

H. F. BECHMAN.
MECHANICAL PRESSURE MECHANISM.
APPLICATION FILED APR. 22, 1912.

1,150,484.

Patented Aug. 17, 1915.
2 SHEETS—SHEET 1.

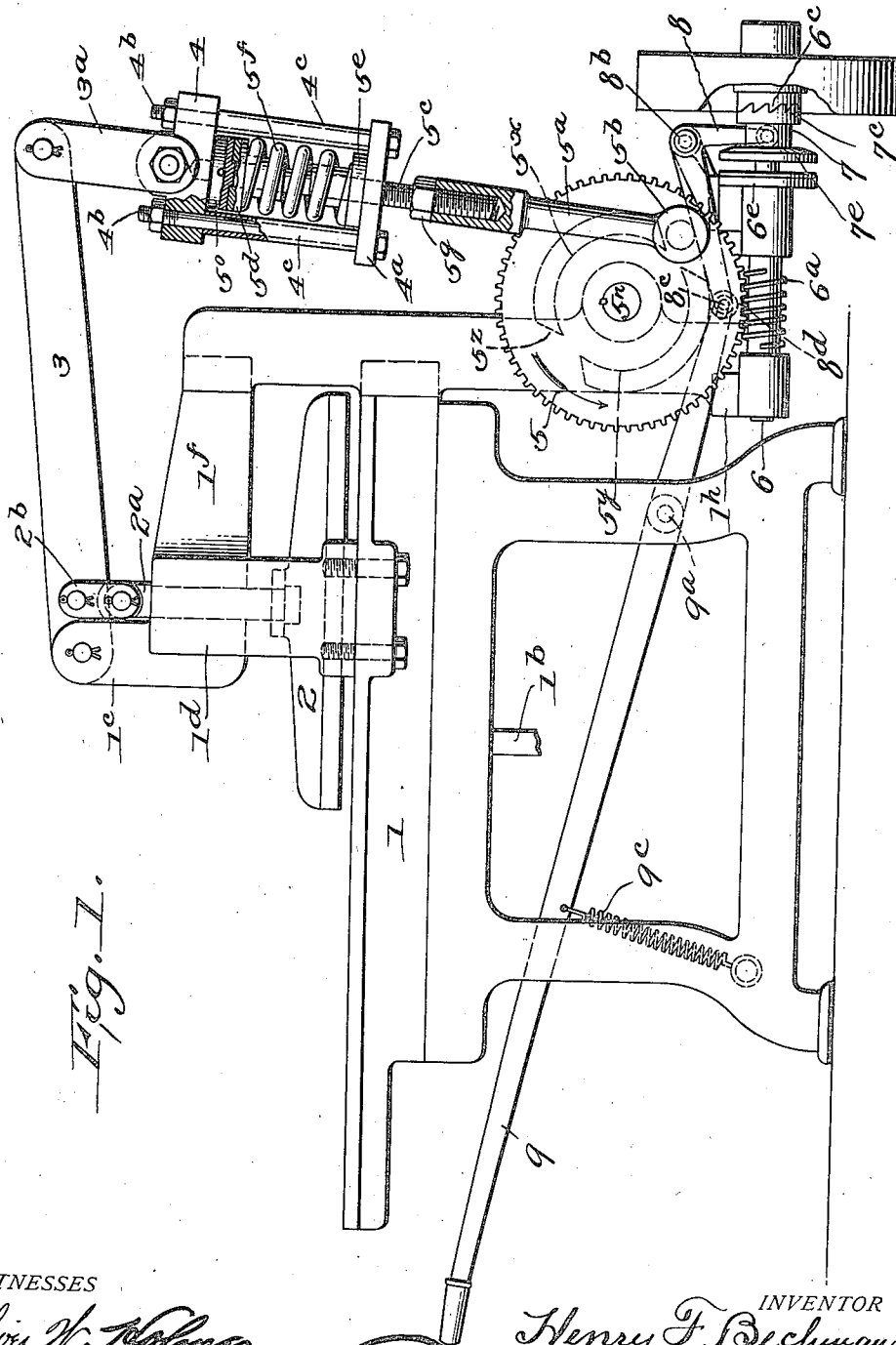


Fig. 1.

