

(No Model.)

3 Sheets—Sheet 1.

A. W. ROBINSON.
DREDGING APPARATUS.

No. 341,277.

Patented May 4, 1886.

Fig. 1.

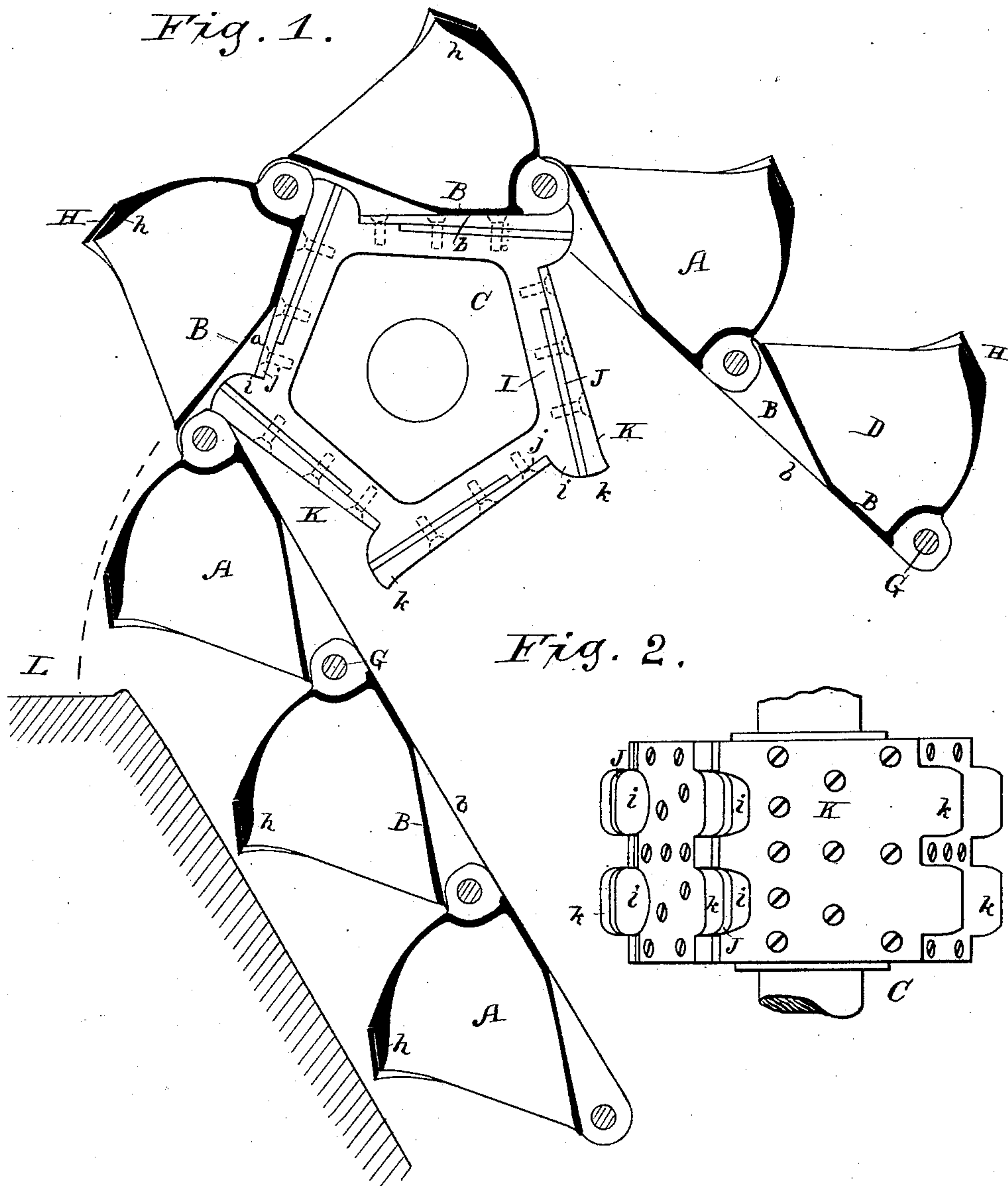
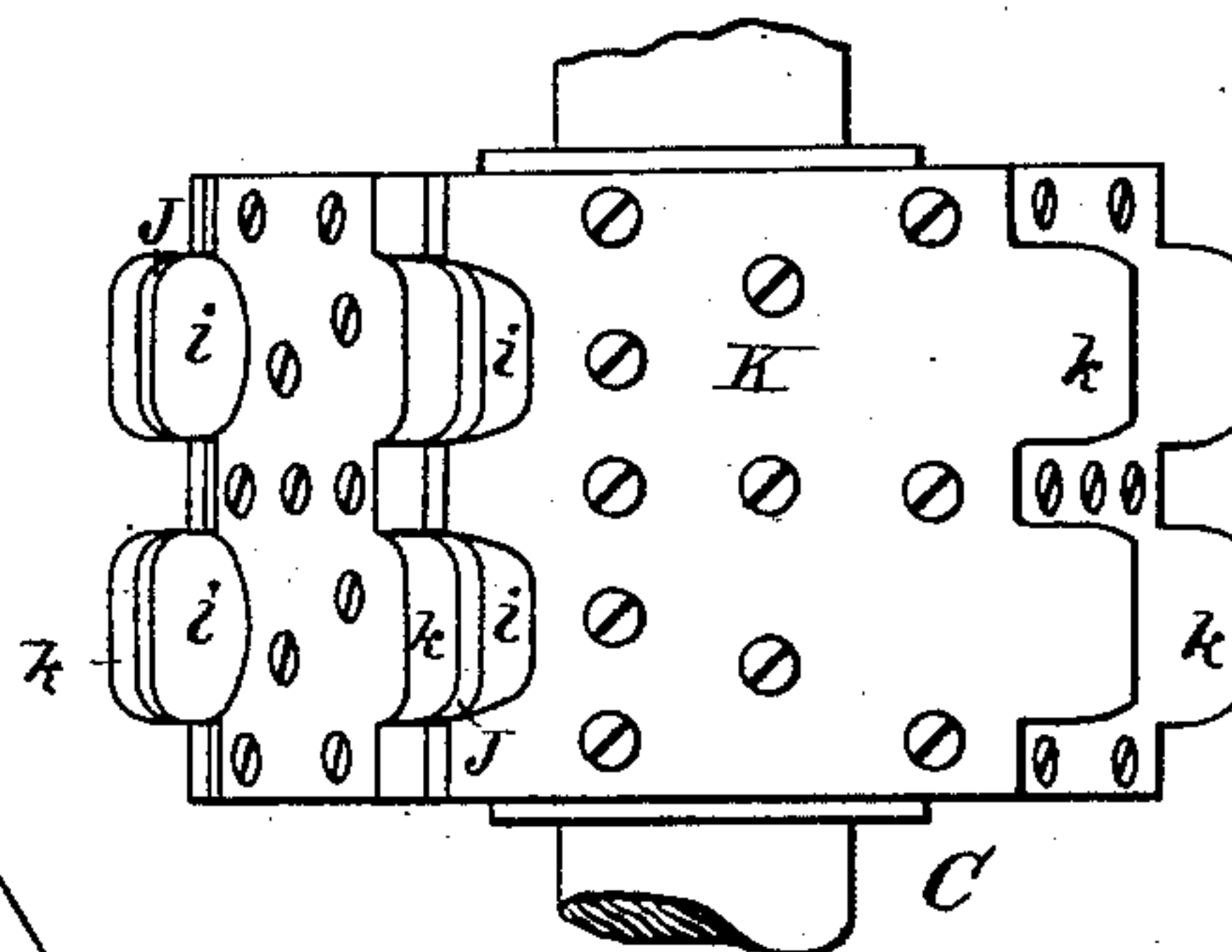


