J. B. SEDBERRY.

GRINDING MILL.

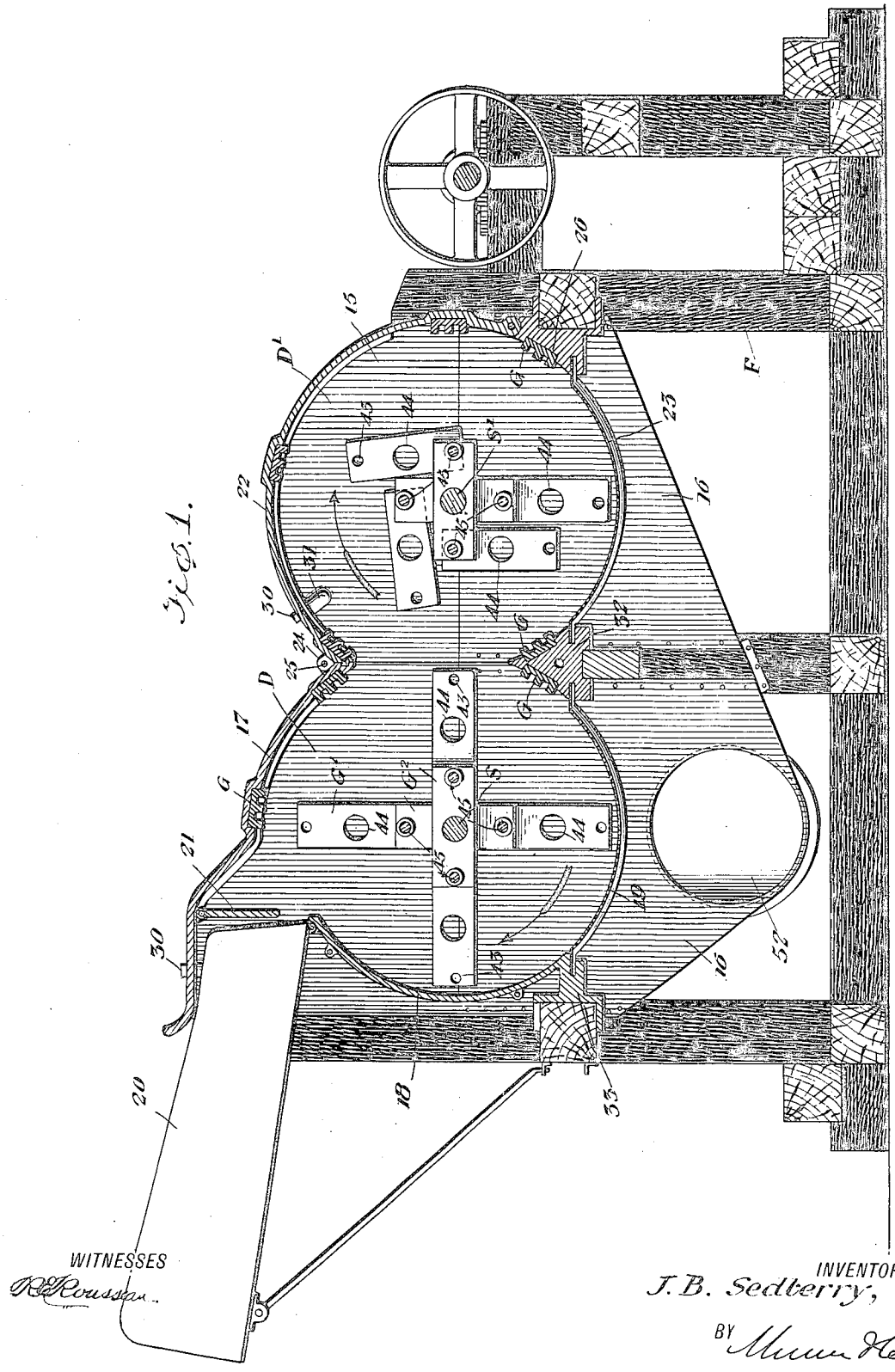
APPLICATION FILED MAY 4, 1920.

