Sept. 29, 1959 R. G. FRANK 2,906,214

PILL PRESS APPARATUS

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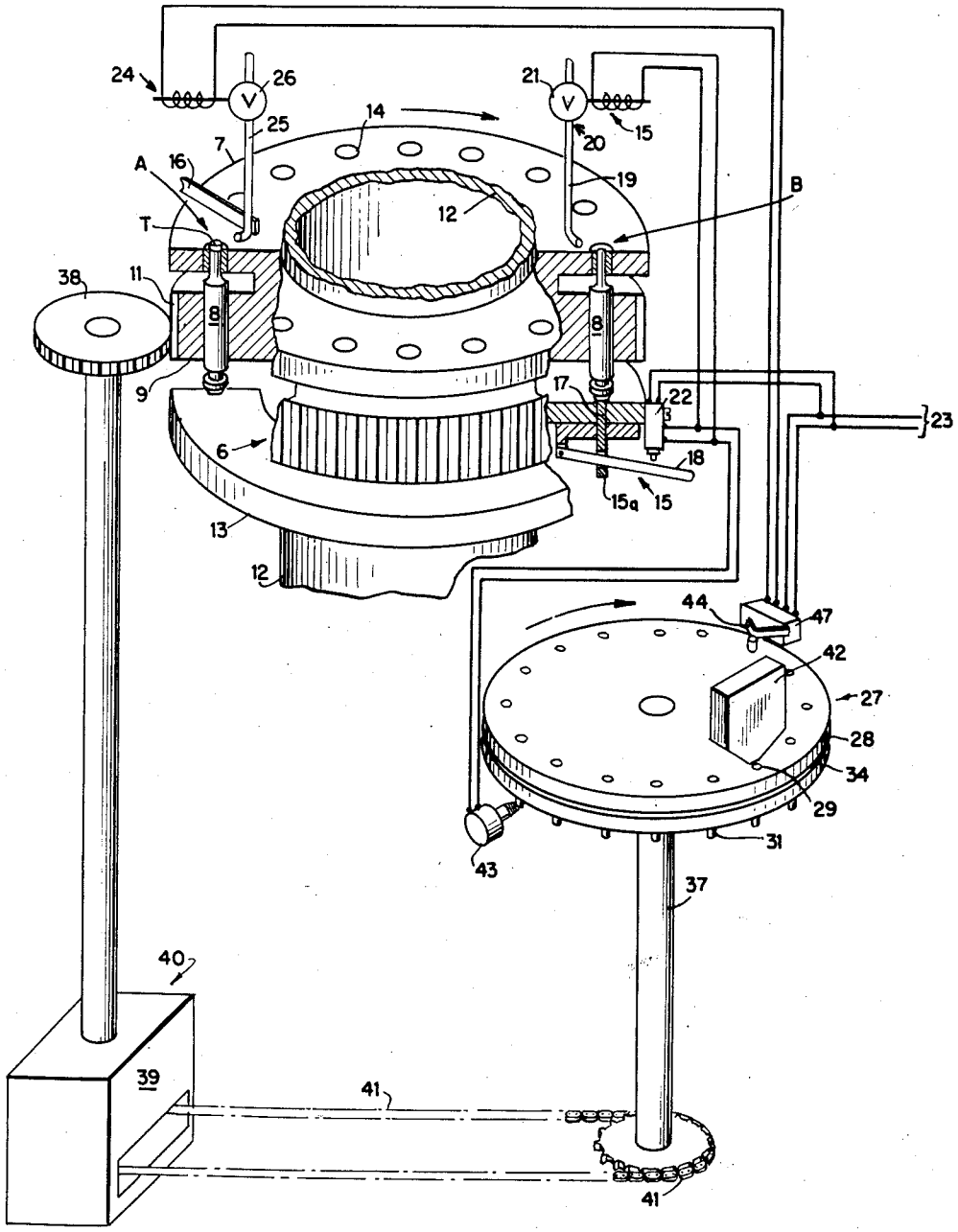