WITNESSES

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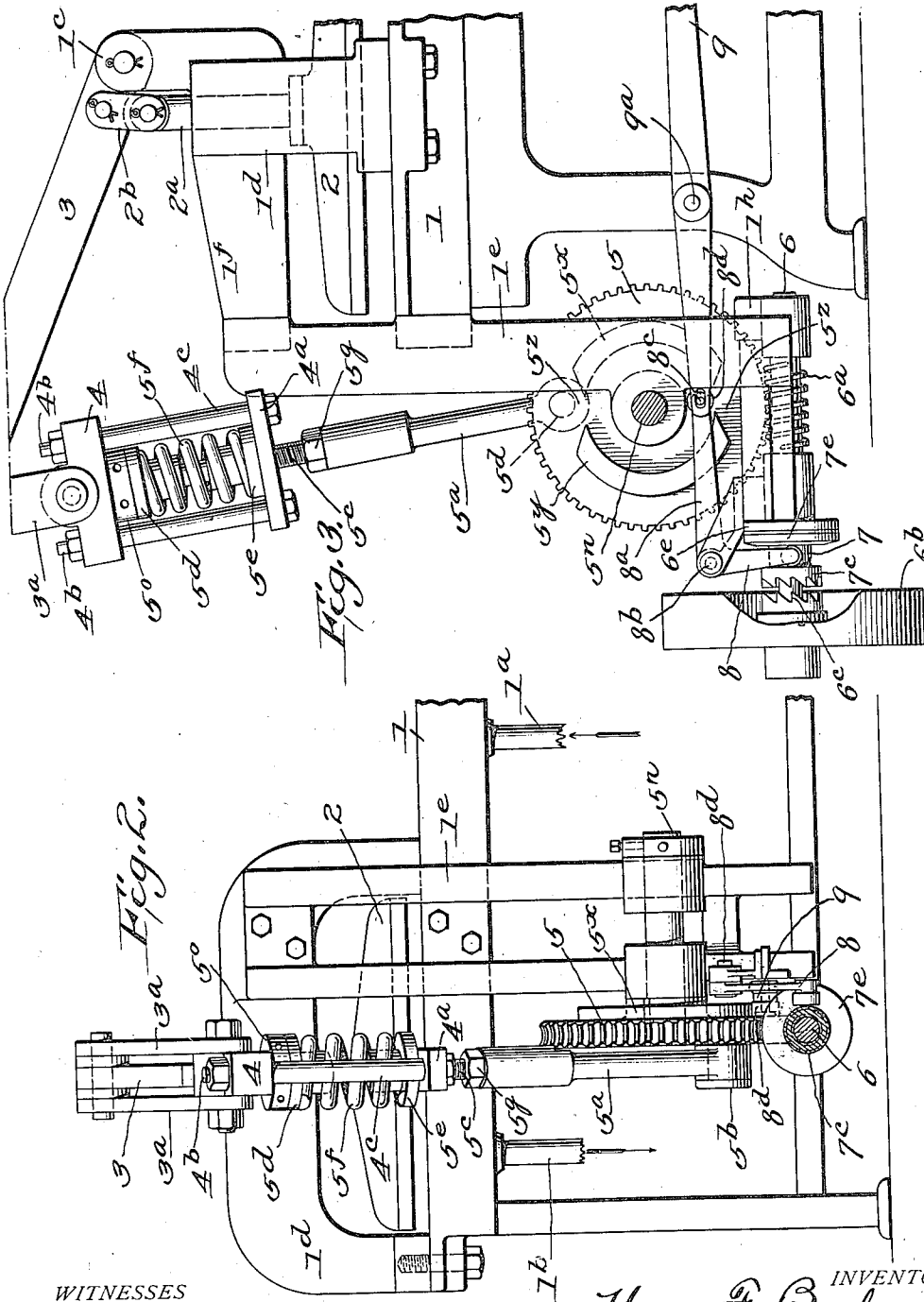
INVENTOR

Henry F. Bechman
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UNITED STATES PATENT OFFICE.

