereof. These arms 34 and 35 extend normally side by side and are operatively connected to swing together, by mounting upon the upper end of the short arm 34, a solenoid 38 with its core in opposed relation to the adjacent side of the arm 35 so that upon energization of said solenoid, it will attract the arm 35, drawing said arm toward the arm 34 so that said arms will swing together until such time that the resistance to the swinging of arm 35 exceeds the pull of said solenoid, when said arm 34 will swing away from arm 35, immediately reducing the magnetic pull on arm 35 and permitting it to stop, thus stopping the movement of slide 4 which is actuated by arm 35 extending up through an opening in said slide. The upper end of this arm 35 is also extended upward through a longitudinal slot 39 in the upper slide 5 and this slot is of such a length that when said arm is swung to the limit of its movement in a direction to move the slide 4 away from the gauges and bring the slot 23 therein into registry with the roll slot 22 in the fixed plate 6, said arm 35 will come into contact with the end of said slot 39 in said slide 5 and move said slide against the action of its spring 8 to bring its roll slot 9 into registry with said slot 22, thus transferring a roll from the lower end of the feed passage 10 to said slot 22 where it will drop into slot 23 when said slot comes into registry with said slot 22.

By employing the electromagnet 38 to connect the arms 34 and 35, the pull or strength of this magnet may be very accurately regulated and determined so that when the feed slide 4 is moved forward by the swinging of the arm 35 and meets undue resistance due to the dimension of the roll being greater than the gauge opening, this resistance being slightly greater than the pull of the magnet, will overcome such pull and permit the arm 35 and slide 4 to stand still while the arm 34 continues to move. This magnetic pull can be so regulated that it will not force the roll into the gauge and cause it to jam therein and this magnetic pull rapidly diminishes as the magnet leaves the operating arm 35, thus bringing the slide immediately to rest with the roll in position upon the discharge member, to be discharged thereby either through the chute 32 or 33 depending upon which gauge has blocked the passage of the roll therethrough, and should the roll be under size and thus pass freely through both gauges, this pull will be sufficient to project the

slide through both gauges and discharge the roll at the end of the machine.

Obviously machined articles other than rolls may be gauged and sorted and the gauging may be as to diameter or any other dimension, and the number of classes into which the rolls or other articles may be sorted, may be increased by increasing the number of gauge units. Further, any suitable means may be employed to effect the discharge of the gauged rolls into separate discharge chutes, and the construction and arrangement of the elements of the machine may be further varied within the scope of the appended claims, without departing from the spirit of the invention, and such changes are contemplated.

Having thus fully described my invention what I claim is:

1. In a machine for the purpose described, the combination of a pair of spaced apart and horizontally aligned gauges each of a different gauge than the other, a horizontally reciprocable feed slide, means for reciprocating said slide to feed articles through said gauges, article discharging means forming article supporting surfaces in the horizontal plane of the lower face of said slide at opposite sides of said first of said gauges and over which surfaces said slide is reciprocable, and means for operating said discharging means in timed relation to the movements of said slide.

2. In a machine for the purpose described, the combination of a pair of spaced apart and horizontally aligned gauges each comprising a pair of rigid fixedly spaced apart members to permit an article of lesser gauge to pass therebetween and to form a stop for others, a horizontally reciprocable feed slide, for positively feeding articles to be gauged, said slide being projectable through all of said gauges, power means for reciprocating said slide, means for operatively connecting said slide and power means and operative to effect a disconnection thereof upon the presentation to either of said gauges by said slide, of an article of a dimension too great to pass freely there-through, and means operative to separately discharge articles stopped by said gauges, whereby sorting of said articles according to limits set by said gauges is effected.

3. In a machine for the purpose described, the combination of a pair of spaced apart and horizontally aligned gauges each of a different gauge than the other, a horizontally reciprocable feed slide, means for reciprocating said slide to feed articles through said gauges, including a pair of pivoted arms arranged side by side with one arm extended and operatively connected to said slide to reciprocate the same, a solenoid mounted upon the other arm to attract said first named arm and operatively connect said arms, a power shaft, means for transmitting motion from said shaft to swing said solenoid carrying arm, article discharging means forming article supporting surfaces at opposite sides of one of said gauges, a chute to receive articles from each of said surfaces, and a cam on said power shaft for operating said article discharging means.