FIG. 1

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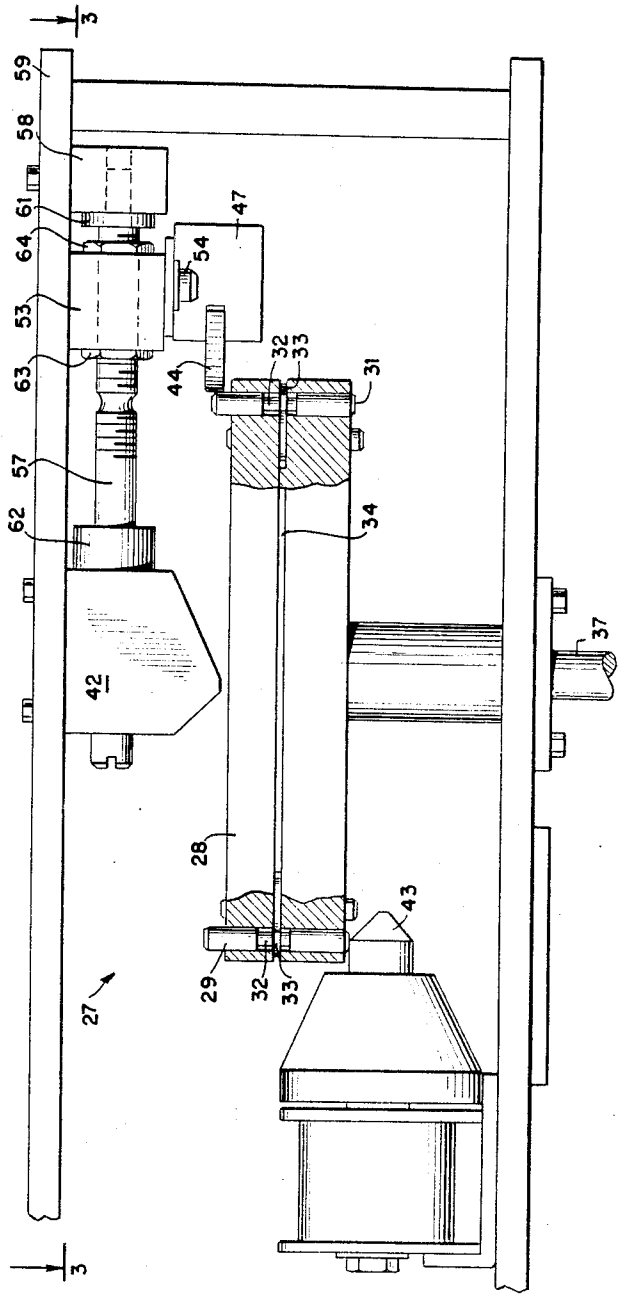


FIG. 2

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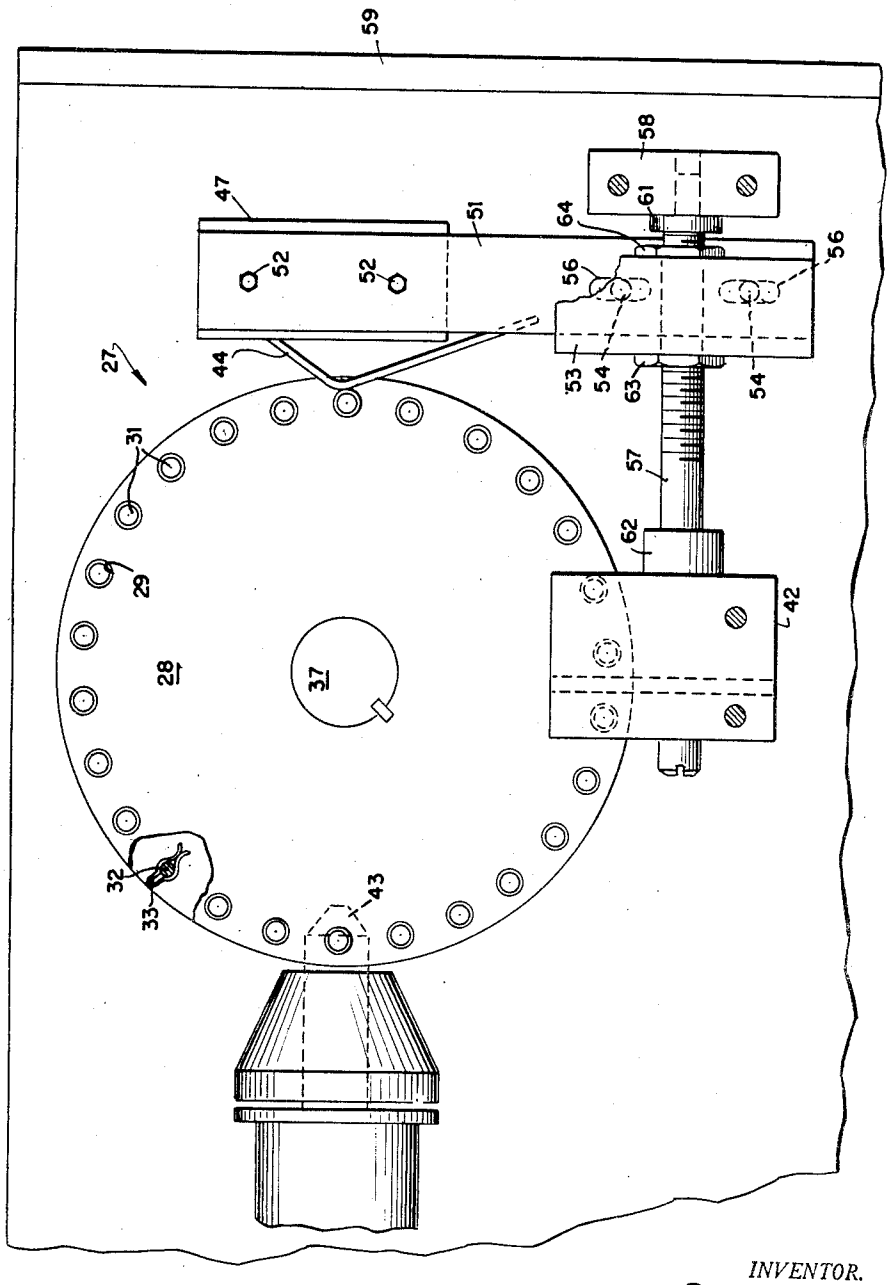
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FIG. 3