Fig. 2.



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Fig. 3.

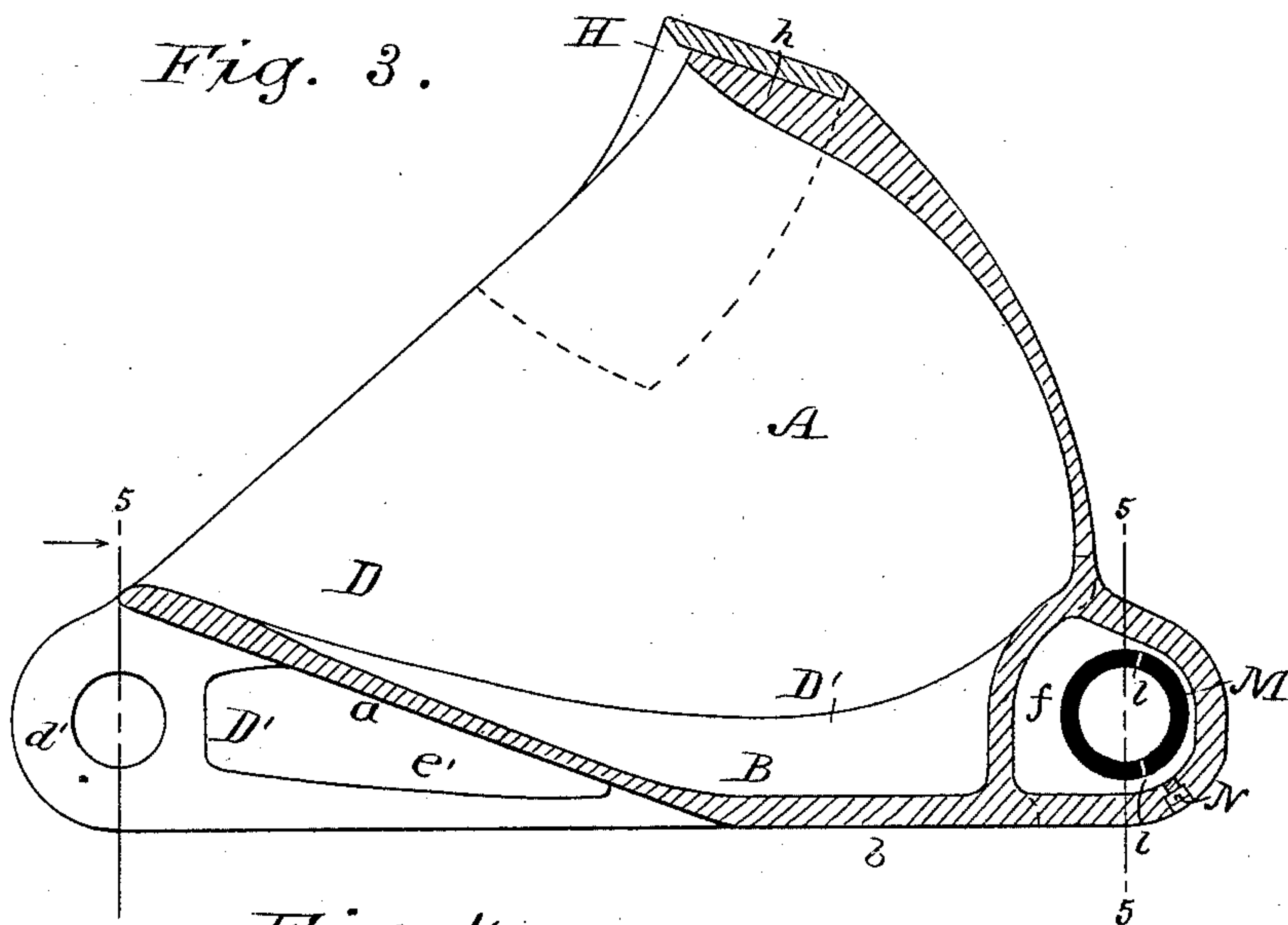
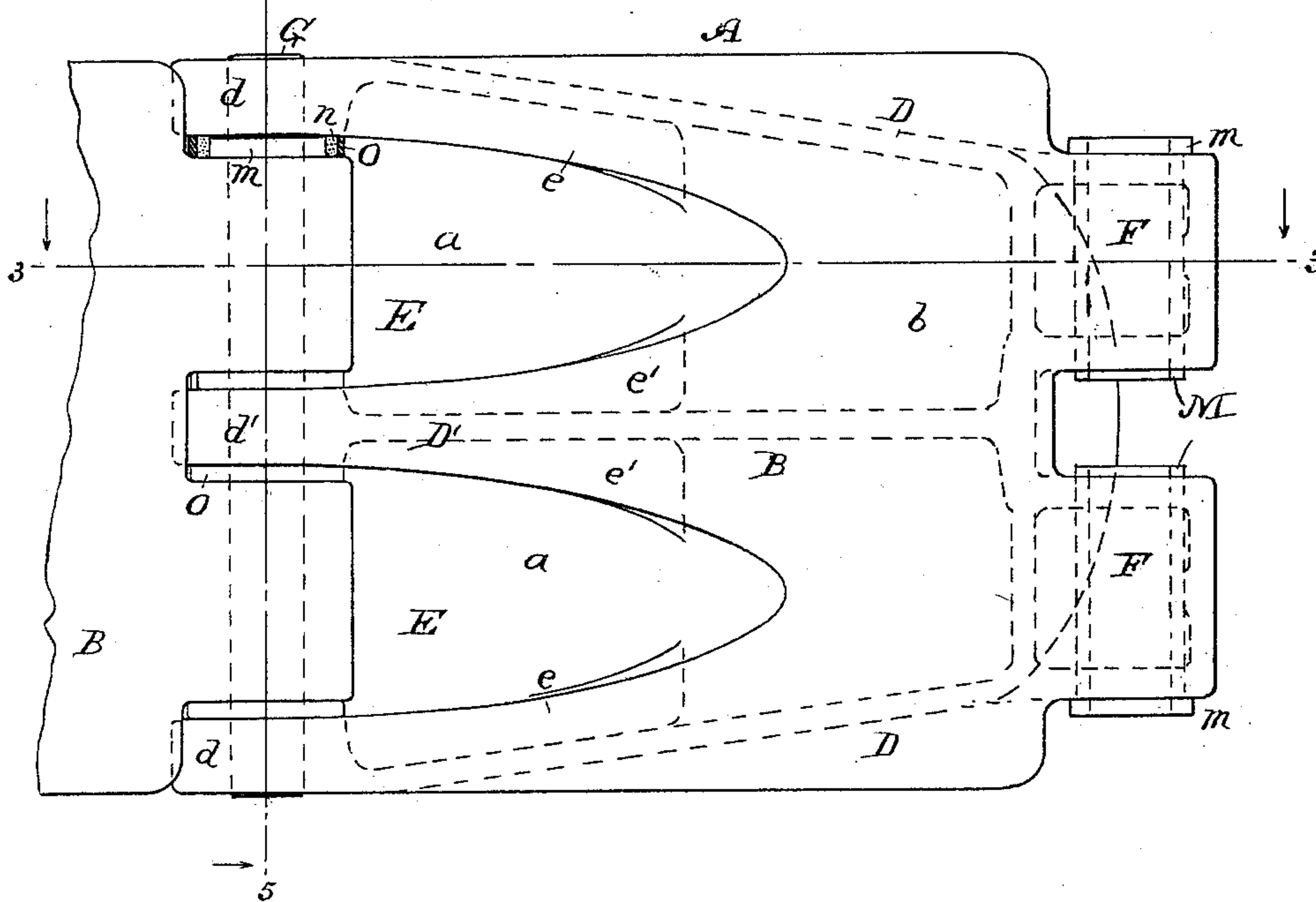


Fig. 4.



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Fig. 5.