1,433,042.

Patented Oct. 24, 1922.

4 SHEETS—SHEET 1.

Fig. 1.



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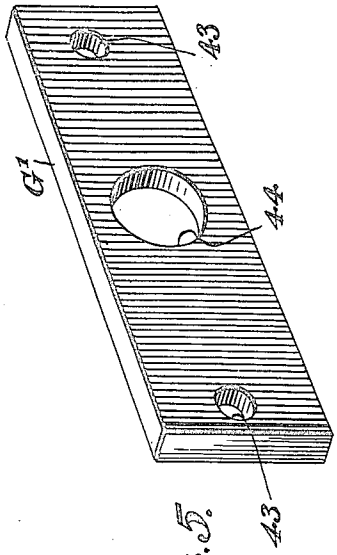

Fig. 3.

Fig. 2.

WITNESSES

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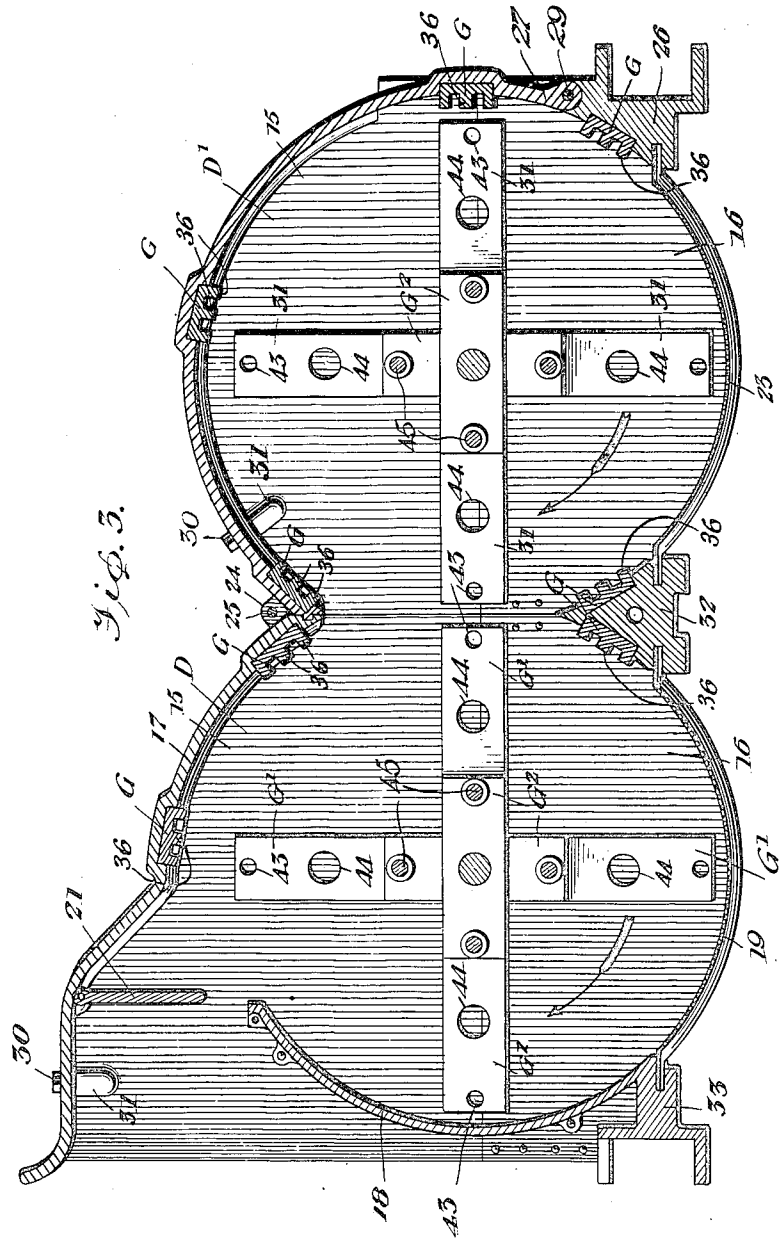
4 SHEETS—SHEET 3.