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PILL PRESS APPARATUS

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Application January 28, 1957, Serial No. 636,678

5 Claims. (Cl. 107—1)

This invention relates to a check device for use in combination with a rotary press such as is commonly used to make tablets from pulverant material.

Rotary presses for use in making tablets are described in United States Patent 1,248,571 to Stokes and in copending application Serial No. 623,993, filed November 23, 1956 and in my copending application Serial No. 636,677, filed January 28, 1957. Such presses comprise a rotating die head having several die cavities which are arranged in a ring and extend through the die head. An upper punch and a lower punch is associated with each die cavity. These punches are mounted so that they rotate with the die head, and ride on fixedly positioned cam tracks which are formed so that they reciprocate the punches and thereby cause the punches to manipulate material contained in the die cavities. The presses are provided with auxiliary devices which are fixedly positioned at different points along the path of the die cavities and perform various tablet manufacturing steps such as filling the die cavities with pulverant material and removing finished tablets from the press. The auxiliary devices may include a check device for checking on press performance and a normally inoperative rejector for rejecting production determined by the check device to be imperfect. The primary object of the present invention is to provide a memory device for coordinating the operation of a check device and a rejector.

The memory device of the invention includes a wheel mounted for rotation in time relationship with the die head and having passageways disposed in a ring about the center thereof. Pegs which are reciprocable between a resting position and a working position are disposed one in each passageway. Fixedly positioned along the path of the pegs is a leveling means which is effective to level the pegs as they pass thereby, an impressing means which is mounted for reciprocation and is normally inoperative and when operated is effective to move a peg to its working position, and means sensitive to the position of the pegs and responsive to pegs passing thereby in the working position. The impressing means is located along the path of the pegs ahead of the leveling means, and the peg position sensitive means is located along the path of the pegs ahead of the impressing means and before the leveling means. There is also provided means operatively connecting the impressing means and the checking device and means operatively connecting the peg position sensitive means and the rejector. The orientation of the impressing means and the peg position sensitive means along the path of the pegs corresponds to the orientation of the checking device and the rejector along the path of the die cavities in the press die head so that when the checking device determines production at a particular cavity to be imperfect and the impressing means is therefore actuated, the rejector will be in operation when the imperfect production arrives at the rejector.

Advantageously, the memory device comprises means for adjusting the position of the peg position sensitive means so that the time at which the rejector is actuated and the interval of time during which the rejector operates may be adjusted. Such adjusting means permits obtaining precise coordination between the check device and the rejector, and also permits adjusting the memory device so that tablets present in cavities on either side of the cavity containing the imperfect production can be rejected along with the imperfect production.

