No. 862,306. PATENTED AUG. 6, 1907.

C. S. BURTON.

EXPANDING PIPE MOLD.

APPLICATION FILED JUNE 14, 1907.

Fig. 1.

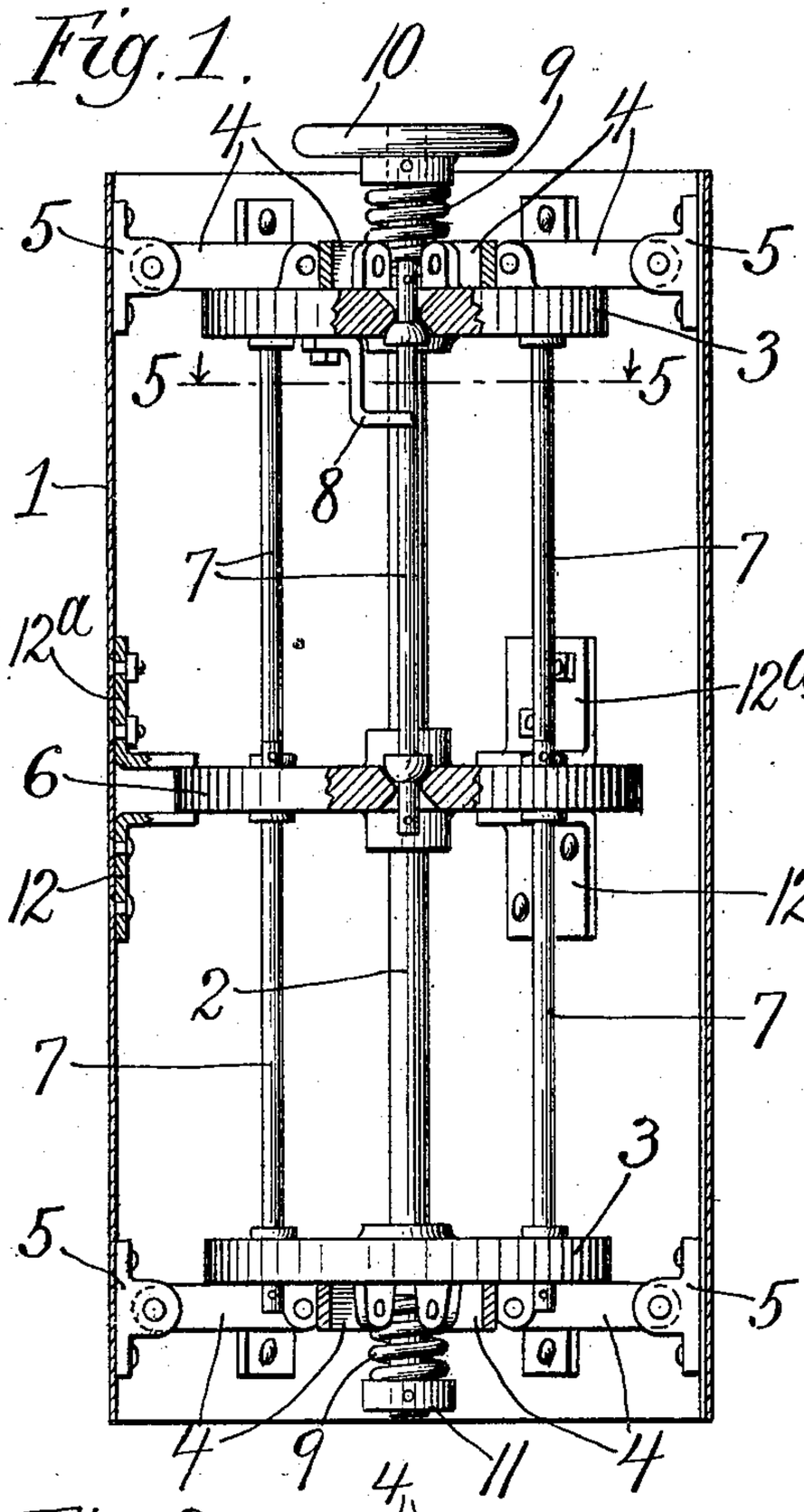


Fig. 2.

