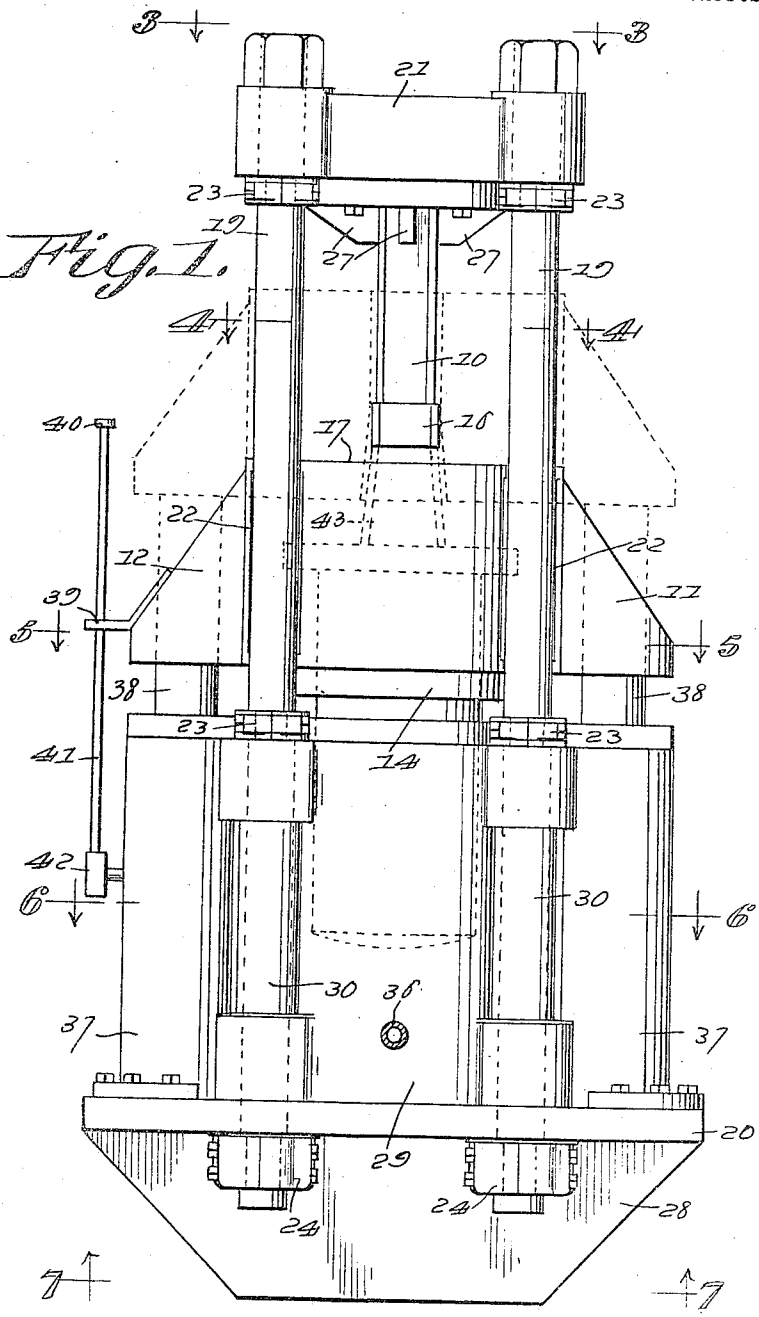
July 10, 1923. 1,461,093

G. KERSHNER

HYDRAULIC SALT PRESS

Filed Nov. 10, 1919 4 Sheets-Sheet 1

Fig. 1.



Inventor
George Kershner,
By E. J. Colladay
Attorney

July 10, 1923.