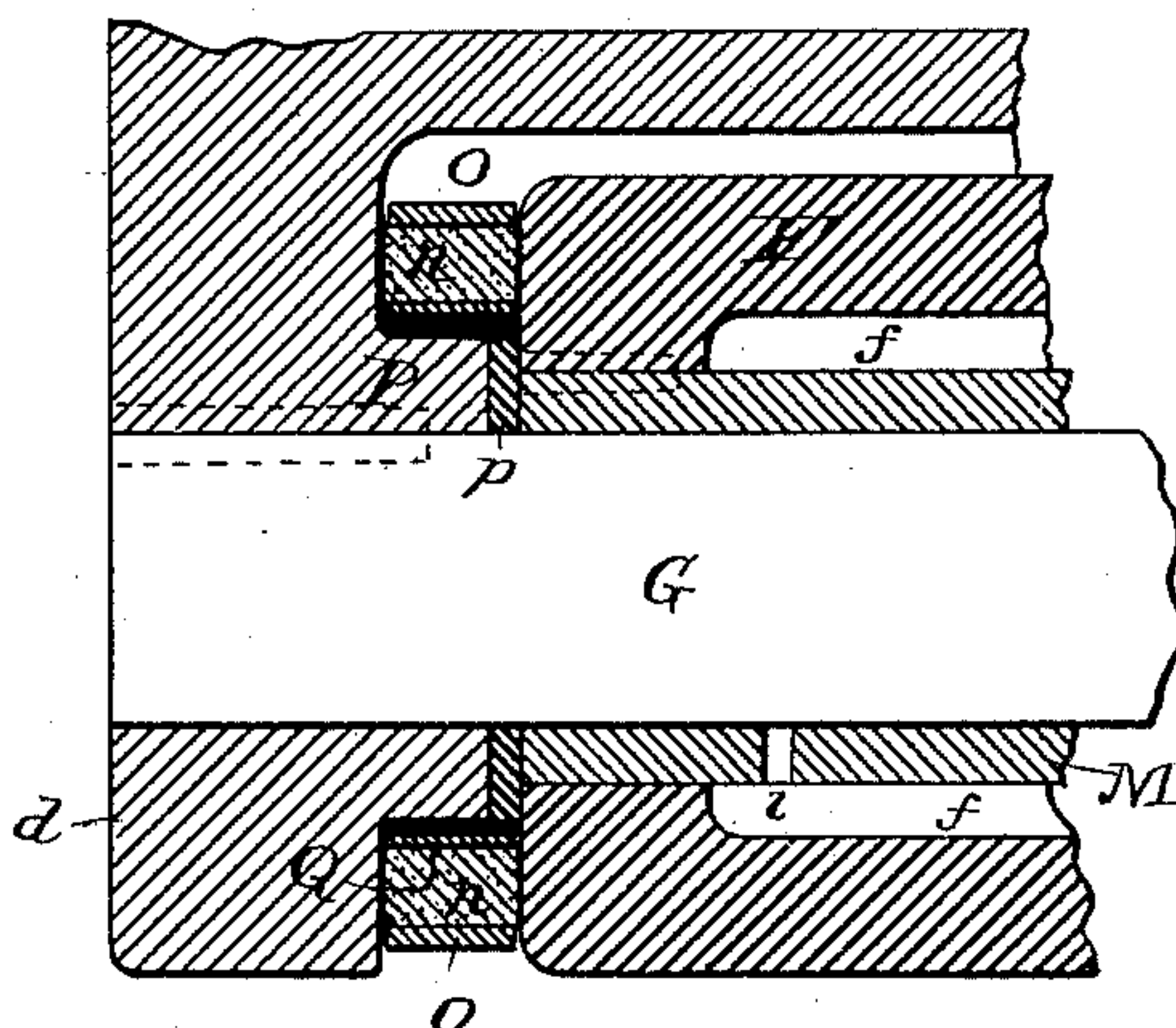


Fig. 9.