Fig. 3.



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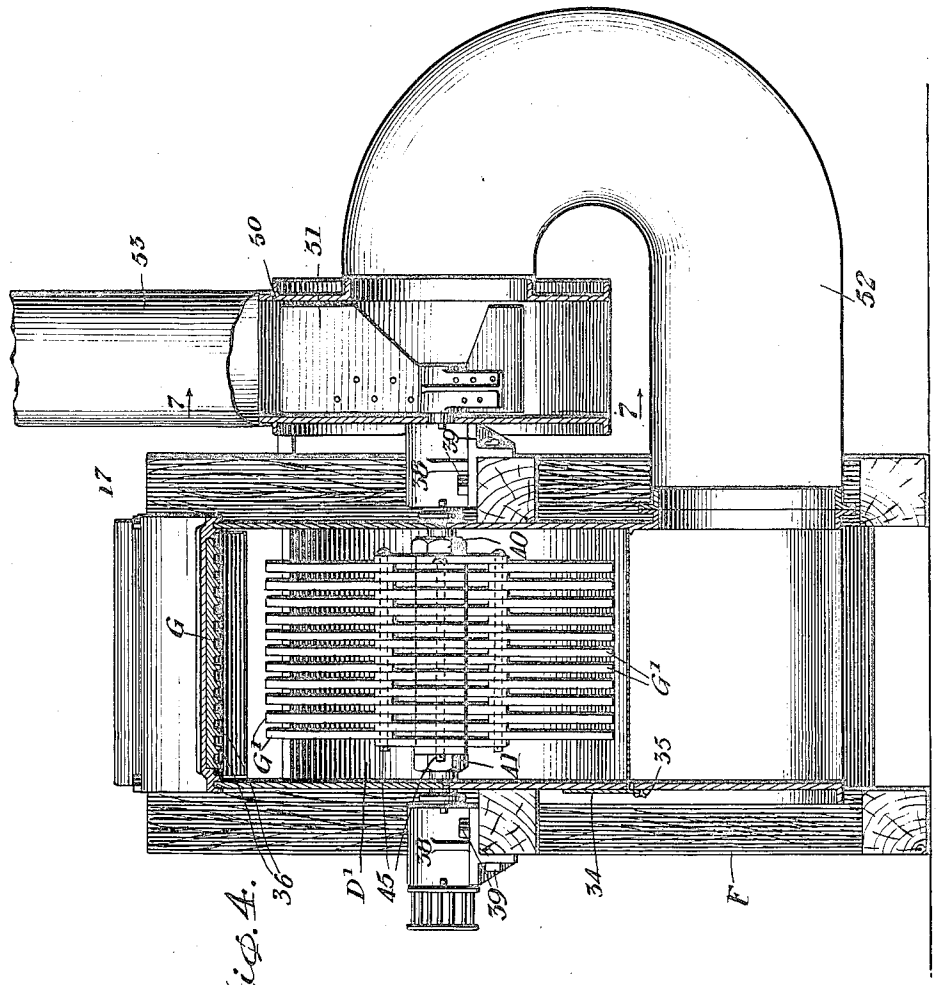

Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES BERNARD SEDBERRY, OF TEXARKANA, ARKANSAS.

GRINDING MILL.

Application filed May 4, 1920. Serial No. 378,771.

To all whom it may concern:

Be it known that I, JAMES B. SEDBERRY, a citizen of the United States, and a resident of Texarkana, in the county of Miller and State of Arkansas, have invented certain new and useful Improvements in Grinding Mills, of which the following is a specification.

My invention relates to mills for grinding and pulverizing materials of any character, and the purpose of my invention is the provision of a mill having stationary and movable grinding elements which coact to effect a thorough grinding of grain.