1,461,093

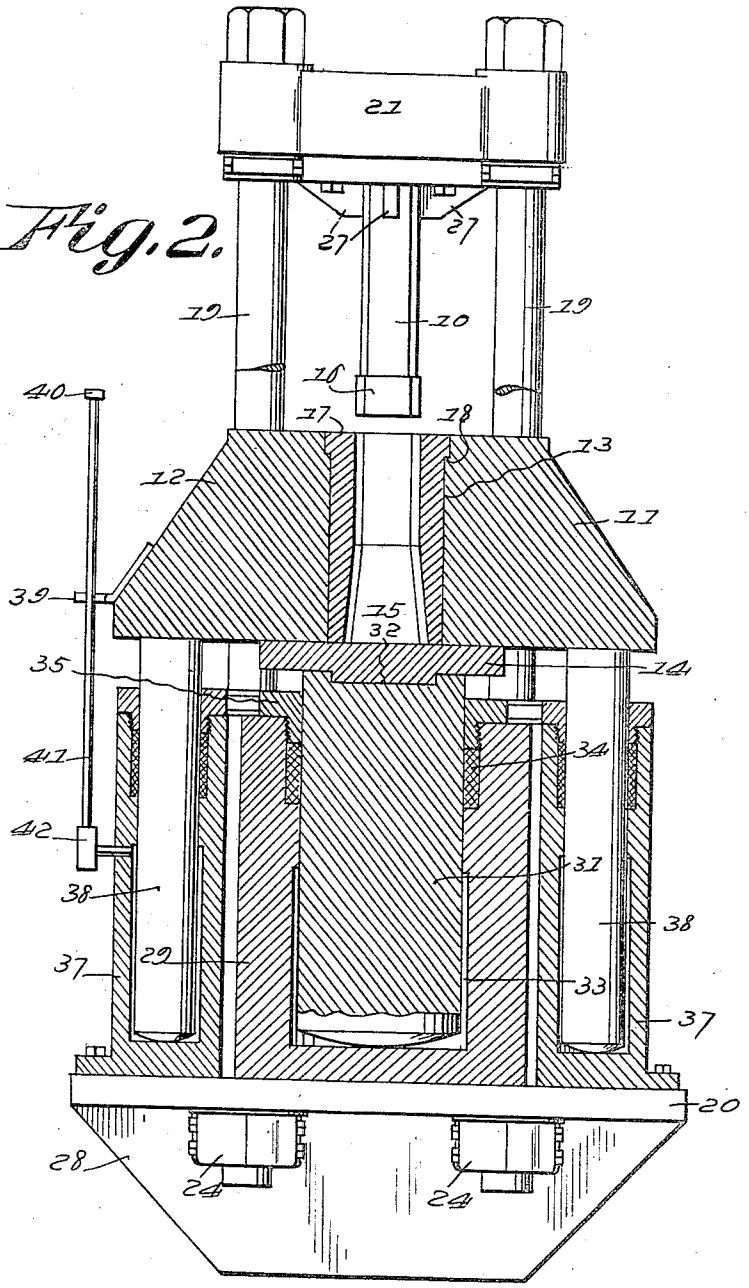
G. KERSHNER

HYDRAULIC SALT PRESS

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Fig. 2.



Inventor
George Kershner;
By E. H. Gladding
Attorney

July 10, 1923.

1,461,093

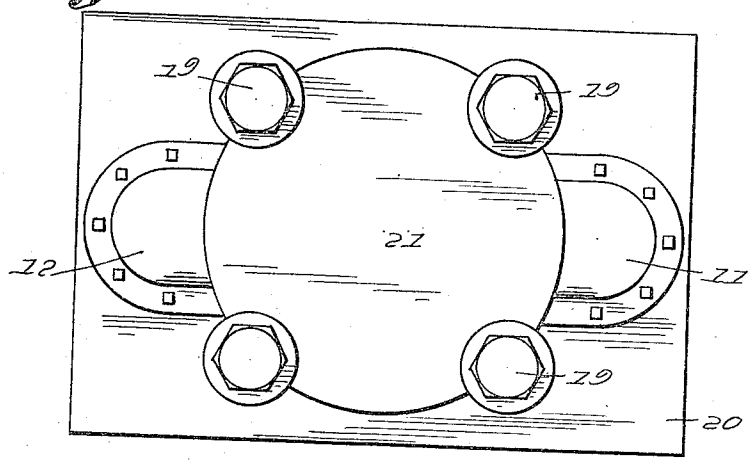
G. KERSHNER

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4 Sheets-Sheet 3

Fig. 3.