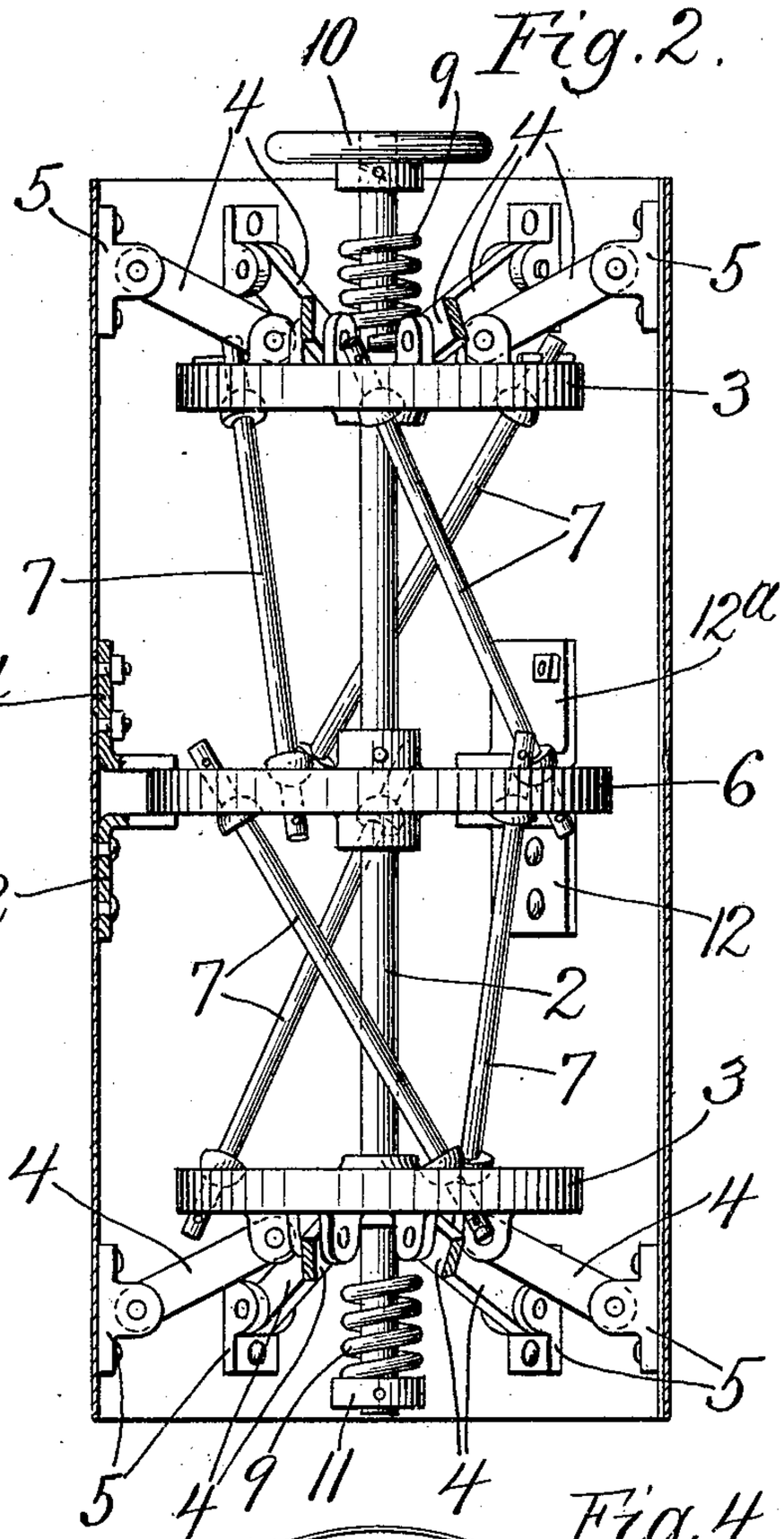


Fig. 3.