The invention will be better understood by reference to the accompanying drawings of which:

Fig. 1 is a schematic representation of a rotary press provided with a memory device according to the invention;

Fig. 2 is an elevation view of a memory device according to the invention; and

Fig. 3 is a horizontal section taken along line 3—3 in Fig. 2.

The press represented in Fig. 1 is of the type described in the aforementioned copending application Serial No. 623,993, filed November 23, 1956 and is adapted to make two-layer tablets. Only a portion of the press is shown in Fig. 1.

Referring to Fig. 1, the portion of the press there shown comprises a head assembly **6** comprising a die head **7**, punches **8**, punch guide block **9**, and head assembly drive gear **11**. The head assembly is rotatably mounted on press pedestal **12** and is driven by drive means, not shown, operatively connected with head assembly drive gear **11**. Die cavities **14** are arranged in a ring about the center of the die head **7** and extend vertically through the die head. One of the punches **8** is aligned with each die cavity and as the head assembly rotates the punches are reciprocated up and down in the die cavities by cam track **13** on which the punches ride and which is fixedly secured to press pedestal **12**.

During operation of the press, with the aid of various auxiliary devices not shown in the drawing, as the die cavities move from the position indicated by reference letter A clockwise as is indicated by the arrow to the position indicated by the reference letter B, each die cavity is filled with a first charge of pulverant material and this material is compressed to form therefrom a first tablet layer. As each die cavity moves from position B to position A, it contains a first tablet layer and is filled above the first tablet layer with a second charge of pulverant material, and the pulverant material and first tablet layer are compressed to form a two-layer tablet. As the die cavities approach position A, the cam track **13** raises the punches **8** so that the two-layer tablets T are ejected from the cavities, and then guide plate **16**, which is fixedly secured to the press pedestal **12**, guides the two-layer tablets to the edge of the die head **7** from where the tablets fall into a collecting receptacle, not shown.

In order to control production it is necessary from time to time to remove from the press first tablet layers for weighing. In order to accomplish this without stopping the press, there is provided at position B a check device **15** comprising manually operated ejector **15***a* and first tablet layer rejector **20**. The ejector **15***a* comprises lifting cam **17** disposed in cam track **13** and hand lever **18**. The rejector **20** comprises compressed air line **19** which is provided with solenoid operated valve **21**. The ejector **15***a* and rejector **20** are operatively connected by switch **22** installed in the line connecting the solenoid of valve **21** with power source **23**. When the hand lever **18** is raised, first tablet layers are ejected from the die cavities as the die cavities pass through position B, and the switch **22** is tripped so that the solenoid of valve **21** is deenergized and the valve opens. Compressed air then issues from line **19** and blows the ejected first tablet layers off the die head. Following ejection of a first tablet layer from a die cavity at position B, as the die

cavity moves to position A it will be filled with pulverant material and this material will be compressed and formed into a single layer tablet.

In order to prevent commingling of this imperfect production (i.e. the single layer tablet) with two-layer tablets removed from the press by guide plate 16, an imperfect production rejector 24 is positioned just before the guide plate. The rejector 24 comprises compressed air line 25 which is provided with a solenoid operated valve 26. The memory device 27 coordinates the operation of the check device 15 and the imperfect production rejector 24 so that valve 26 will be open and allow compressed air to issue from line 25 and blow the production determined to be imperfect by operation of the check device off the die head before it arrives at guide plate 16.

The memory device 27 comprises a horizontally disposed wheel 28 fixedly mounted on shaft 37 which is driven in synchronism with the press head assembly 6 by the gear train 40 which connects the head assembly 6 and the shaft 37 and consists of the gear 38, gear box 39 and chain 41. The wheel 28 is provided with vertical passageways 29 which are equal in number to the number of die cavities in the die head and are oriented on the wheel as the die cavities are oriented on the die head. A peg 31 is slidably mounted in each passageway 29. As is best seen in Fig. 2 and Fig. 3, the central portion 32 of each peg is necked down and a clip 33 or other friction means, which fits tightly in circumferential groove 34, in wheel 28, grips the central portion of the peg. The clips hold the pegs by friction at the level to which they are raised or lowered during operation of the memory device.