HENRY F. BECHMAN, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO DUPLEX PRINTING PRESS COMPANY, OF BATTLE CREEK, MICHIGAN, A CORPORATION OF MICHIGAN.

MECHANICAL PRESSURE MECHANISM.

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To all whom it may concern:

Be it known that I, HENRY F. BECHMAN, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Mechanical Pressure Mechanism; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel mechanical pressure mechanism especially adapted for use in connection with steam tables, electric tables, and other devices; particularly when used in matrix making, stereotyping and the like; and its object is to provide novel mechanical means whereby any desired pressure may be positively and uniformly applied to the article upon the table at the will of the operator; such pressure being regulable by adjustment of the parts.

Another object of the invention is to provide mechanical spring pressure regulated mechanism for such tables which will be perfectly reliable in operation under the most trying conditions, and which will avoid all the objections which have been heretofore attendant upon pneumatic or fluid pressure tables.

I will explain the invention in detail with reference to the accompanying drawings in which I have illustrated a practical form of apparatus embodying the invention; but the invention is not limited to the particular form and construction of parts shown.

In said drawings—Figure 1 is a side elevation of a table equipped with my novel mechanical spring regulated pressure mechanism with the platen lowered. Fig. 2 is a partial end elevation of Fig. 1. Fig. 3 is a detail rear view of Fig. 1, showing the platen elevated.

The table 1 may be of any desired kind and size; and as shown is a steam table which is usually constructed with a hollow body to which steam may be admitted through pipe 1^a and withdrawn through pipe 1^b, which pipes may be connected to the table at any desired points. Mounted above this table is a vertically movable platen 2 which is connected by a rod 2^a and link 2^b to a pressure lever 3; said lever being pivoted on lugs 1^c rising from a yoke 1^d supported upon the table and fastened thereto as shown. The link 2^b is pivotally connected

to the rod 2^a and to the lever as shown; the latter pivot being close to the fulcrum of the lever 3, so that very great pressure can be exerted upon the platen by the lever 3. The lever 3 extends rearwardly beyond the edge of the table, and its outer end is connected mediatly to a pitman bar 5^a that is pivoted to a crank pin 5^b on a driving gear 5 by the rotation of which lever 3 can be vibrated.

A spring pressure regulating device is preferably interposed between the pitman 5^a and the lever 3; such pressure regulating device as shown comprises a frame, consisting of an upper member 4 and a lower member 4^a rigidly united by bolts 4^b and spaced apart by shouldering or sleeving the bolts as indicated at 4^c. The lever 3 is pivotally connected by a link 3^a to the upper member 4. In the lower member 4^a is a central opening through which passes freely a rod 5^c the upper end of which rod projects into a corresponding guide opening in the upper member 4. Rod 5^c is provided near its upper end with a flange 5^d in which are pin holes 5^e into which a tool may be inserted to turn the rod.

Loosely strung on rod 5^c between the flange 5^d and member 4^a, are flanged collars 5^a, 5^e; and interposed between these collars is a stout helical expansion spring 5^f. The lower end of rod 5^c has a threaded connection with the upper end of the pitman 5^a so that the total length of the connections between the crank pin 5^b and the pivot of link 3^a to lever 3 can be nicely and accurately adjusted by screwing rod 5^c more or less into or out of the socket in pitman 5^a; and when properly adjusted the rod can be locked by jam nut 5^g. When jam nut 5^g is loosened the rod can be turned and adjusted without twisting the spring or the collars. The spring 5^f holds collars 5^a, 5^e apart as far as permitted by the members 4, 4^a; and the normal tension or resistance of spring 5^f is approximately equal to the maximum pressure which could be safely applied to the material being treated; and when the maximum pressure is reached said spring will slightly yield and thus avoid the breaking of any portion of the mechanism, or injury to the material being compressed, while insuring that the desired pressure shall be applied through the platen to such material and evenly maintained.