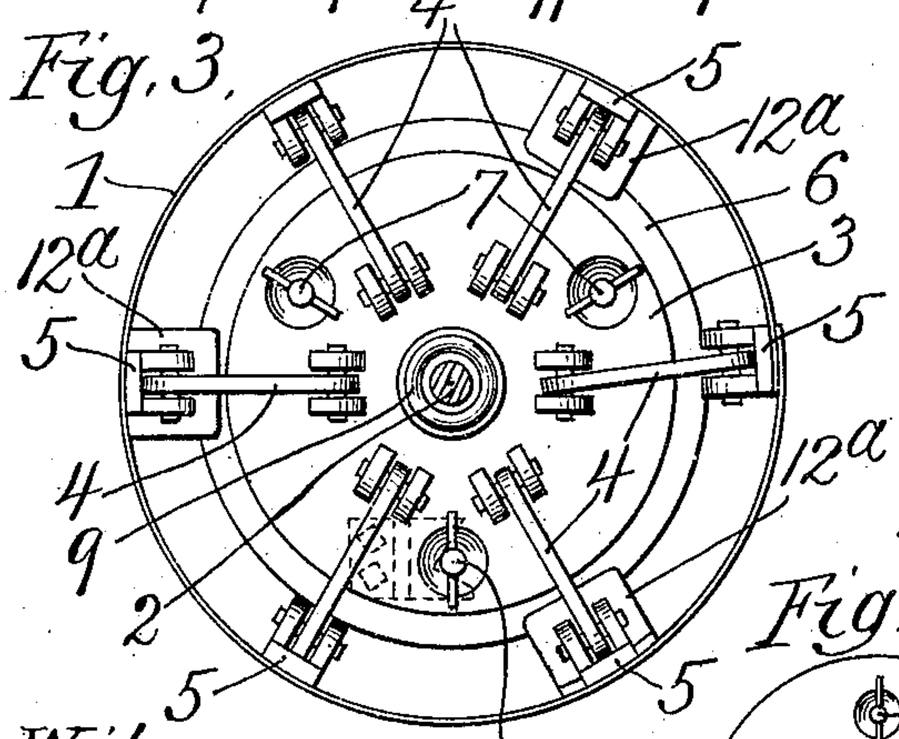


Fig. 4.

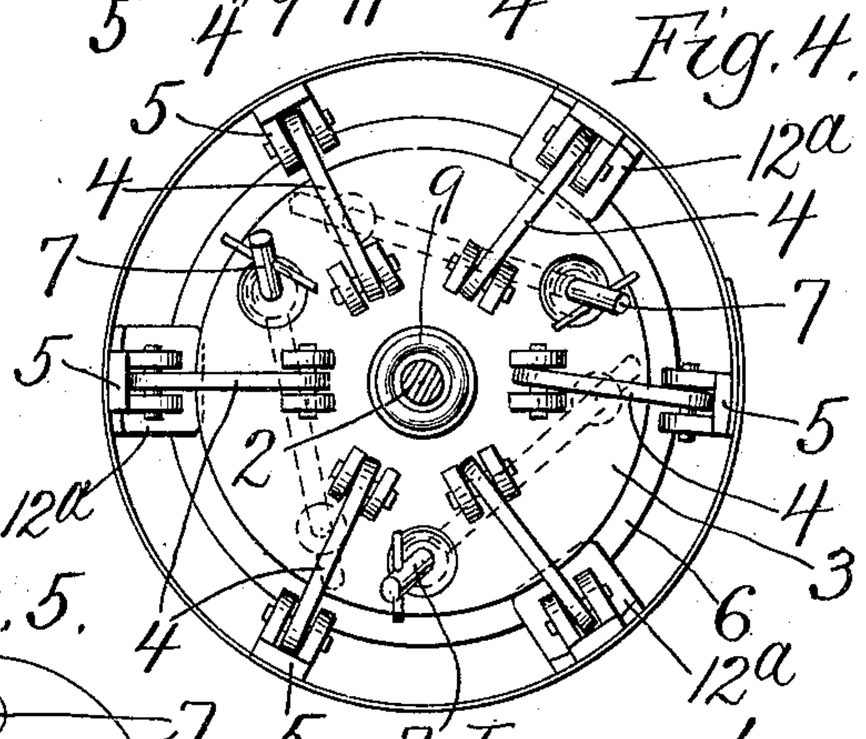
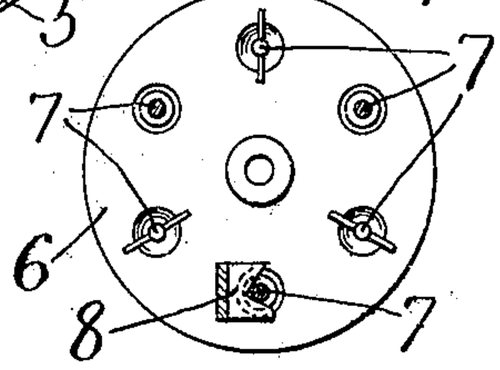


Fig. 5.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES S. BURTON, OF OAK PARK, ILLINOIS, ASSIGNOR TO MIRACLE PRESSED STONE COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF SOUTH DAKOTA.