It is also a purpose of my invention to provide a mill having grinding elements which are reversible to present new grinding surfaces when the other surfaces become dulled, the movable grinding elements being supported by other movable grinding elements which are interchangeable with the first elements to provide new grinding surfaces.

I will describe one form of mill embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings:—

Figure 1 is a vertical longitudinal sectional view, showing one form of mill embodying my invention;

Figure 2 is a horizontal longitudinal sectional view of the mill shown in Figure 1;

Figure 3 is a view similar to Figure 1, showing in detail the grinding drums and elements;

Figure 4 is a transverse sectional view of the mill shown in the preceding views;

Figure 5 is an enlarged detail perspective view of one of the grinding elements comprised in the mill shown in the preceding views.

Similar reference characters refer to similar parts in each of the several views.

Referring specifically to the drawings, F designates a frame comprised of vertical and horizontal beams arranged to substantially support a pair of grinding drums designated generally at D and D′, respectively. The side walls of the drums D and D′ are formed from a pair of upper plates 15 and a pair of lower plates 16 which have interfitting edges, as illustrated to advantage in Figure 4. The purpose of constructing the side walls of the drums in section in this manner is to allow of the ready assembling or disassembling of the drums when it is desired to clean the interior of the drums or replace certain parts thereof when they become worn. The periphery of the drum D is formed by a cover plate 17, an arcuate plate 18 and a screen 19. As shown in Figure 1, the cover plate 17 is curved in the form of an arc for a portion of its length and is then bent outwardly and upwardly so that it is spaced from the upper edge of the arcuate plate 18 to provide a mouth for receiving one end of a chute 20. This chute 20 is designed for the purpose of feeding the grain to the drum D, and for effecting a uniform feeding of such grain, a baffle plate 21 is hingedly mounted upon the cover plate 17 in such manner that it is disposed in the path of movement of the grain and thereby restricts the amount of grain delivered to the drum.

The periphery of the drum D′ is formed from a cover plate 22 and a screen 23. As shown in Figure 3, the confronting edges of the plates 17 and 22 have an interfitting connection and are rigidly connected to each other by ears 24 through which extend a rod 25. The lower edge of the plate 22 is detachably connected to a casting 26 supported upon the frame F by ears 27 formed on the casting and plate and through which extends a rod 29. As a further means for securing the cover plates 17 and 22 to the upper side plates 15, bolts 30 are also provided which extend through the cover plates and are secured in bosses 31 formed on the side plates.

The screens 19 and 23 are removably fitted within castings 26, 32 and 33. As clearly shown in Figure 3, the screen 19 is slidably fitted within slots formed in the castings 32 and 33, while the screen 23 is likewise slidably fitted within slots formed in the castings 26 and 32. As shown in Figure 1, suitable openings are provided in one lower side plate 16, through which the screens 19 and 23 may be inserted or withdrawn to or from the castings. These openings are controlled by doors 34 which are hingedly supported for outward swinging movement upon the frame F and are adapted to be locked in closed position by means of thumb screws 35.

Referring again to Figure 5, the cover plates 17 and 22 as well as the castings 26 and 32 are provided with stationary grinding

elements designated generally at G. Each stationary grinding element G comprises a bar of rectangular formation having one side thereof provided with longitudinally extending teeth 36.

As shown in Figures 1 and 2, the drums D and D′ have mounted eccentrically therein a pair of shafts S and S′, respectively, which extend through the plates 15 and 16 at their meeting edges and are journaled in bearings 38 supported upon the frame F. The bearings 38 are preferably of the roller type and are adjustable longitudinally of the frame by means of flanges 38ª which are slotted to receive bolts 39, such bolts extending into the frame and engaging the flanges when tightened so as to prevent lateral movement of the bearings.