4. In a machine of the character described, the combination of a supporting frame, a horizontal feed slide reciprocable on said frame, a pair of gauges mounted upon said frame and through which said slide is projectable to feed articles therethrough, a hopper and feeding means beneath said hopper supported on said frame above said slide for feeding articles to said slide, an article discharging member hav-

ing article supporting upper surfaces at opposite sides of one of said gauges and over which surfaces said slide is reciprocable, a power shaft mounted on said frame, a cam on said shaft for raising and lowering said discharging member, a pair of arms pivotally supported at their lower ends on said frame for independent swinging movement, one of said arms being extended and operatively engaged with said slide, a solenoid mounted upon the other of said arms for operatively connecting the same to swing together, and means for transmitting motion from said shaft to swing said solenoid carrying arm.

5. In a machine for the purpose described, the combination of a frame having a top provided with horizontal ways and an opening at one end of said ways, a pair of gauges including bridge bars spanning said opening with said gauges spaced apart, a pair of independently movable feed slides mounted in said ways with the lower of said slides arranged to be projected through said gauges and formed with an article receiving opening adjacent one end, a fixed plate between said slides and formed with an article receiving opening into registry with which said opening in said lower slide is adapted to be brought by reciprocation of said lower slide, a casing on said frame above said slides, a feed drum in said casing, said casing having a feed passage to receive articles from said drum, the lower end of said passage being out of registry with said opening in said fixed plate and said upper slide having an article receiving opening normally in registry with the lower end of said passage and adapted to be brought into registry with said opening in said fixed plate by movement of said upper slide, a discharge member embracing one of said gauge bridge bars and having upper surfaces at opposite sides of said bars over which said lower slide is reciprocable, means for raising and lowering said discharge member, a pair of parallel independently pivoted arms, one of which is extended through an opening in said lower slide, a solenoid mounted upon the other of said arms to operatively connect said arms to turn together, and power means for swinging said solenoid carrying arm.

6. In a dimensional sorting machine, the combination of a series of separate stationary gauging units, each unit having rigidly spaced apart gauging instrumentalities; means for propelling between said instrumentalities, of an article to be gauged, each unit forming a stop for said means, said means being stopped by resistance offered by said instrumentalities, to the passage of said article therebetween; movable means arranged in advance of each gauging unit, to support an article when brought into engagement with said unit and movable to discharge said article stopped by said unit; and means for operating said discharging means in timed relation to said propelling means.

7. In a dimensional sorting machine, the combination of a series of rigid, stationary gauging units, each unit having rigidly spaced apart gauging instrumentalities for permitting or hindering the passage therethrough of articles to be gauged; means for propelling toward said instrumentalities, of an article to be gauged; means for actuating said propelling means stopped in its movement by resistance to the passage of an article between said instrumentalities, means pivotally supported in advance of each gauging unit, and forming a support for an article stopped by resistance to its passage between said instrumen-

talities; and means for operating said discharging means in timed relation to the movement of said propelling means.

8. In a machine for the purpose described, the combination of a gauge comprising fixed opposed and spaced apart members, a slide movable into and through said space between said members to feed articles to and through said gauge, a pair of power applying members one of which members is engaged with said slide to reciprocate the same and the other of which members is power actuated, and means carried by said last named member for connecting said members to move together and for breaking said connection upon resistance to movement of said slide offered by resistance of an article to passage through said gauge.

9. In a machine as characterized in claim 8 and wherein said means for connecting said members comprises a magnetic device mounted upon one power applying member to attract and hold within the limits of its attractive force, the other member.

10. In a machine for the purpose described, the combination of a table, a slide mounted upon said table for longitudinal reciprocation, a plurality of gauges each including bridge bars extending transversely of the path of movement of said slide with their adjacent sides spaced apart to provide a space through which an article to be gauged is moved by said slide, means for feeding articles, one at a time, to said slide, means for separately discharging articles stopped by a gauge from those stopped by another gauge, a power actuated member, a member to engage said slide, and an electrically controlled device for connecting said members and for disconnecting the same upon excessive resistance being offered by one of said gauges to the passage of an article therethrough.

