

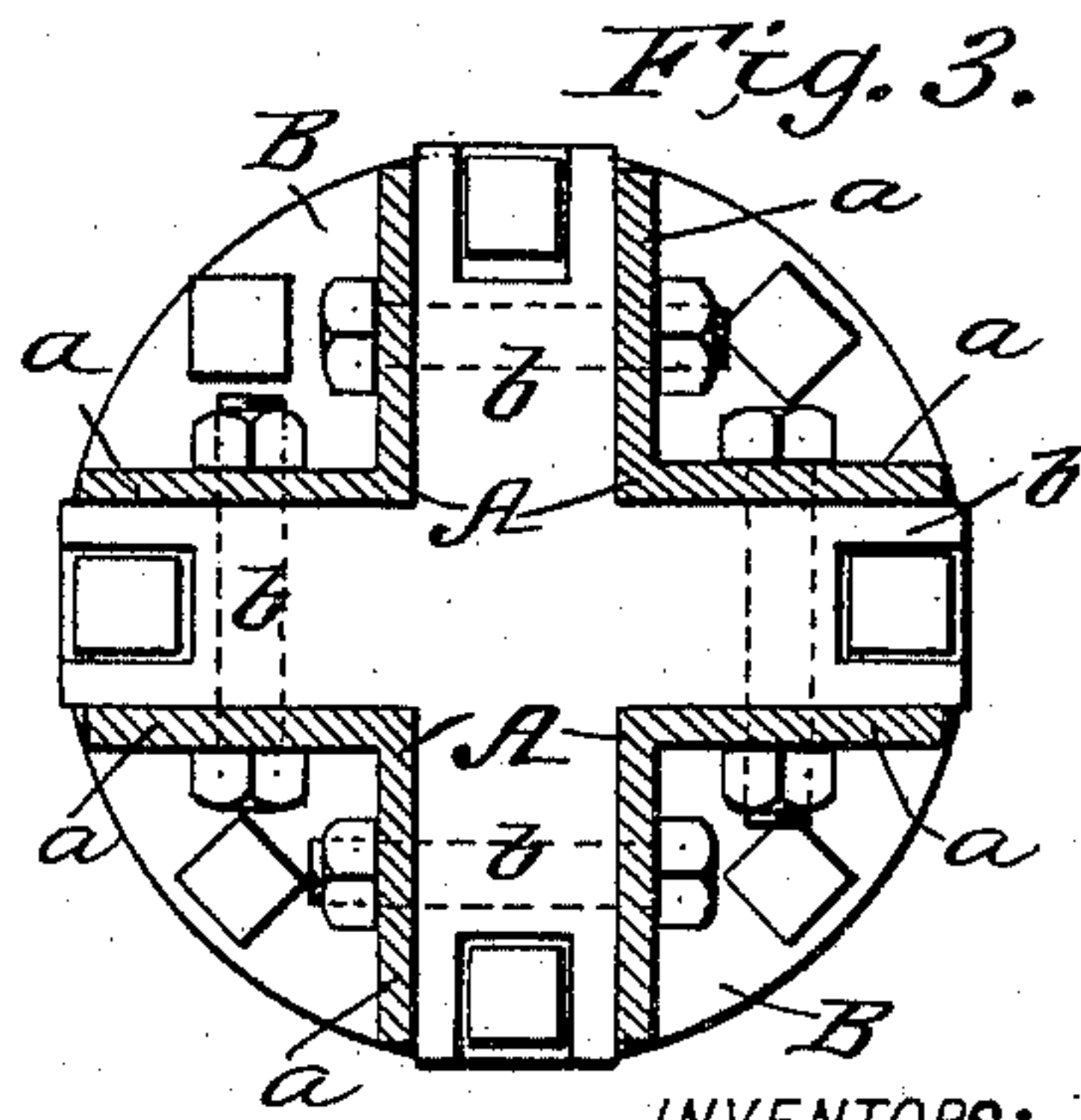