The gear 5 is preferably a worm gear, and is mounted upon a shaft 5^a having bearings in upright members 1^e attached to the main frame; the members 1^e preferably extend above the top of the table and are connected by extensions 1^f to the side of the yoke 1^d, thus assisting in bracing the latter. The gear 5 meshes with a worm 6^a on a transverse shaft 6, journaled in bearings attached to brackets 1^h supported upon or attached to the lower ends of the members 1^e, or otherwise suitably connected to the frame.

Upon the shaft 6 is loosely mounted a pulley 6^b, that may be driven from any suitable source of power, not shown. Said pulley is provided with a clutch face 6^c adapted to be engaged by a clutch member 7^c attached to a sleeve 7 slidably mounted upon and splined to the shaft 6 at the inner side of the pulley 6^b and between the outer bearing of the shaft 6 and the pulley. The sleeve 7 has a friction disk 7^e on its inner end opposite a fixed disk 6^e attached to the end of the adjacent journal box of the shaft; and disk 6^e may be faced with leather or other frictional material.

The sleeve 7 may be shifted outwardly so as to engage its clutch face 7^c with the pulley clutch face 6^c; or may be shifted inwardly so as to disengage the clutch and simultaneously engage the friction surfaces 7^e, 6^e. The sleeve clutch may be shifted, at the will of the operator, by means of a bell-crank clutch lever, pivoted at 8^b, having a short arm 8 engaging the groove in the clutch sleeve, and a long arm 8^a extending inwardly and pivotally connected at 8^c to the rear end of a controlling lever 9, which is pivoted at 9^a on the main frame and extends under the table to the front side thereof so that its forward end can be readily grasped by the hand of the operator. The forward end of the lever 9 is normally depressed by a spring 9^c attached at one end to the lever 9 and to the frame at its outer end.

A roller 8^d is attached to the arm 8^a of the bell-crank lever, and is adapted to engage with semi-circular cams 5^x, 5^y formed on or attached to the inner face of the gear 5. These cams are slightly separated at their ends forming gaps 5^z into which roller 8^d can enter; and the ends of each cam are preferably tapered inwardly at the gap, as indicated in the drawings, so that the lever 9, under the influence of spring 9^c, will cause roller 8^d to move inward at such point and enter the gap thus automatically disengaging the clutch 7^c from the pulley and bringing the friction surfaces into contact. Whenever the roller 8^d enters a gap 5^z between the ends of the cams 5^x, 5^y, the clutch will be disengaged and the friction surfaces engaged, and consequently the gear will be stopped.

In the construction shown, when the machine is in operation roller 8^d will engage a cam 5^x or 5^y and keep the clutch in engagement until gear 5 has made a half revolution; and then the roller 8^d will enter a gap and automatically disengage the clutch and engage the friction surfaces and stop the operation of the gear. When the operator desires to start the machine he simply raises the outer end of lever 9 which will move roller 8^d out of the gap and simultaneously throw the clutch into engagement and start the gear 5, and the proper cam (5^x or 5^y) will hold the clutch in engagement until the gear 5 has made a half revolution.

The cams 5^x, 5^y are so arranged that the clutch will be held in engagement until the gear 1 has made one-half revolution, and will be thrown out of engagement either when the crank pin 5^b is at its lowest or compression point; or at its highest or throw off point; therefore during one-half revolution of the gear the platen will be moved to the lowest pressure position, and during the next half revolution of the gear the platen will be raised to its highest position, so that work may be inserted thereunder.