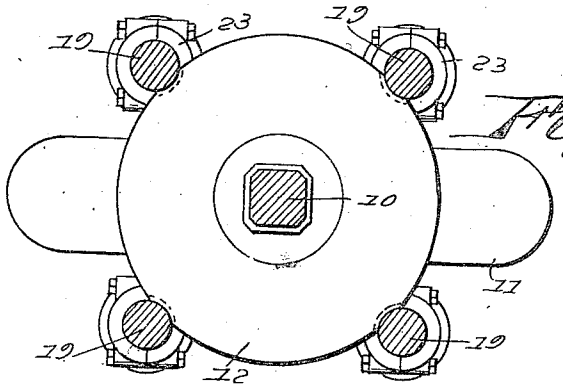


Fig. 4.

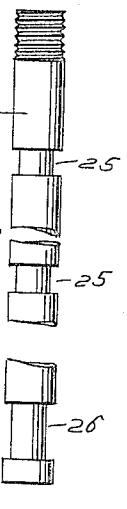
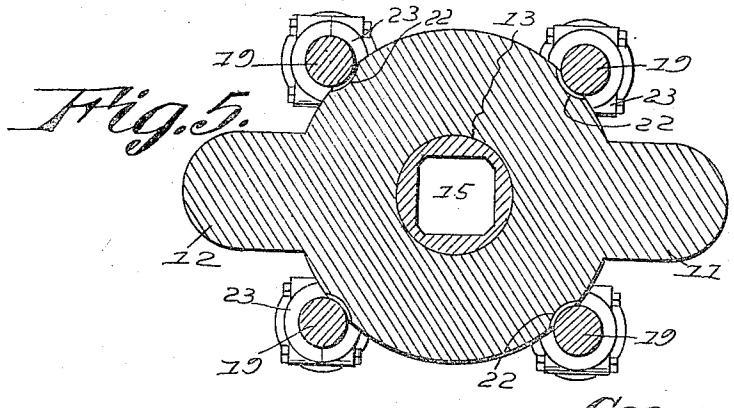


Fig. 6.

Fig. 5.



Inventor
George Kershner,
By E. F. Colladay
Attorney

July 10, 1923.

G. KERSHNER

1,461,093

HYDRAULIC SALT PRESS

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4 Sheets-Sheet 4

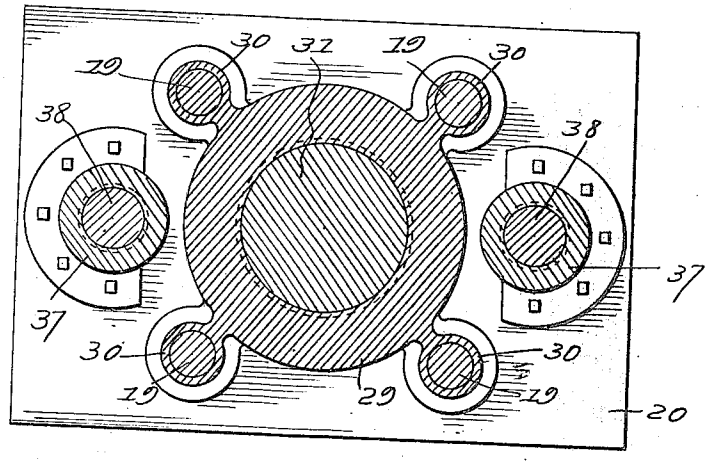


Fig. 6.