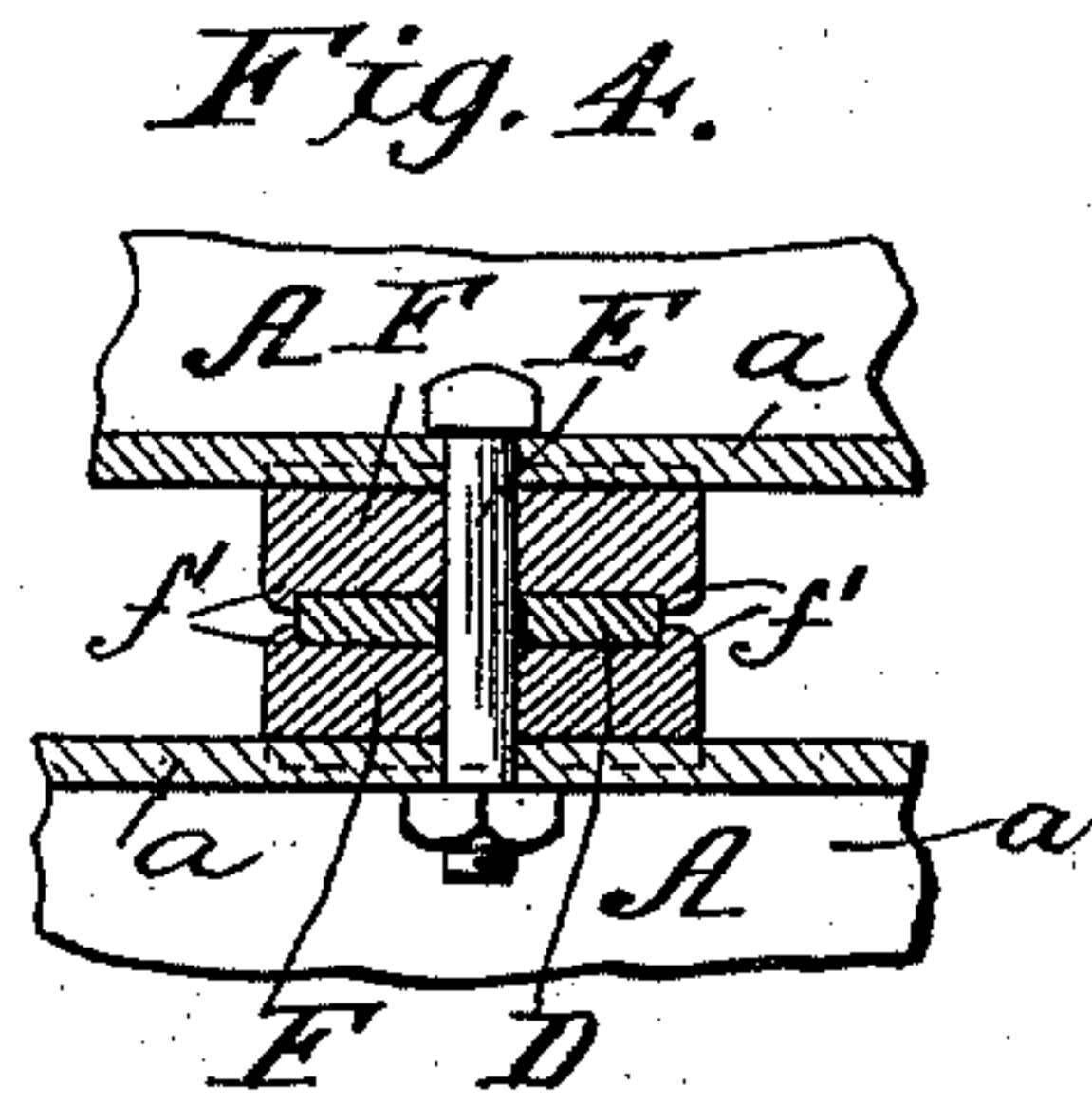