Fixedly positioned in sequence along the path of the pegs 31 are a wiping cam 42, a solenoid operated impressing cam 43, and a contact arm 44, such that pegs 31 are carried past cam 42, cam 43 and arm 44 in that order by rotation of wheel 28 in a clockwise direction as seen in Figure 1. As suggested above the number of pegs 31 corresponds to the number of die cavities 14 and the pegs have the same orientation on wheel 28 as cavities 14 have on die head 7. Impressing cam 43 and contact arm 44, moreover, have the same angular displacement along the clockwise path of pegs about wheel 28 as the displacement of check device 15 and imperfect production rejector 24 along the clockwise path of die cavities 14 about die head 7. The solenoid of impressing cam 43 normally maintains the impressing cam in a retracted position. When the solenoid is deenergized the impressing cam moves to an extended position so that it projects into the path of the pegs and moves pegs passing by while it is extended from a resting or lowered position to a working or raised position. Pegs raised by the impressing cam are held in the raised position by friction and strike the contact arm 44 as they pass thereby. Pegs in the lowered position pass under the contact arm without incident. The wiping cam lowers raised pegs 31 to the lowered position and hence levels the pegs as they pass thereby returning from adjacent contact arm 44 to a position adjacent impressing cam 43.

The impressing cam 43 and the check device 15 of the rotary press are operatively connected as the solenoid of impressing cam 43 is connected to power source 23 through switch 22 which is tripped and hence deenergizes the solenoid of impressing cam 43 when the check device is operated by raising hand lever 18. The contact arm 44 and imperfect production rejector 24 are operatively connected as contact arm 44 operates switch 47 which is installed in the power line connecting the solenoid of valve 26 of imperfect production rejector 24 with power source 23. Thus, when the check device determines production to be imperfect, a peg 31 of the memory device is moved to the raised position and as the raised peg passes the contact arm 44 it strikes the arm and opens switch 47. This deenergizes the solenoid of valve 26 of imperfect production rejector 24 so that compressed air issues from compressed air line 25 of rejector 24 and blows the imperfect production off the die head before it arrives at guide plate 16. Thus the memory device prevents commingling of imperfect production with finished tablets removed by guide plate 16.

As is best seen in Fig. 2 and Fig. 3, the contact arm 44 is mounted so that its position is adjustable horizontally. This permits adjusting the time at which the imperfect production rejector 24 is actuated and the interval of time during which it is operated. As shown in the drawing, the switch 47 which the contact arm 44 operates is fixedly secured to bracket 51 by bolts 52, and the bracket 51 is secured to tapped block 53 by bolts 54. The bolt holes 56 for bolts 54 are in the form of slots which permit horizontal adjustment of the contact arm 44 in the direction of a line tangent to the peg path adjacent the point where the contact is positioned. Thus, the bolt holes 56 permit adjusting the time at which raised pegs strike the contact and hence the time at which the imperfect production rejector 24 is actuated.

The tapped block 53 is threaded onto spindle 57. The spindle is journaled in journal block 58 and the wiping cam 42 both of which are fixedly secured to the memory device housing 59. The spindle 57 is provided with collars 61 and 62 which abut respectively with journal block 58 and wiping cam 42 and hence prevent longitudinal movement of the spindle, and with lock nuts 63 and 64 which are threaded on spindle 57 and are provided for locking the tapped block 53 on the spindle. By loosening the lock nuts and rotating the spindle, the position of the contact can be adjusted radially of the wheel 28 and in this way the time during which the switch 47 is held open can be adjusted and, if desired, the memory device can be adjusted so that tablets in cavities on either side of the cavity containing the imperfect production are rejected.

The invention has been described in detail with reference to its use in combination with a multi-layer tablet press. However, the memory wheel can advantageously be employed with any rotary press provided with a check device and a rejector which it is desired to coordinate. For example, the memory device can advantageously be employed in combination with the coated tablet press described in my aforementioned copending application Serial No. 636,677, filed January 28, 1957. This coated tablet press employs a check device to determine if tablets to be coated are properly positioned in the die cavities, and a rejector positioned ahead of the check device along the path of the die cavities for rejecting production determined to be imperfect by the check device. Advantageously, the memory device of the present invention is employed to coordinate the operation of the coated tablet press check device and rejector.