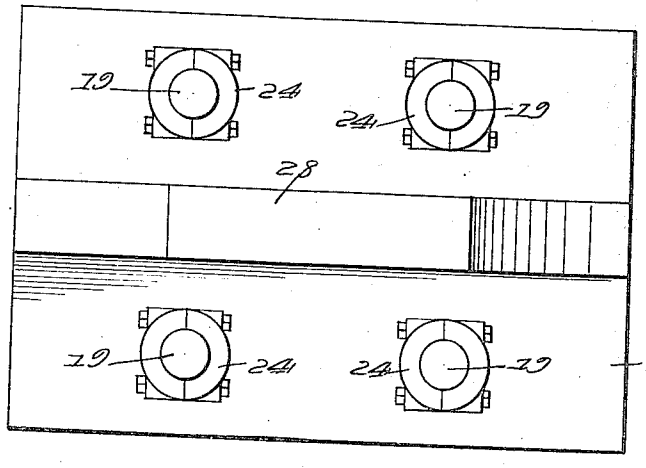


Fig. 7.

Inventor
George Kershner,
by E. F. Holladay
Attorney

Patented July 10, 1923. 1,461,093

UNITED STATES PATENT OFFICE.

GEORGE KERSHNER, OF HUTCHINSON, KANSAS.

HYDRAULIC SALT PRESS.

Application filed November 10, 1919. Serial No. 336,967.

To all whom it may concern:

Be it known that I, GEORGE KERSHNER, a citizen of the United States, residing at Hutchinson, in the county of Reno and State of Kansas, have invented new and useful Improvements in Hydraulic Salt Presses, of which the following is a specification.

The object of the invention is to provide a salt block press or forming mechanism designed for actuation by hydraulic pressure or by utilizing power applied hydraulically, wherein certain practical advantages are attainable, both as to the construction, operation and maintenance cost of the apparatus and as to the commercial value and cost of producing the salt block, and incidentally it is a further object to provide mechanism for the purpose whereby the extent of necessary handling of the product during and subsequent to its formation, including its removal from the press, is minimized and such manipulation is facilitated.

In order that the full import of the improvements may be appreciated, it is well to note that in the ordinary and well known methods of producing salt blocks or "licks" for cattle and other stock from loose or fine salt, the commercial value or salability of the product is often depreciated by discoloration due to water which drips or leaks into the mold or die during the process, and moreover the discharge of the block is frequently attended by the breakage or chipping thereof owing to the fact that the delivery is effected horizontally or at an angle, transversely of the machine, or otherwise results in dropping the block from a point of discharge, to a rest, shelf, table or like receiving surface; and moreover, such delivery usually must be effected by the special movement or operation, by hand or otherwise of some part of means or mechanism to liberate the block,—as, to open the mold or die, or to displace a head-block or gate or the equivalent thereof.

It is therefore the particular object of this invention to so arrange the cooperative agencies in the organization of the apparatus as to cause all leakage and drippings from the hydraulic or other operating means to flow away from the die or mold and from that part of the machine where the same is located and to arrange the block forming members in such a relation as to leave the completed block in a stable position upon a suitable rest or support wholly unobstructed by any collateral mechanism or devices, and readily accessible to the attendant and from which the block may be removed manually without risk of injury.

It is a further object to provide for the opening of the mold or die to deliver the completed block without manual intervention or the removal or displacement of any part or member of the mechanism, and at the same time to effect the positive and forcible ejection, if necessary, of the block from the mold without involving any risk or modifying the perfectly symmetrical formation or contour thereof.

Furthermore, it is the purpose to construct the machine on a floor plan of the minimum dimensions and eliminate all lateral or transverse movements, while securing a stability and sturdiness of detail which will insure durability and an efficient resistance to the enormous strains to which such apparatus must be subjected in practice, while minimizing the cost of preparing, shaping and assembling the parts.