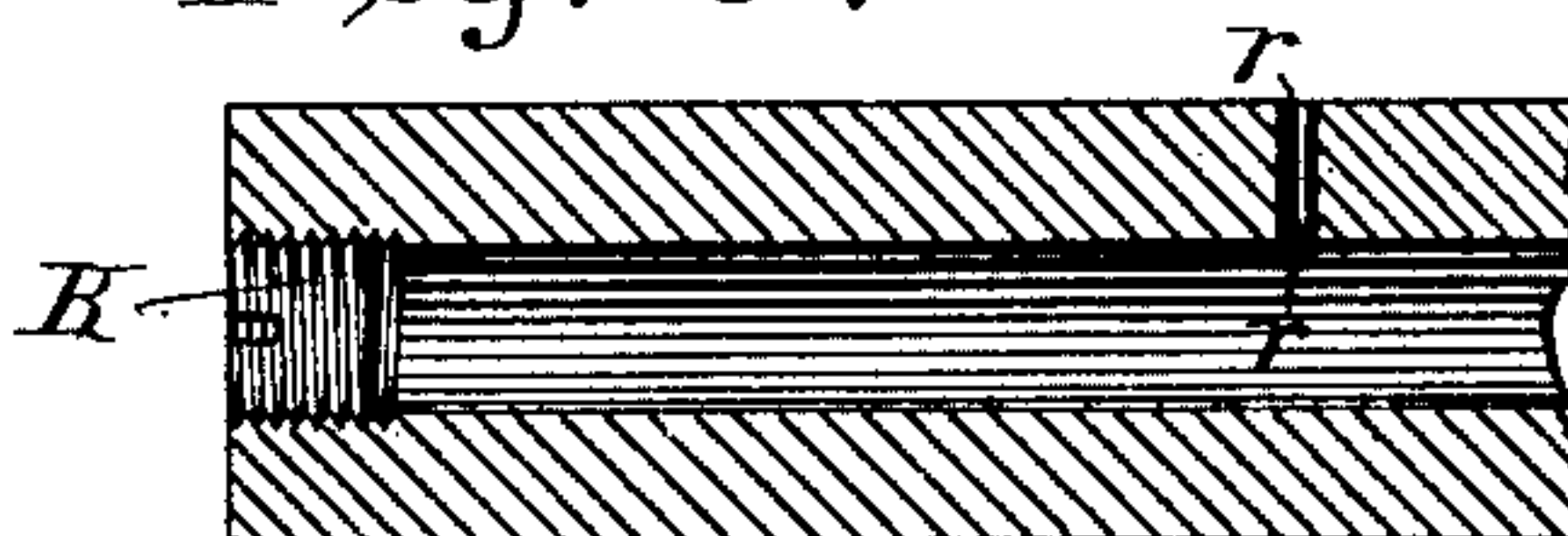


Fig. 6.