Each shaft S and S′ carries a plurality of movable grinding elements, certain of which are normally active while the others are normally inactive. The active grinding elements are identical in construction to the inactive elements but to simplify the description, the active grinding elements are designated G′ while the inactive grinding elements are designated G^2. As shown in Figures 2 and 3 the inactive grinding elements G^2 are fixed to the shaft S or S′ by a pair of nuts 40 and 41 which engage the outermost elements and when properly adjusted firmly grip the same to cause rotation of all of the elements with the shaft. The shaft S or S′ is provided with right-hand screw threads 42 to receive the nut 40 and left-hand screw threads 43 to receive the nut 41, the purpose of this arrangement being to prevent movement of the elements with respect to the shaft. If there should occur any slippage of the intermediate elements, the nuts 40 and 41 will have a tendency to tighten the elements instead of loosening the same so that the rotation of the elements with the shaft is at all times insured. As shown in Figure 5, the elements G′ and G^2 each comprises a plate of rectangular formation which is formed adjacent its ends with openings 43, and at a point medial its length with a relatively large opening 44. The opening 44 is for the reception of the shaft S or S′ and the openings 43 are for rods 45 that are adapted to hingedly connect the active elements G′ with the inactive elements G^2. As shown in Figure 2, the rods 45 extend through the confronting ends of the elements G′ and G^2 and are secured in position by means of pins 45ª. As shown in this same figure, the elements G′ are arranged in staggered relation with respect to the elements G^2 and because of the hinged connection between the two, it is obvious that the elements G′ will normally assume the positions shown in drum D′ in Figure 1, when the corresponding shaft is idle. As indicated by the arrows in Figure 3, the grinding elements G′ and G^2 are adapted to be driven in the direction of the arrows and to effect this movement, the shafts S and S′ are driven in the same direction through the following mechanism: As shown in Figure 2, P designates a driving pulley to which power is to be applied, such pulley being fixed to a shaft 46 journaled in bearings 47 which are similar in construction to the bearings 38 in that they are adjustable upon the frame F. The shaft 46 is operatively connected to the shaft S′ through the medium of a silent chain 48 which is trained around suitable gears fixed to the shafts. The shaft S′ in turn drives the shaft S through a silent chain 49 which is trained about gears fixed to the adjacent ends of the shafts S and S′. As shown in Figure 4, the shaft S is extended beyond the drum D and into a fan drum 50. This end of the shaft S carries a fan 51 of any suitable construction for creating a suction within a pipe 52 that is connected at one end to the drum and at its opposite end to the adjacent lower side plate 16 at a point below the drum D, as clearly shown in Figure 1. The fan drum 50 communicates at its upper side with a conduit 53 which extends to some remote point for conducting the grain thereto after it has been milled.

The operation of the mill is as follows:

With the shafts S and S′ rotating in the direction of the arrows in Figure 5, the active grinding elements G′ are thrown, under the action of centrifugal force, from the position they occupy in the drum D′ in Figure 3 to the extended position shown in Figure 3. As these grinding elements rapidly rotate the grain is introduced into the drum D through the chute 20, and upon reaching the drum the grinding elements G′ engage and throw the grain radially and forwardly against the stationary grinding elements G located at the top of the drum D which causes a disintegration of the particles of grain as a result of the coaction of the corners of the active grinding elements with the teeth 36 of the stationary elements. As the grain continues in its travel in the direction of the drum D′, it falls between and is simultaneously engaged by the rotating grinding elements of both drums and because the elements of one drum at this point are rotating in a reverse direction to the elements of the other drum, it will be clear that the grain is subjected at this point during its travel to a powerful and most efficient grinding action. From this point a portion of the grain is carried downwardly onto the screen 19, while the remainder passes into the drum D′. That portion of the grain which falls onto the screen 19 is, before actually reaching the screen, subjected to a further grinding action by virtue of the stationary grinding element disposed at the meeting sides of

the two drums. When the grain finally reaches the screen 19, those particles which are small enough to pass through the openings in the screen are drawn therethrough under the suction created by the fan 51, where they are ultimately delivered exteriorly of the mill through the pipe 52 and the conduit 53. Those particles of grain which are too large to percolate the screen are held against the upper side of the screen under the suction of the fan, and are there subjected to a further grinding by the rapidly moving grinding elements G'.