With these general and other related objects in view, as will appear in the course of the following particular description of a preferred and thoroughly tested embodiment of the same, the invention consists in a construction, combination and arrangement of parts illustrated in the accompanying drawings, it being however understood that variations in form, proportions and details may be resorted to, within the scope of the appended claims without departing from the principles involved.

In the drawings

Figure 1 is a front view of the apparatus.

Fig. 2 is a vertical sectional view of the same.

Fig. 3 is a plan view,—see the dotted line 3—3 of Fig. 1.

Figs. 4, 5 and 6 are transverse sectional

views, respectively on the planes indicated by the dotted lines 4—4, 5—5 and 6—6 of Fig. 1.

Fig. 7 is a bottom plan view,—see dotted line 7—7 of Fig. 1.

Fig. 8 is a detail view, partly broken away of one of the tension rods by which the base is connected with the head.

The mechanism illustrated in the drawing, which is merely typical of that necessary for carrying out the objects of the invention, embodies, essentially, a die comprising male and female complementary members 10 and 11, one of which, preferably the latter as shown, is movable relative to the other to cause pressure of the former in a path or direction parallel with the axis and hence the side or retaining wall (preferably substantially cylindrical) of the latter. This movement is also preferably vertical or upward and downward at approximately an angle of ninety degrees to a horizontal plane so as to provide for discharging the molded block or other product by withdrawing the female die member therefrom, as will appear later.

The female die member, in addition to the side or retaining wall element, formed by a heavy block 12 in which is provided a bore or channel 13, open at both its lower and upper ends to permit of free progress of the male or pressure member 10 therethrough, includes a bottom or closure element 14, consisting of a plate adapted to oppose the pressure of the male die member and close the bottom or outlet of the female member during the formation of the block, and also designed to act as a receiving and delivery table or support for the completed block or product, receiving the same from the side or retaining wall element of the female die member and presenting it, unobstructed by any adjacent objects, for removal by the attendant, said block being received and supported in a stable position or in a position of stable equilibrium by said die bottom or closure element.

The pressure or forming chamber or zone 15 of the female die member is coned or expanded toward the outlet to facilitate discharge of the product, the corners or angles at the intersections of the side wall planes being truncated by intersecting wall planes, corresponding with the chamfered formation of the slightly enlarged head 16 of the male die member so as to produce a block of trunco-pyramidal form having a polygonal base which is formed upon the surface of the closure element of the female die and remains there undisturbed subsequent to the discharge of the block from the wall or mold element of the die until removed by the attendant.

As a matter of advanced mechanical construction the wall or retaining element, or as it may be termed the mold element of the die which is exposed to contact with the salt during its compression to form the block, consists of a specially prepared and hardened lining or sleeve 17 fitted, replaceably, in the seat represented by the bore or channel 13 in the body block or casting 12 and it may be shouldered as at 18 to insure its stability and permanence of position. When as illustrated, the female die member is movable relative to the male member and is adapted to progress upwardly during the compression of a charge of salt, the guide and tension bars 19 which are engaged at their lower ends with a base 20 and which support a head 21 carrying the depending rigid resistance post forming the male or pressure member 10 of the die, serve to direct the said female member of which the body block 12 is provided with grooves or ways 22 engaging the bars. Sectional clamping rings 23 and 24 engage reduced seats 25 and 26 to maintain the relation of the head and base with the tension bars or bolts, and suitable bracing webs 27 and 28 may be employed to add necessary rigidity to the head and base.