11. In a machine for the purpose described, the combination of a table, a feed slide reciprocable on said table, article feeding means above said table and slide and having an article feed passage, a second feed slide having an opening to register with said passage and receive one article at a time therefrom, a fixed plate between said slides and having an article receiving opening out of registry with said passage and opening in said second named slide and having a longitudinal slot, said first named slide having an opening opposite said slot, an operating arm pivotally supported at its lower end beneath said table with its upper end projecting through said opening and slot in said slides, a plurality of gauges extending transversely of the path of movement of said first named slide and through which said slide is adapted to be projected, a power arm pivotally supported for swinging movement toward and from said operating arm, power means for swinging said power arm, and a solenoid mounted upon said power arm to attract said operating arm and cause said arms to turn together.

12. A machine as characterized in claim 11 and including means for separately discharging articles stopped by each gauge, said means comprising a discharge member pivotally supported with its upper surface in the plane of the upper surface of said table at the forward side of one of said gauges, and means for swinging said discharge member in timed relation to the reciprocation of said slides.

13. In a machine for the purpose described, the combination of a table, a feed slide reciprocable

longitudinally upon said table, a gauge unit comprising a pair of bridge bars on said table extending transversely of the path of movement of said slide with their adjacent sides spaced apart for the passage of said slide therebetween, article discharging means having parts normally lying at opposite sides of the lower of said bridge bars with the upper surface of said parts extending in the plane of the upper surface of said table to form a support for articles moved thereover by said slide, said means being movable to effect the discharge of an article resting thereon, power means for reciprocating said slide, and means for moving said discharging means and slide in timed relation.

14. A machine for the purpose described as characterized in claim 13 and wherein said article discharging means comprises a pivotally supported member of U-shape in cross-section to embrace said lower bridge bar and said power means for reciprocating said slide comprises a pair of arms pivotally supported at their lower ends with the upper end of one arm engaged with said slide, an electrically energized solenoid mounted upon the other of said arms to cause said arms, by the attractive force of said solenoid, to swing together and to permit said arms to swing independently upon resistance to movement of said slide, caused by resistance of an article to passage through said gauge; and wherein said means for moving said discharging member and slide in timed relation includes a drive shaft, a cam on said shaft to engage and swing said discharging member, and a crank and connecting rod for transmitting motion from said shaft to said arm upon which said solenoid is mounted.

15. In a machine for the purpose described, the combination of a plurality of aligned and spaced apart gauges each comprising rigidly spaced apart members, a feed member reciprocable through said gauges between said members thereof for feeding articles successively through said gauges along a straight path, power means for reciprocating said feed member, and means for connecting said feed member and power means and operated by the resistance to the passage of an article fed thereby between said members of any one of said gauges for effecting a disconnection of said power means and feed member.

16. In a machine for the purpose described, the combination of a plurality of fixed and aligned and spaced apart gauges each including rigidly spaced apart members, a slide for engaging and feeding articles through said gauges between the members thereof, power means for reciprocating said slide, and means for operatively connecting said power means and slide including a magnet exerting a magnetic force to effect said connection.

17. In a machine for the purpose described, the combination of a plurality of spaced apart gauges arranged in alignment and each including fixed spaced members, a slide for feeding articles through said gauges between the members thereof, power means for reciprocating said slide, and means for operatively connecting said power means and slide including a pair of arms and an electro-magnet mounted upon one of said arms for holding said arms by the attractive power of said magnet, to turn together.

18. In a machine for the purpose described, the combination of a pair of spaced apart and aligned gauges, each of a different gauge from

the other, each gauge comprising two rigid fixed-
ly spaced apart members, means for feeding
articles successively to and through said gauges
between the members of each gauge, power
5 means for operating said feeding means, means
for connecting said power means and feeding
means, said connecting means being operated by

the resistance to the passage of an article
through either of said gauges for effecting a dis-
connection of said power means from said feed-
ing means, and pivotally supported discharging
means forming a support for each article at the 5
entrance to each gauge.

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