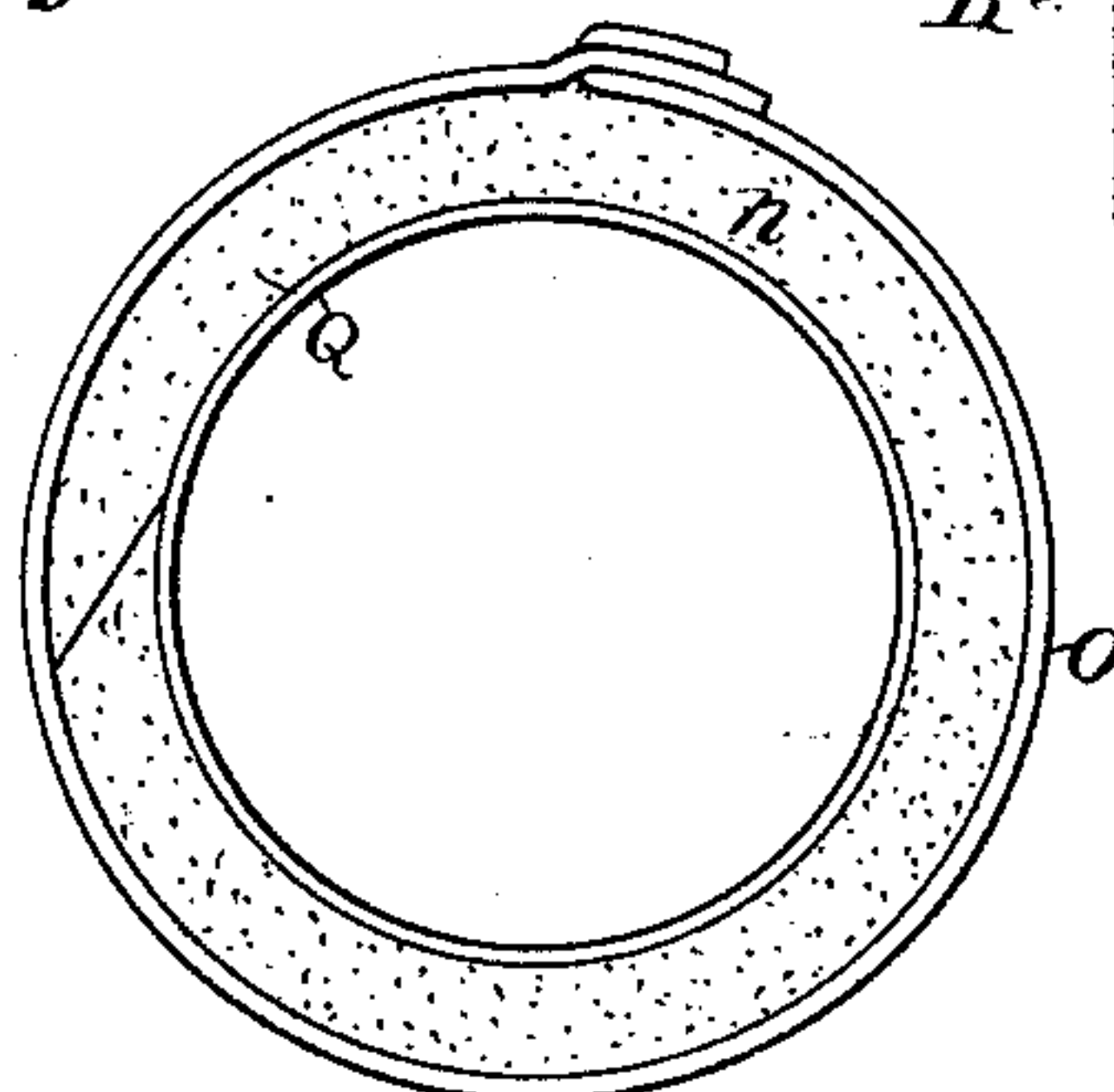
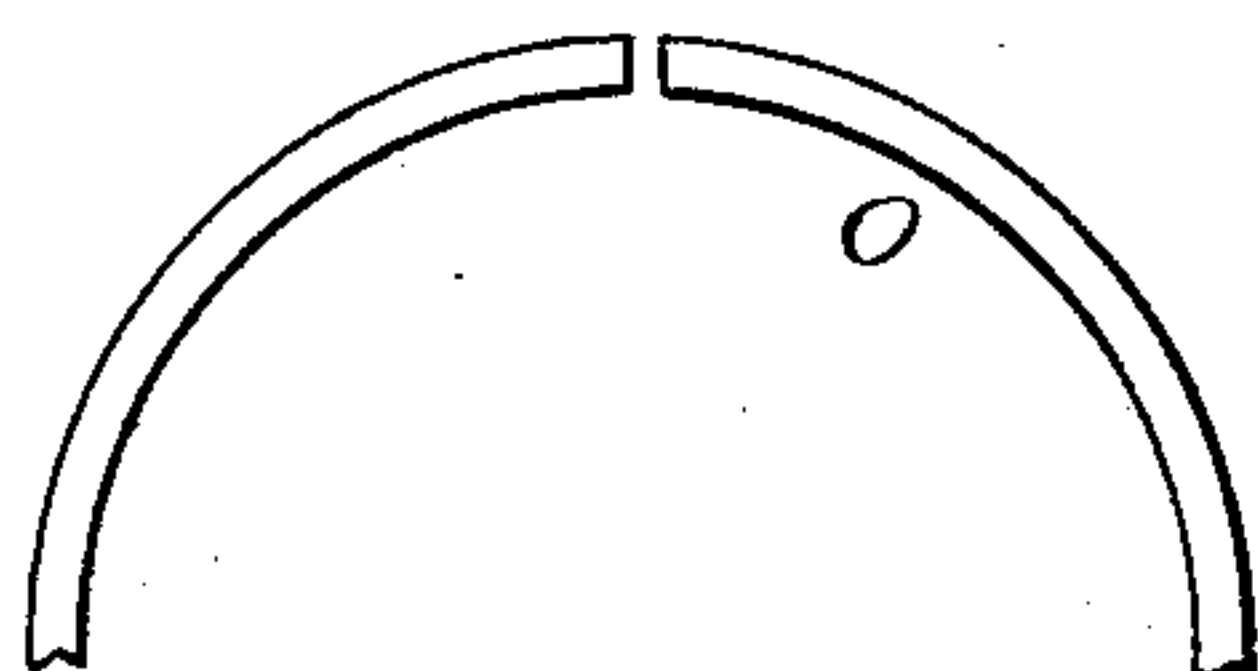