The means for operating the movable elements of the die, when, as shown, the female member progresses upwardly on the compression stroke, consist of a main hydraulic ram located centrally beneath the die members with its cylinder 29 resting upon the base and engaged and held in position by the tension bars or bolts 19 (for which purpose it is provided with eyes 30, Fig. 6) and with its piston 31 bearing terminally against the underside of the die closure plate 14. Said plate may have a central depending boss 32 fitted in a seat in the end of the piston and the cylinder is counter-bored and enlarged as at 33 from a plane below the stuffing box to the bottom to afford clearance and a path of escape by gravity of any particles of metal, dirt, grit, or hard substances from the packing 34 or gaining access through the gland 35 or otherwise, to guard against scratching or grooving the surface of the piston and thus reducing the efficiency of the hydraulic pressure supplied through the port 36 or other suitable inlet.

Supplementing the action of the main ram in the operation of the movable elements of the die structure, as illustrated, and designed especially to provide for a differential as well as a joint movement of the elements of the female die member, or in other words to provide not only for a corresponding and equal movement thereof in a common direction (as in opposition to and parallel with the path of pressure by the male member) but also for an independent movement thereof in the same or opposite directions, there are employed auxiliary rams, having cylinders 37 and pistons

38, corresponding substantially in construction with the main ram and having direct lifting or advancing engagement of their pistons (or equivalent motion transmitting elements) with the body block 12 forming the wall or mold element of the female die member. Thus, while the operation of the main ram progressively or on its advance stroke, will correspondingly advance the entire composite female member, inclusive of the wall or mold element and the bottom or closure element, the advance movement of the auxiliary rams will correspondingly move only the wall or mold element, and inversely a return or receding movement of the main ram, which is accomplished gravitally, will affect only the closure element of the die, unless the auxiliary rams have previously been withdrawn.

This arrangement provides for advancing the composite female die member (as by means of the main ram) to cause a sufficient relative downward progress of the male member in the mold element, opposed by the closure element to compress and properly form the block, and then holding the block 12 by means of the auxiliary rams, while permitting the closure element to recede or move downwardly with the main ram and thus deliver the block progressively without jar or shock. Or, if preferred, after the completion of the compression stroke due to the joint upward movement of the wall and closure elements of the female die-member, the progress of the main ram may be stopped to hold the closure element stationary while the movement of the auxiliary rams is continued to prolong the progress of the wall element of the die, relative to the closure element and the male member, so that the latter then constitutes and serves as an ejector to remove the salt block from the die mold and leave it standing on the plate or support 14. Or, by a suitable relative control of the main and auxiliary rams, a combination of these movements may be effected and their sequence modified to economize time in the formation and delivery of the product without necessitating any stoppage of the mechanism, or any manual intervention in order to open the mold or deliver the block, and without involving any drop or fall of the latter in its discharge, even when forcibly ejected as above explained.

It has been found expedient in practice to operate the main ram to advance the female die member to compress the charge in the downwardly expanded portion 15 of the mold between the pressure head 16 and the closure 14, and, when a tappet eye 39 on the block 12 engages a stop 40 on the valve rod 41, a valve 42 of any suitable construction is opened to admit pressure to the auxiliary rams which then continue the movement of the mold element while pressure being discontinued or reduced in the main ram cylinder permits the closure element of the female die member to settle or descend by gravity so as to expose the molded salt block (as at 43, see the dotted lines Fig. 1) resting upon said closure element in a stable position and free from the mold element so that it may be removed by hand or otherwise without risk of breakage.

All of the hydraulically controlled and lubricated elements of the mechanism being arranged below the plane of the block forming, charge receiving and compressing elements, represented by the die members and including both elements of the composite female die member, any overflow or dripping of water and oil or other foreign matter will move away from and hence cannot discolor or detract from the appearance and commercial value of the product.

Moreover, there are no laterally or transversely movable parts or elements of the mechanism, requiring floor space or operating room beyond the area of the base 20 which is just sufficient to properly support the rams,—the base, operating mechanism including both main and auxiliary rams, and the die mechanism, including the main body block 12, being substantially coextensive and all moving parts thereof operating in vertical paths, with the strains confined between the base 20 and the head 21 and effectually resisted by the tensile strength of the connecting bars or bolts 19 which also serve to hold the intermediate members of the mechanism,—stationary and movable, against lateral displacement.