The spring 9^c has sufficient power to disengage clutch 6^c and throw the friction face 7^e into engagement with friction face 6^e whenever roller 8^d finds a gap; this will quickly stop the revolution of the gear with the crank pin either at the highest or lowest point of its orbit.

Operation: The machine normally stands with the crank pin 5^b in its highest position and with the roller 8^d in a gap between the cams 5^x and 5^y, the platen being then in its highest position, see Fig. 3. After the work has been adjusted on the table beneath the platen the operator lifts the outer end of lever 9 thereby throwing roller 8^d out of the gap and simultaneously engaging the clutch 7^c with the pulley 6^b, whereupon motion is imparted to the gear 5 and the clutch held in engagement for a half revolution; and as gear 5 turns the outer end of lever 3 is depressed, consequently lowering the platen with great power until the crank pin 5^b reaches its lowest point, when the roller 8^d again enters a gap 5^z between the cams 5^x, 5^y and the clutch is thrown out of engagement, bringing the gear to a stop; this holds the platen down under pressure, the amount of pressure being regulable by adjusting the length of the composite pitman connections between lever 3 and crank pin 5^b, so that any desired pressure may be applied by the platen, but a dangerously excessive pressure will be prevented by the yielding of spring 5^f. While compression is on and 5^b is at its lowest point the spring should always be slightly compressed, which will insure that the desired pressure for which the machine

is set shall be maintained evenly and constantly. This pressure mechanism is capable of applying any desired pressure. When the operator wants to remove the work he again raises the outer end of lever 9, thereby reengaging the clutch, and the gear 5 will then rotate another half revolution until the crank pin 5^b has reached its uppermost position, when the roller 6^c again enters a gap between the cams and the machine is stopped as before, until the operator wishes to again lower the platen.

It will be seen that at each operation the gear makes a half revolution; during one-half revolution of the gear pressure is applied and the machine stops with the platen held in its lowest position under the desired pressure; and during the other half revolution of the gear the pressure is released and the platen stops in its highest out of the way position.

What I claim is:

1. In a mechanical compression apparatus, the combination of a table, a platen, a pressure regulating means connected with said platen adapted to prevent excessive pressure, means for applying pressure to said platen through said pressure regulating means, and means for holding the platen under full pressure after said pressure applying means has operated to apply the pressure.

2. In combination, a table, a platen, a pressure regulating device adapted to prevent excessive pressure, and means for applying pressure to the platen through the said pressure regulating device; with manually controlled means for starting the said pressure applying means, and means for automatically stopping the said pressure applying means when full pressure is applied.

3. In combination, a table, a platen, a pressure regulating device adapted to prevent excessive pressure, a worm gear and connections for applying pressure to said platen through said pressure regulating device; with manually controlled means for starting the gear, and means for automatically stopping the gear when the full pressure is applied.

4. In a mechanical compression apparatus, the combination of a table, a platen, a pressure regulating device, a gear, and connections for operating said platen through said pressure regulating device, means for driving the gear, and a clutch for throwing the gear driving means out of operation when the full pressure is applied.

5. In a mechanical compression apparatus, the combination of a table, a platen, a pressure regulating device, a gear, and connections for operating said platen through said pressure regulating device, means for driving the gear, manually operated means for throwing the gear driving means into

operation, and automatic means for throwing the gear out of operation when the full pressure is applied.

6. In a mechanical compression apparatus the combination of a table, a platen, a spring pressure regulating device operatively connected with said platen and adapted to prevent excessive pressure, and means for actuating the said pressure regulating device; with manually controlled means for starting the said actuating means, and means for automatically stopping the said actuating means when the full pressure is applied.

7. In combination, a table, a platen, a spring pressure regulating device operatively connected with said platen and adapted to prevent excessive pressure, and power actuated means for causing said pressure regulating device to operate the platen; with manually controlled devices for starting the power actuated means, and automatic means for stopping the power actuated means when the full pressure is applied.