Fig. 7.



Fig. 8.



WITNESSES

Ed. A. Newman.
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INVENTOR

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UNITED STATES PATENT OFFICE.

ARTHUR WELLS ROBINSON, OF ST. CATHARINES, ONTARIO, CANADA.

DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 341,277, dated May 4, 1886.

Application filed February 13, 1886. Serial No. 191,830. (No model.) Patented in England October 24, 1885, No. 12,758, and in Germany December 1, 1885, No. 5,047.

To all whom it may concern:

Be it known that I, ARTHUR WELLS ROBINSON, of St. Catharines, Ontario, Canada, have invented certain new and useful Improvements in Dredging Apparatus, (patented by me in Great Britain, No. 12,758, October 24, 1885, and in Germany, No. 5,047, December 1, 1885,) of which the following is a specification.

My invention relates to improvements in apparatus of the class in which endless chains of dredge-buckets are employed.

The objects of my invention, mainly, are to increase the working capacity of the apparatus, to render it more durable, and to increase its strength.

The accompanying drawings show those features of the apparatus illustration of which is needed to convey a proper understanding of a preferred embodiment of my improvements. Some of these improvements may be used without the others, or in connection with equivalents of omitted parts.

Figure 1 shows, partly in elevation and partly in vertical section, a portion of the chain of buckets mounted on the upper or driving tumbler. Fig. 2 is a plan view of the tumbler. Fig. 3 is a vertical section of one of the buckets on the line 3 of Fig. 4. Fig. 4 is a bottom view with parts in section, showing the manner of joining the buckets together. Fig. 5 is a section on the lines 5 of Figs. 3 and 4, with parts broken away, showing details of one way of lubricating and protecting the joints connecting the buckets. Fig. 6 shows detached an elevation of one of the packing-rings and its supporting and protecting rings to be employed in connection with the bucket-joints. Fig. 7 is a plan of the protecting-ring of the packing, and Fig. 8 an elevation showing a portion of a modified form of this ring. Fig. 9 shows, in longitudinal section, a portion of one of the pivot-pins of the bucket-joints of modified construction.

The buckets A, of the number required to complete an endless chain to pass around the tumblers at the opposite ends of the ordinarily employed bucket-ladder, are duplicates of each other. Each bucket of the series is composed of cast-steel, in a single piece preferably, and in order that the buckets may be jointed directly together, instead of being connected by the usually employed links, they are provided

at their opposite ends with knuckles or perforated lugs, so that by the use of pivot-pins they may be jointed together, as are the knuckles of ordinary hinges.

As shown, each dredge-bucket is constructed as follows: The single back plate, B, constituting the bottom of the bucket, forms by its rear portion, *b*, a tumbler-bearing surface of the full width of the bucket. This portion of the back plate bears upon one of the faces of the tumbler C when the bucket is brought in contact with it, as will readily be understood. From its bearing-surface *b* to the front end of the bucket the back plate is inclined, as at *a*. The sides D D of the bucket extend below this inclined portion of the back plate, and also extend slightly in advance of the front end of the back plate, and are provided with the perforated lugs or knuckles *d d*. A third knuckle, *d'*, is formed in the front end of a back rib, D', and in line with the side knuckles. This back rib extends from front to rear of the bucket, partly below and partly above the back plate, and bottom recesses, E E, are provided between the bucket sides and the back rib under the inclined portion of the back plate. These bottom recesses adapt the bucket-chain to be operated by a horned tumbler, as in turn to be described. The sides are formed with inner recesses, *e e*, beneath the inclined portion of the back plate, and corresponding recesses, *e' e'*, are provided in the opposite sides of the bottom rib. Unnecessary weight is thus avoided while ample strength is secured.