I claim:

1. A hydraulic press for forming salt blocks having relatively movable members combining to bound a forming space subject to reduction in capacity to compress a contained substance, and represented respectively by a lateral restraining wall and terminal opposed elements, one of which elements is adapted to progress into the space bounded laterally by the wall member, and means for successively causing said elements to approach each other to define a predetermined length of forming space and then retain said relation during a continued progress of said first named element into the space.

2. A compressing die having relatively movable members combining to bound a forming space of which one member is represented by a lateral restraining wall and the other acts to reduce the capacity of said space by pressure in a direction parallel with said wall, and comprises relatively movable opposed elements having a common path of movement, means for effecting advancing and receding movements of one of said members relative to the other, and means for alternately varying and maintaining the rela-

tive positions of said opposed elements during the progress of the moving member.

3. A compressing die having relatively movable male and female members of which the former is adapted to progress relative to and exert pressure in a path parallel with the circumferential wall of the latter, and the latter being provided with an end wall opposed to the former, and movable relatively to the latter in the path of pressure applied by the former and during the progress thereof, and means for operating said parts.

4. A compressing die having relatively movable male and female members of which the latter is provided with an outlet closure opposed to the pressure of the former and alternately movable relatively to said members in a path corresponding with the direction and during the progress of pressure.

5. A compressing die having relatively movable male and female members of which the latter is provided with an outlet closure opposed to the pressure of the former and relatively movable away from the latter in a path corresponding with the direction of and during the pressure of the former.

6. A compressing die having relatively movable male and female members of which the latter is provided with an outlet closure opposed to the pressure of the former and alternately movable relative to and independently of each of said members in the direction of pressure of the former.

7. A compressing die having relatively movable male and female members of which the latter is provided with an outlet closure opposed to the pressure of the former and movable toward and from the former and relative to and independently of each of said members in a path corresponding with the direction of pressure of the former.

8. A compressing die having male and female members relatively arranged to provide for progress of the former through the latter, and the latter being provided with a closure forming a support for the delivered product and alternately movable relative to each of said members in the path of and during the progress of the former.

9. A compressing die having male and female members relatively arranged to provide for progress of the former through the latter, and the latter being provided with a closure movable to open the same in the path and during the progress of the former.

10. A compressing die having male and female members, one of which is movable to cause progress of the former relative to the latter, and the female member comprising side wall and closure elements, one of which is movable relative to and independently of the other in the direction of progress of the male member to cause the ejection of the product from the female member by the continued progress of the male member therethrough.

11. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for one end of the wall element, and independently controlled means for imparting movement to said elements.

12. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for one end of the wall element, and means for actuating the wall element independently of said closure element.

13. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for one end of the wall element, and means for actuating the female die member to cause independent relative movement of the said wall and closure elements thereof.

14. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for one end of the wall element, and means for advancing the wall element beyond the limit of movement of the closure element.

15. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for one end of the wall element, and actuating devices for the female member, having means for effecting joint and independent movements of said elements thereof.

16. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for one end of the wall element, and cooperative and independently operative means for advancing said wall and closure elements.

17. A compressing mechanism having male and female die members of which the latter is upwardly movable to cause progress of the former therethrough, the female die member comprising a wall element and a closure element for the lower end of the wall element, and actuating means for advancing the female die member adapted to release the closure element at an interme-

diate point in the progress of the wall element.

18. A salt block press having a base and a head connected by tension bars or bolts, a die having a male pressure member pendently carried by said head and a female member comprising a chambered block movably guided by said tension bars or bolts and a closure member movable in the path of said block to close the lower end of the chamber therein, and main and auxiliary rams seated upon the base, below the plane of the female die member and held in place by said tension bars or bolts.

In testimony whereof I have hereunto affixed my signature.

GEORGE KERSHNER.