8. In combination, a table, a platen, a spring pressure regulating mechanism connected with the platen adapted to prevent excessive pressure, a gear operatively connected with the said pressure regulating mechanism, means for driving the gear, a clutch for throwing the driving means into or out of operation, means for preliminarily engaging the clutch, and spring controlled means for disengaging the clutch when full pressure has been applied to the platen.

9. In combination, a table, a platen, a pressure lever pivotally connected with the platen, a crank gear, a pitman connecting the gear with the said lever said pitman having an adjustable spring compression section adapted to prevent excessive pressure, means for driving the gear, and means for throwing the driving means into or out of operation and for stopping the gear when full pressure has been applied to the platen.

10. In combination, a table, a platen, a pressure lever operating the platen; a crank gear, a pitman connecting the crank with the said lever; means for driving the gear, a clutch for throwing the driving means into or out of operation; cams controlling the clutch, manually operable means for preliminarily engaging the clutch, and spring controlled means for disengaging the clutch when full pressure has been applied to the platen.

11. In combination, a table, a platen, a pressure lever for operating said platen, a crank, a pitman connecting said crank with said pressure lever, means for driving the crank, a clutch for throwing the driving means into or out of operation, means for holding the clutch in engagement during a desired period, means for automatically disengaging the clutch and means for initially engaging the clutch.

12. In a mechanical compression table, the combination of a table, a platen, a pressure lever for operating said platen, a crank, a pitman connecting said crank with said pressure lever, means for driving the crank, a clutch for throwing the driving means into or out of operation; cams for holding the clutch in engagement during a desired period, and means for disengaging the clutch at the end of such period.

13. In combination, a table, a platen, a pressure lever connected with the platen, a crank gear provided with a crank pin, a pitman connecting the crank pin with the lever, a driving gear meshing with the crank gear, a pulley on the driving gear shaft, a clutch on said shaft for locking the pulley to the shaft, a lever for operating said clutch, and cams for holding said lever in engagement for a desired period.

14. In combination, a table, a platen, a pressure lever connected with the platen, a worm gear provided with a crank pin, a pitman connecting the crank pin with the lever, a worm meshing with the worm gear, a pulley on the worm shaft, a clutch on said shaft for locking the pulley to the worm, a lever for operating said clutch, and means for holding said lever in engagement for a half revolution of the gear and means for automatically disengaging the clutch.

15. In combination, a table, a platen, a pressure lever pivotally connected with the platen, a crank gear, a pitman connecting the gear with the said lever said pitman having an adjustable spring compression section, means for driving the gear, and means for throwing the driving means into or out of operation; semicircular cams attached to the gear, a clutch lever controlled by said cams, manually operable means for preliminarily engaging the clutch, and spring controlled means for disengaging the clutch.

16. In combination, a table, a platen, a pivoted lever for actuating the platen, a gear having a crank pin, a pitman connected with said crank pin; means for driving the gear, a clutch for throwing the driving means into or out of operation, cams connected with the gear for holding the clutch in engagement during a half revolution of the gear, and means for disengaging the clutch at the end of a half revolution of the gear.

17. In combination, a table, a platen, a pressure lever connected with the platen, a worm gear provided with a crank pin, a pitman connecting the crank pin with the lever; a worm meshing with the worm gear, a pulley on the worm shaft, a clutch on said shaft for locking the pulley to the worm, a lever for operating said clutch, cams for holding said lever in engagement for a half revolution of the gear; and a spring for causing the lever to disengage the clutch

when the gear has made a half revolution, and means for shifting said lever to initially engage the clutch.

18. In combination, a table, a platen, a pivoted lever for actuating the platen, a gear having a crank pin, a pitman connected with said crank pin, an adjustable spring compression member connected with the pitman, a link connecting the lever to said compression member; means for driving the gear, a clutch for throwing the driving means into or out of operation; cams connected with the gear for holding the clutch in engagement during a half revolution of the gear, means for disengaging the clutch at the end of a half revolution of the gear; and manually operable means for initially engaging the clutch.