The grain which enters the drum D' is subjected to further grinding in a manner identical to that described in connection with the grain in the drum D, this grain finally being sucked from the drum through the screen 23 and into the pipe 52. It will be understood that during the passage of the grain through the drum D', the rotating grinding elements forced the grain into contact with the stationary elements located in such drum, thus effecting a further grinding of the grain before it reaches the screen 23.

It is to be particularly noted that because of the disposition of the stationary elements G only one edge of the several sets of teeth 36 coact with the forward corners of the elements G' so that when they become dulled after repeated use, the elements as a unit may be reversed to present the other edges of the teeth to the elements G'. When the forward corners of the movable elements G' become dulled, it is obvious that by removing the bolts 45 and turning the elements G' a new and sharp corner is prevented. When both corners of any one end G' become dulled the element is reversed so that the corners of the opposite end can be employed. When all four corners of the element become dulled, the element can be removed and replaced by one of the inactive elements G^2, it being understood that the former active element is placed in the position of the former inactive element. It will thus be seen that all of the movable grinding elements are interchangeable so that the several corners of any one element can be utilized in the grinding of the grain. As previously mentioned, the stationary grinding elements are also reversible to present new grinding surfaces so that both the stationary and movable elements can be said to be reversible and interchangeable.

By reference to Figure 5, it will be noted that the stationary elements G at the top of the drums D and D' are spaced from the outer ends of the elements G' a greater distance than the elements G mounted at the side and bottom of the drums. The purpose of this arrangement is to effect a gradual disintegration of the grain, at the same time preventing the clogging of the grain between the grinding elements and thereby insuring a smooth operation of the mill at all times. Should it be desired to mill the grain to a predetermined degree of fineness, screens of a corresponding mesh can be inserted so that the grain will not pass through the screens until it has been ground to the desired fineness.

From the foregoing description, taken in conjunction with the accompanying drawings, it will be manifest that I have provided a grinding mill in which the several parts comprised in the two drums are detachably associated so as to permit the removal and substitution thereof and the ready assembling and disassembling for inspection or cleaning of the several parts. Furthermore, the stationary and movable grinding elements are also removably mounted within the mill and reversible and interchangeable to allow of the utilization of all of their parts in the grinding of the grain.

Although I have herein shown and described only one form of mill embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention or the spirit and scope of the appended claims.

Having thus described my invention, I claim:—

1. A grinding mill comprising, a drum, a shaft journaled in the drum, and two sets of grinding elements either of which is adapted to be rigidly supported on the shaft with the other set pivotally sustained on the first set, the elements of either set being interchangeable with the elements of the other set for the purpose described.

2. A grinding mill comprising, a drum, a shaft journaled in the drum and having reversely threaded portions, grinding elements mounted on the shaft, nuts engaging the threaded portions and embracing the grinding elements to rigidly secure the same upon the shaft, and a second set of grinding elements pivotally supported upon the first grinding elements, the second set of grinding elements being of the same construction as the first set and interchangeable therewith.

3. A grinding mill comprising, a drum, a shaft journaled in the drum and having reversely threaded portions, grinding elements mounted on the shaft, nuts engaging the threaded portions and embracing the grinding elements to rigidly secure the same upon the shaft, a second set of grinding elements of the same construction as the first set and having end portions interposed between the elements of the first set, and rods extending through the first set of grinding elements and the end portions of the second set for pivotally supporting the second set of grinding elements upon the first set.

4. In a grinding mill, a plurality of grind-

ing elements of rectangular form having openings provided therein, said grinding elements being arranged in two sets with the elements of one set spaced apart in parallelism and arranged in alternate relation with respect to the elements of the other set, a shaft extending through the openings of one set, means for rigidly securing the elements of the last mentioned set to said shaft, and means for pivotally supporting the elements of the second set upon the elements of the first set.

JAMES BERNARD SEDBERRY.