I claim:

1. In a rotary press including a rotating die head having a plurality of die cavities disposed therein, auxiliary devices each fixedly positioned at a different point along the path of the die cavities for effecting steps of press operation at the die cavities, said auxiliary devices including a check device for checking press performance and a normally inoperative rejector actuatable to reject press production, the combination therewith which includes a memory device for coordinating operation of the check device and the rejector, said memory device including a wheel mounted for rotation in time relation with the die head and having a plurality of passageways disposed in a ring about the center thereof, a plurality of pegs positioned one in each passageway, each peg being reciprocable in said passageway between a resting position and working position, first means fixedly positioned along the path of said pegs for reciprocating said pegs in said working position to said resting position, second means fixedly positioned along the path of said pegs, said second means being normally inoperative and being effective when operated to move said pegs passing said second means from

said resting position to said working position, third means fixedly positioned along the path of said pegs responsive to the passage thereby of a peg in said working position, said first, second and third means being arranged in such order along the path of rotation of said pegs as said wheel is rotated in time relation with said die head, means operatively connecting said check device and said second means for operating said second means when said check device is actuated, and means operatively connecting said third means and said rejector to actuate said rejector upon passage of a peg in said working position past said third means, the angular displacement along said wheel in the direction of rotation thereof of said third means from said second means being equivalent to the displacement along said die head in the direction of rotation thereof of said rejector from said check device.

2. The combination of claim 1 wherein the memory device comprises means for adjusting the position of the said third means whereby the time at which the rejector is actuated and interval of time during which the rejector operates may be adjusted.

3. In a rotary press including a rotating die head having a plurality of die cavities disposed therein, auxiliary devices each fixedly positioned at a different point along the path of the die cavities for effecting steps of press operation at the die cavities, said auxiliary devices including a check device for checking press performance and a normally inoperative rejector actuatable to reject press production, the combination therewith which includes a memory device for coordinating operation of the check device and the rejector, said memory device including a horizontally disposed wheel mounted for rotation in synchronism with the die head and having a plurality of vertical passageways extending therethrough, said passageways being equal in number to the number of said die cavities in said die head and being oriented about said wheel in the same manner as said die cavities are oriented about said die head, a plurality of pegs positioned one in each passageway, each peg being vertically reciprocable in said passageway between a lowered resting position with the lower end thereof projecting beneath said wheel and a raised working position with the upper end thereof projecting above said wheel, a wiping cam fixedly positioned above said wheel along the path of said pegs for engaging the upper ends of said pegs in said working position to reciprocate said pegs to said resting position, an impressing cam mounted for reciprocation beneath said wheel at a fixed position along the path of said pegs, said impressing cam being normally retracted and upon actuation thereof being extendable to engage the lower ends of said cams in said resting position to raise said pegs to said working position, a contact arm fixedly positioned above said wheel along the path of said pegs to engage the upper ends of said cams in said working position, said wiping cam, said impressing cam and said contact arm being arranged in such order along the

path of rotation of said pegs as said wheel is rotated in synchronism with said die head, means operatively connecting said check device and said impressing cam to actuate said impressing cam to said extended position when said check device is actuated, and means operatively connecting said contact arm and said rejector to actuate said rejector upon engagement of a peg in said working position with said contact arm, the angular displacement along said wheel in the direction of rotation thereof of said contact arm from said impressing cam being equal to the angular displacement along said die head in the direction of rotation thereof of said rejector from said check device.

4. The combination of claim 3 wherein the check device comprises means for horizontally adjusting the position of the contact arm whereby the time at which the rejector is actuated and the interval of time during which the rejector operates can be controlled.

5. A memory device including a rotatably mounted wheel having a plurality of passageways disposed in a ring about the center thereof and extending therethrough, a plurality of pegs positioned one in each passageway, each peg being reciprocable in said passageway between a resting position with a first end thereof projecting on one side of said wheel and a working position with the second end thereof projecting on the other side of said wheel, a wiping cam fixedly positioned on said other side of said wheel along the path of said pegs for engaging the second ends of said pegs in said working position to reciprocate said pegs to said resting position, an impressing cam mounted for reciprocation on said one side of said wheel at a fixed position along the path of said pegs, said impressing cam being normally retracted and upon actuation thereof being extendable to engage the first ends of said cams in said resting position to move said pegs to said working position, a contact arm fixedly positioned on said other side of said wheel along the path of said pegs to engage said second ends of said cams in said working position, said wiping cam, said impressing cam and said contact arm being arranged in such order along the path of rotation of said pegs as said wheel is rotated, means for actuating said impressing cam to said extended position, and means operatively connected to said contact arm to be actuated upon engagement of a peg in said working position with said contact arm.

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