19. In combination with a compression table, a platen, a pressure lever connected with the platen, a worm gear provided with a crank pin, a pitman connecting the crank pin with the lever said pitman having a pressure controlling section, a worm meshing with the worm gear, a pulley on the worm shaft, a clutch on said shaft for locking the pulley to the worm, a lever for operating said clutch, a pair of cams on the gear for holding said lever in engagement for a half revolution of the gear, a spring for causing the lever to disengage the clutch when the gear has made a half revolution, and manually controlled means for shifting said lever to initially engage the clutch.

20. In combination, a table, a platen, a pivoted lever for actuating the platen, a worm gear having a crank pin, a pitman connected with said crank pin, a worm engaging said gear, a pulley for driving the worm, a sleeve clutch for locking the pulley to the shaft, said sleeve being provided with a friction-face opposite the clutch face, a stationary friction surface adjacent the sleeve friction-face, a lever for shifting said sleeve to cause engagement of the clutch surfaces or the friction surfaces, cams adapted to be engaged by the lever to hold the clutch in engagement, and means for shifting the lever to disengage the clutch at the end of each cam.

21. In combination, a table, a platen, a pivoted lever for actuating the platen, a worm gear having a crank pin, a pitman connected with said crank pin, an adjustable spring compression member connected with the pitman, a link connecting the lever to said compression member; a worm engaging said gear, a pulley for driving the worm, a sleeve clutch for locking the pulley to the shaft, said sleeve being provided with a friction face opposite the clutch face; a stationary friction surface adjacent the sleeve friction-face, a lever engaging said sleeve to cause engagement of the clutch surfaces or the friction surfaces, a pair of cams con-

5 nected to the gear and adapted to be engaged by the lever to hold the clutch in engagement, means for shifting the lever to disengage the clutch at the end of each cam, and manually operable means for shifting said lever to initially engage the clutch.

10 22. In a mechanical compression apparatus, the combination of a table, a platen, a pressure regulating device adapted to prevent excessive pressure, and means for causing said pressure regulating device to operate the platen and automatically stop to hold the platen under pressure.

15 23. In a mechanical compression apparatus, the combination of a table, a platen, a pressure regulating device adapted to prevent excessive pressure, and means for applying pressure to the platen through the said pressure regulating device; with means 20 for starting the said pressure applying means, and means for automatically stopping the said pressure applying means when full pressure is applied.

25 24. In a mechanical compression apparatus the combination of a table, a platen, a spring pressure regulating device operatively connected with said platen and adapted to prevent excessive pressure, and means for causing said pressure regulating device 30 to operate the platen and automatically stop to hold it when the full pressure is applied; and also to automatically stop when the platen is fully retracted.

35 25. In a mechanical compression apparatus the combination of a table, a platen, a spring pressure regulating mechanism operatively connected with said platen and

adapted to prevent excessive pressure, means for actuating the said pressure regulating mechanism, manually operable means for 40 throwing the same into operation and means for automatically throwing it out of operation when the platen is under full pressure and also when the platen is fully retracted.

26. In combination, a table, a platen, a 45 spring pressure regulating mechanism for operating the platen and adapted to prevent excessive pressure; a gear, connections for operating said pressure regulating mechanism from said gear, means for driving the 50 gear, and a clutch for throwing the gear driving means into or out of operation, and means for automatically stopping the gear when the full pressure is applied by the platen. 55

27. In combination, a table, a platen, a spring pressure regulating mechanism for operating the platen and adapted to prevent excessive pressure; a gear, connections for operating said pressure regulating mechanism from said gear, means for driving the 60 gear, and a clutch for throwing the gear driving means into or out of operation, and means for automatically stopping the gear when the full pressure is applied by the 65 platen and also when the platen is fully retracted.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

HENRY F. BECHMAN.

Witnesses:

IRVING K. STONE,
CHARLES A. GRAMES.