At its rear end the bucket is provided with two knuckles, F F, to fit between the front knuckles of an adjacent bucket, a pintle or pivot-pin, G, serving to joint the knuckles together in proper way.

Details of devices for protecting and lubricating the wearing surfaces of the bucket-joints will farther on be explained. Each bucket is provided with a suitable cutting-lip, H, seated in a recess and against a shoulder, *h*, and secured by rivets.

To adapt the tumbler C for operating to the best advantage upon an endless chain of buckets, formed as above described and jointed directly to each other, it is peculiarly constructed, as now to be explained. The sides or faces I of the casting constituting the body of the tumbler are provided with projections

or lugs *i i* at their corners or angles, and with seats for cushions or slightly-yielding pieces *J*, having lugs to correspond with the lugs *i i*. These, cushions are best made of wood—such as oak. Steel facing or wearing plates *K*, provided with horns *k k*, are strongly and detachably secured, as by screws, to the sides of the tumbler-body. Each wearing-plate rests upon a cushion, *J*, and also extends over a shoulder, *j*, of the tumbler-body, against which the cushion is seated. The same screws fasten both a wearing-plate and its cushion in place, with the horns of the wearing-plate registering with the corner lugs of the tumbler-body and the lugs of the cushion. The employment of the cushions is not absolutely necessary, though highly desirable. They serve, as will be apparent, to lessen shocks and prevent unnecessary strains.

It will be seen that by jointing the buckets of a chain directly together their working capacity is doubled as compared with a chain of corresponding length made up of half as many buckets of the same size coupled by links, as usual. It will also be seen that the material discharged from a bucket runs along the bucket next in advance and is directed to the discharge-chute *L*, whereas were the buckets coupled by links this could not be so, as there would be a considerable space between adjacent buckets. It will further be seen that by dispensing with the coupling-links the driving-shaft and its tumbler may and should be lower down or nearer to the chute than ordinarily arranged, thus lessening the destructive action of the falling discharged material and reducing the length of the bucket-chain, as well as the distance between its top and bottom tumblers. It should be noticed that in operation the horns of the tumblers act upon the rear ends of the buckets by engaging with the knuckles *F*, the horns projecting into the bottom recesses, *E*, of one bucket while engaging with the rear of the immediately preceding bucket.

The pivot-pins *G* are best made of steel, and secured tightly but detachably in the front knuckles, *d d'*, in suitable way, as by being forcibly inserted or keyed in place, and in this way the rear knuckles, *F F*, which are of considerably greater extent in the direction of the pivot-pins than the front knuckles, are made the bearing-knuckles—that is to say, the pivot-pins while held firmly in the front knuckles are loose in the rear knuckles, so that these knuckles and the pins may turn or rock relatively to each other.

Provision is made for lubricating and protecting the bucket-joints as follows: The rear or bearing knuckles of each bucket are fitted with detachable bushes or bearing-sleeves *M M*, preferably made of hardened steel. The bushes are keyed in place in obvious way. The bucket-joints are provided with oil-reservoirs. As shown in Figs. 3 and 5, the bearing-knuckles are hollow, constituting oil-reservoirs *f f*. As shown in Fig. 4, the bushes pro-

ject at their opposite ends from the knuckles, and the outer ends of the bushes are shouldered to form bosses *m m*. The lubricant finds its way to the wearing-surfaces of the joints from the oil-reservoirs through passages *l*, Fig. 3, in the bushes.

Inlet-openings stopped by screws *N* are provided for charging the oil reservoirs. (See Fig. 3.)

The waste of lubricant and the entrance of sand, grit, &c., to the joints of the buckets are prevented by means of suitable packing rings, *n*, secured between adjacent knuckles by protecting-rings *O*.

It is obvious that instead of having the ends of the bushes project they may be terminated flush with the adjacent ends of the knuckles and the packing-rings be fitted about the pivot-pin and within their securing and protecting rings, and that instead of the bosses on the ends of the bushes equivalent bosses may be formed with either the front or the rear knuckles, or partly on the front and partly on the rear knuckles.

The protecting-rings *O* may be removed to renew the packing as needed, and each of these rings may be made as indicated either by Figs. 6 and 7 or Fig. 8. By one construction the ends of a ring are interlocked by being looped together, and by the other construction the ends of the ring simply abut or terminate close together.

In Fig. 5 adjacent ends of one of the bushes *M* and bearing-knuckles *F* are shown flush with each other, and the adjoining knuckle *d* is represented as formed with a boss, *P*, having between it and the bearing-knuckle and its bush a packing-washer, *p*. An inner or packing-supporting ring, *Q*, is also employed.

The advantages arising from protecting the wearing-surfaces of the joints between the buckets and providing for their self-lubrication are obvious.