EXPANDING PIPE-MOLD.

No. 862,306. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed June 14, 1907. Serial No. 378,922.

To all whom it may concern:

Be it known that I, CHARLES S. BURTON, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented new and useful Improvements in Expanding Pipe-Molds, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to molds for making cement pipe, and particularly to the inner or expansible and contractible member of such molds.

It consists of the elements and features of construction shown and described, as indicated in the claims.

In the drawings:—Figure 1 is an axial section showing the shell fully expanded. Fig. 2 is a similar view showing it contracted. Fig. 3 is a top plan view corresponding to Fig. 1. Fig. 4 is a similar view corresponding to Fig. 2. Fig. 5 is a detail section at the line 5—5 on Fig. 1.

The sheet-metal shell, 1, is rolled or coiled into cylindrical form with its edges lapped, as clearly seen in the plan or cross sectional views.

2 is a shaft extending axially within the shell.

3, 3 are travelers which are mounted for sliding on the shaft. Each of the travelers is connected with the shell at a plurality of points distributed throughout the circumference of the latter by links, 4, pivotally connected at their inner ends to the travelers respectively and at their outer ends to the shell by means of brackets, 5, riveted to the latter for that purpose. The pivotal connection of the links, both with the travelers and with the pivot brackets, 5, is sufficiently loose to allow the links considerable lateral play, as may be clearly seen by comparison of Figs. 3 and 4. The links are of such length that the shell is expanded to the maximum desired extent at least by the time the travelers have been moved outward to the direct transverse plane of the pivots of the links to the brackets, 5; that is, at such position that the links are in planes at right angles to the axis of the shell. Preferably, as hereinafter explained, the maximum expansion is obtained just before the travelers reach this plane, as seen in Fig. 1. When the travelers are moved longitudinally of the shell away from the position of maximum expansion, the links being drawn into oblique position as shown in Fig. 2 cause or permit the shell to contract to the lesser diameter shown in Figs. 2 and 4. In the operation of the device the longitudinal movement of the travelers for drawing the links to such oblique position is preferably inward,—that is, toward each other.

Fast on the shaft, 2, at a position intermediate the two travelers there is secured a cross head, 6, and extending from such cross head toward each traveler there are at least two and preferably three struts or thrust rods, 7. These rods are stopped at their opposite ends against the cross head and traveler respectively, and the position of the cross head on the shaft is such with relation to the travelers and the length of the rods, 7, that when the latter are parallel with the shaft the traveler is thereby held thrust outward to the position for holding the shell at its maximum desired expansion. The dimensions of the parts may be such that the entire expansion of the shell is effected by rotating the shaft from the position at which the links, 4, are oblique, as shown in Fig. 4, to the position at which the thrust rods or struts, 7, are parallel with the shaft, and this position may be one at which the maximum expansion which the links, 4, can produce is caused. I prefer, however, to make the length of the rods, 7, such that they become parallel with the shaft and cause the maximum expansion just before the links, 4, reach the position for producing the maximum expansion which they could cause. The reason for this is that if the links, 4, are carried fully to the position at which the maximum expansion which they can produce is caused, they are liable to pass slightly beyond it by reason of the looseness of connection of the strut rods, as hereinafter indicated, and the reaction of the shell would then cause the travelers to move still further outward and permit contraction of the shell from the maximum expansion which would be caused. While this could be prevented, the tendency to such action would operate to take up in outward direction some of the unavoidable slack in the pivot joints of the strut rods, and the play thus produced in the opposite direction would tend to defeat the perfect control of the inward movement of the travelers in contracting the shell, as will hereinafter more fully appear. In order that the shell may be held expanded to the desired maximum and may not be free to react by its contractile elasticity, the parts are proportioned so that said maximum expansion is obtained, as stated, when the strut rods are parallel with the shaft,—that is, are in the position at which they have exerted their utmost outward thrust upon the travelers,—and the rotation being continued by the slightest increment beyond that point, one or more of the strut rods, 7, if brought against a stop, 8, which arrests the movement, and at this stage it will be seen that the inward tendency of the cross heads which the contractile tendency of the shell tends to cause operates with a tendency to swing the thrust rods laterally in the same direction in which they have been swung to reach their position of maximum outward thrust on the travelers, and movement in this direction being prevented by the stop, 8, the

structure is locked at this position of maximum expansion of the shell. The stop, 8, is most conveniently provided on one of the travelers, as shown, but it will be obvious that it may be mounted on any one of the parts with respect to which the struts change their relative position when they are swung as described by the rotation of the shaft.