It will be seen that the construction of the buckets is such that great strength and durability are attained without unnecessary weight; that by inclining the back plate and extending it far enough to locate its front end over the joint by which the bucket is directly united to the preceding bucket of the chain the discharge of material is facilitated, as no obstruction is offered by the bearing-knuckles of the one bucket to the discharge of material from the mouth of the other. By extending the front end of the single back plate over the joint connecting the front of one bucket with the rear of another the holding capacity of the bucket is increased, its bottom being made to extend from the front to the rear knuckles.

Although I have described a one-piece cast-steel bucket, I do not wish to be understood as confining my invention to such construction, as the buckets might be made in sections—for instance, the single back plate and knuckles of a bucket might be made together of cast-steel and the rest of the bucket formed by riveting one or more parts in place, and

my improvements may be modified in various other respects, instead of adhering closely to the particularly-described details of construction. Obviously the buckets may be provided
 5 with any suitable number of knuckles adapted for making the jointed connections between them, instead of each being formed with the three front knuckles and the two rear or bearing knuckles, as preferred, and in detail described; also, when desirable, oil-reservoirs of
 10 the bucket-joints are formed in the pivot-pins, which are made tubular for this purpose. In accordance with this modification, (see Fig. 9,) oil-passages *r*, in suitable number, admit of
 15 the escape of oil from the reservoirs in the pins to the surfaces to be lubricated. A screw-plug, *R*, stops the end of the modified form of pin, as shown. There is no change required in the construction of other parts to adapt
 20 them for the use of the tubular pivot-pins, though it is best to plug up the oil-passages *l* in the bushes, or these oil-passages, as well as the inlet-openings stopped by the screw-plugs *N*, may be omitted when it is preferred to employ the tubular pivot-pins exclusively.

I claim as of my own invention—

1. The dredge-bucket having the front and rear jointing-knuckles and the single plate bottom inclined and terminating at front over
 30 the front knuckles, substantially as and for the purpose set forth.

2. The dredge-bucket having the front and rear jointing-knuckles and the single plate bottom with the inclined front portion and the
 35 tumbler-bearing rear portion, substantially as and for the purpose set forth.

3. The dredge-bucket having the back plate provided with the inclined front portion and the tumbler-bearing rear portion, the back
 40 rib, the front jointing-knuckles beneath the back plate in the bucket-sides and back rib, and the rear jointing-knuckles, substantially as and for the purpose set forth.

4. The dredge-bucket having the back plate with the tumbler-bearing rear portion and inclined front portion, the sides extending below the inclined portion of the bucket, the
 45 back rib, the front jointing-knuckles, the bottom recesses between the bucket-sides and back rib, and the rear jointing-knuckles, substantially as and for the purpose set forth.

5. The endless chain of dredge-buckets, consisting of the combination of the buckets, each having a single plate bottom with the inclined
 55 front portion and tumbler-bearing rear portion, and the front and rear jointing-knuckles, and the pivot-pins directly connecting the front and rear knuckles of respectively adjacent buckets, substantially as and for the purpose set forth.

6. The combination of the tumbler body having the corner lugs, and the wearing-plates having the horns registering with said corner
 65 lugs, substantially as and for the purpose set forth.

7. The combination of the tumbler-body having the corner lugs, the wearing-plates hav-

ings horns registering with the corner lugs, and the cushions upon which the wearing-plates rest, substantially as and for the purpose
 70 set forth.

8. The combination of the buckets jointed directly together to constitute the endless chain, each bucket being provided with the
 back plate inclined in front and having the
 75 bottom recesses, and the tumbler provided with the corner horns, substantially as and for the purpose set forth.

9. A series of dredge-buckets provided with the front and rear jointing-knuckles
 80 connected by pivot-pins, and having their joints provided with oil-reservoirs, substantially as and for the purpose set forth.

10. A series of dredge-buckets provided with the front and rear jointing knuckles
 85 connected by pivot-pins, and having their joints provided with oil-reservoirs, and the packing and protecting rings, substantially as and for the purpose set forth.

11. The combination of the buckets provided with the front jointing-knuckles and the hollow rear jointing-knuckles, constituting
 90 oil-reservoirs, the bushes fitted in the rear jointing-knuckles and having oil-passages, and the pivot-pins secured tightly in the front
 95 jointing-knuckles and directly connecting the front and rear jointing-knuckles of respectively adjacent buckets, substantially as and for the purpose set forth.

12. The combination of the buckets, each
 100 provided at one end with the hollow jointing-knuckles, constituting oil-reservoirs, and with jointing knuckles at its opposite end for engagement with the hollow knuckles of an adjacent bucket, the pivot-pins uniting the buck-
 105 ets, the packing-rings between adjacent knuckles, and the packing-protecting rings, substantially as and for the purpose set forth.

13. The combination of the buckets, each provided at one end with the hollow jointing-
 110 knuckles, constituting oil-reservoirs, and with jointing-knuckles at its opposite end for engagement with the hollow knuckles of an adjacent bucket, the bushes of the hollow knuckles having oil-passages, the pivot-pins, and the
 115 packing rings between adjacent knuckles, substantially as and for the purpose set forth.

14. The combination of the buckets, each provided at one end with the hollow jointing-
 120 knuckles and with jointing-knuckles at its opposite end for engagement with the hollow knuckles of an adjacent bucket, the bushes of the hollow knuckles having oil-passages, the pivot-pins, the packing-rings between adjacent knuckles, the packing-protecting rings,
 125 and the packing-washers, substantially as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

ARTHUR WELLS ROBINSON.

Witnesses:

W. A. CLARK,

J. B. ROBINSON.