The shell tends to adhere quite strongly to the material molded in some instances, adhesion varying with the character of the material, and in contracting the shell to free it from the molded pipe it is desirable that the adhesive grasp of the material should be broken without too great suddenness, because if it is done suddenly chunks of the material are liable to remain adherent to the shell and be torn away from the molded body, producing defective pipe, and in some instances the pipe may be completely destroyed by too sudden contraction of the shell before the adhesion has been broken. The contractile tendency of the shell itself may in some instances be sufficient to cause the travelers to be pressed closely against the stop shoulders of the strut rods and to follow the strut rods when the latter are retracted by the reverse rotation of the shaft for contracting the shell, and when this is the case the contracting action can be entirely controlled by the operator so as to be as gradual as necessary to prevent the disastrous results above indicated. The contractile elasticity of the shell, however, cannot uniformly be relied upon to operate in this manner, and in order that the operator may control the contraction of the shell at the commencement of such movement as completely as desirable, I prefer to provide springs, 9, 9, on the shaft outside the travelers respectively, stopped longitudinally of the shaft, as by the operating handle, 10, at one end, and a correspondingly situated stop collar or nut, 11, at the other end. The travelers at their hubs encounter the inner ends of these springs in the latter part of the expanding movement and the springs are put under tension in completing that movement and are therefore ready to react to force the travelers back whenever the shaft is rotated in reverse direction to carry the strut rods away from their locked position. It will be seen that the springs at this part of the movement supplement the contractile elasticity of the shell and they may be suitable to positively insure the contraction of the shell under perfect control by holding the travelers at all times snug against the stop shoulders of the strut rod so that the travelers will move inward only as fast,—but will in all cases move inward just as fast,—as the rotation of the shaft and retraction of the strut rods permit.

It is most convenient to use molds of this type standing upright upon one end, and in such position it will be seen that the action of gravity on the entire interior mechanism for expanding and contracting the shell by tending to carry the lower traveler downward would tend to expand the lower end, and by giving the same movement,—downward,—to the upper traveler would tend to contract the upper end. Such result would be limited or checked by the encounter of the lower traveler of the spring, 9, and the undesirable inequality of expansion of the two ends would probably in most instances be overcome and the expansion equalized by the operation of the devices for actively and positively expanding the shell, as described. That is to say, the first rotary action of the shaft while the lower cross head rested upon the spring, 9, at the lower end would operate to lift the upper cross head to a corresponding position against the upper spring, 9, and thereafter, in the further rotation of the shaft the expansion would be equal at both ends, or so nearly so that the difference might be negligible. It is preferable, however, to entirely prevent this inequality at all stages of the action, and for that purpose I prefer to definitely locate the cross head longitudinally with respect to the shell so that the two travelers will at all times be similarly situated with respect to the two transverse planes at which their respective sets of links, 4, are pivoted to the shell. This is most conveniently effected by providing three or more brackets, 12, riveted to the shell and suitably distributed in its circumference, upon which the margin of the cross head is lodged, so that the action of gravity will not distort the structure, as above indicated. In some modes of use of such mold, as, for example, if it is expanded somewhat after the mold cavity has been filled, such expansion in that case being a means of completing the compression or compacting of the material molded, any inequality in the density of the material making the resistance to the expanding action greater at one end than the other may tend to cause the shaft to move longitudinally as it is rotated,—the traveler at the end exposed to least resistance yielding easily to the thrust of the thrust rods while the traveler at the other end resists such thrust. Under such circumstances, even with the supporting brackets, 12, above described for the cross head, if the greater resistance were at the lower end, as would be likely, there might be inequality in the expansion of the shell at the two ends, because the cross head and shaft could rise in the shell in the expanding movement. I prefer, therefore, to check the cross-head not only as against the action of gravity but also in the opposite direction, and in addition to brackets, 12, on which it may be lodged, as described, I prefer to provide also brackets, 12^a, preventing its movement in the opposite direction,—that is, upward. With both sets of brackets it will be seen that the cross head is mounted so as to have no longitudinal movement with respect to the shoulder.

I claim:—

1. An inner member or core for a pipe mold comprising a flexible shell of plate rolled into cylindrical form; a rotary shaft extending longitudinally within the shell; travelers movable along the shaft and links from the travelers to the shell; a cross head fast on the shaft and rods extending from each traveler to such cross head universally jointed to the cross head and to the traveler, and means for rotating the shaft.

2. An inner member or core for a pipe mold comprising an expansible and contractible shell; a rotary shaft extending longitudinally within the shell; travelers longitudinally separated and movable along the shaft; links from the travelers to the shell pivoted for swinging toward and from a transverse plane to expand the shell; a cross head fast on the shaft between the travelers; rods extending between the travelers respectively and the cross head stopped endwise against both said parts with limited freedom of pivotal movement in all directions with respect thereto, and provided with means retaining them in connection with said parts and means for rotating the shaft.

3. An inner member or core for a pipe mold comprising a

flexible, expansible and contractible shell; a rotary shaft extending axially within the shell; two travelers on the shaft longitudinally separated and movable therealong; links connecting the travelers with the shell; a cross head fast on the shaft between the travelers, said cross head and the travelers having hour-glass-shaped apertures; struts having shoulders near their ends and reduced terminals beyond the shoulders, the terminals being adapted to pass through the hour-glass-shaped apertures and the shoulders to stop therein, the length of the struts from shoulder to shoulder being such that when the struts extend parallel to the shaft the travelers are approximately in position for maximum expansion of the shell.

4. An inner member or core for a pipe mold comprising a flexible, expansible and contractible shell; a rotatable shaft extending axially within the shell; travelers on the shaft longitudinally separated and movable therealong; springs stopped on the shaft and encountered by the travelers in their outward movement; links connecting the travelers with the shell pivoted for swinging toward and from a transverse plane to expand and contract the shell; a cross head fast on the shaft between the travelers; struts extending between the cross head and the travelers respectively, universally jointed at one end to the cross head and at the other end to the respective travelers, and a stop mounted in position for arresting the swinging movement of one of the struts just beyond the position of greatest spread of the travelers.

5. An inner member or core for a pipe mold comprising a flexible, expansible and contractible shell; a rotatable shaft extending axially within the shell; travelers on the shaft longitudinally separated and movable therealong; links connecting the travelers with the shell pivoted for swinging toward and from a transverse plane to expand and contract the shell; a cross head fast on the shaft between the travelers; struts extending between the cross head and the travelers respectively universally jointed at one end to the cross head and at the opposite end to the respective travelers, and a stop mounted in position for arresting the lateral swing of one strut at the point just beyond that at which the greatest spread of the travelers is caused.

6. An inner member or core for a pipe mold comprising a flexible, expansible and contractible shell; a rotary shaft extending axially within the shell; travelers on the shaft longitudinally separated and movable therealong; links connecting the travelers with the shell pivoted for swinging toward and from a transverse plane for expanding and contracting the shell; a cross head fast on the shaft between the travelers; stops on the shell for the cross head to stop its movement relatively to the shell longitudinally of the latter, and struts extending between the cross head and the travelers respectively, universally jointed at one end to the cross head and at the opposite end to the respective travelers.

7. An inner member or core for a pipe mold comprising a flexible, expansible and contractible shell; a rotary shaft extending axially within the shell; travelers on the shaft longitudinally separated and movable therealong; links connecting the travelers with the shell pivoted for swinging toward and from a transverse plane to expand and contract the shell; a stop on the shell and means on the shell for stopping the cross head relatively thereto longitudinally thereof; struts extending between the cross head and the travelers respectively universally jointed at one end to the cross head and at the other end to the respective travelers, and a stop mounted in position for arresting the lateral swinging movement of one of the struts at a position just beyond that of the greatest spread of the travelers.

In testimony whereof, I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 29th day of March, 1907.

CHARLES S. BURTON.

In the presence of—
EDWARD T. WRAY,
J. S. ABBOTT.