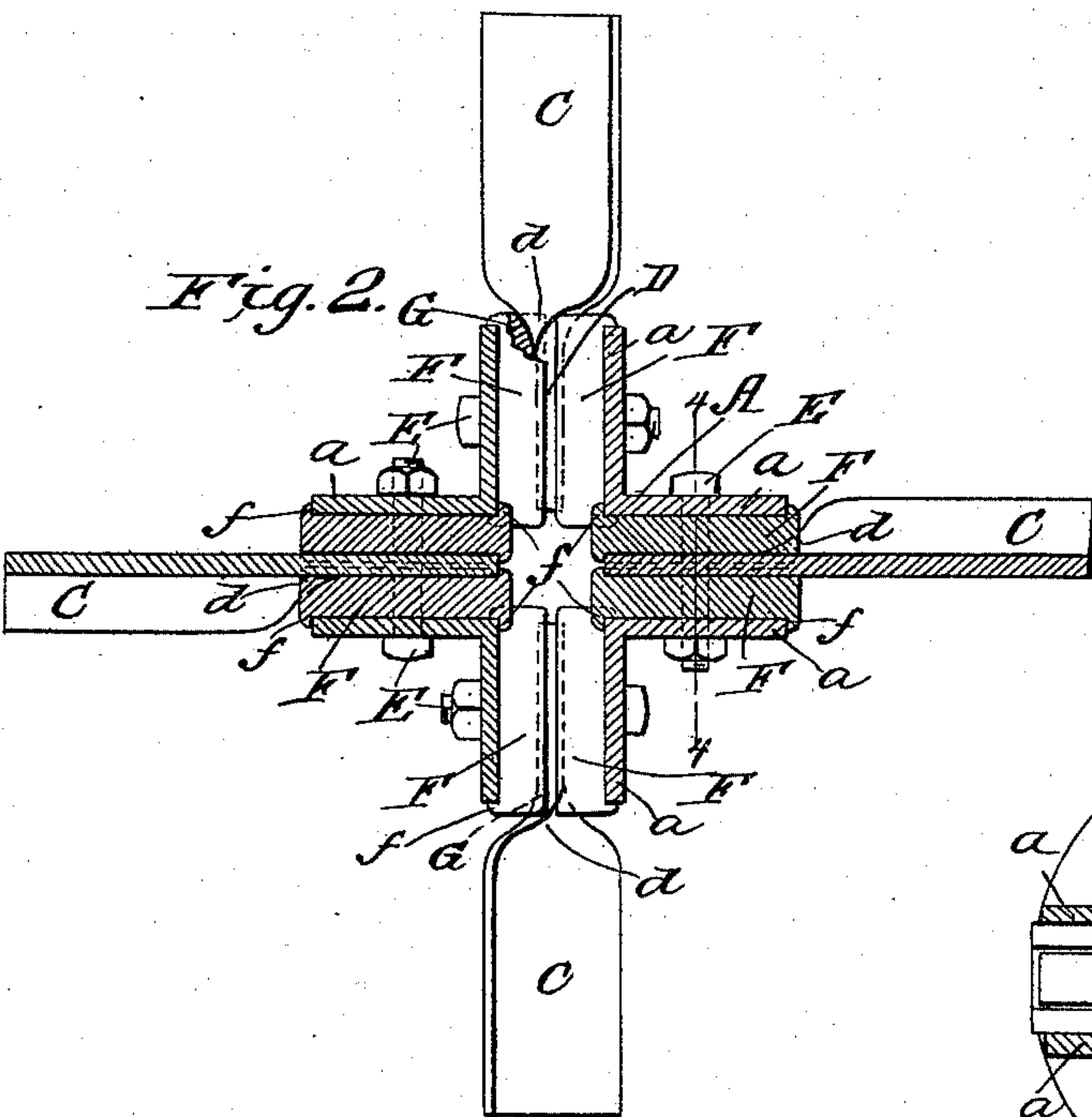
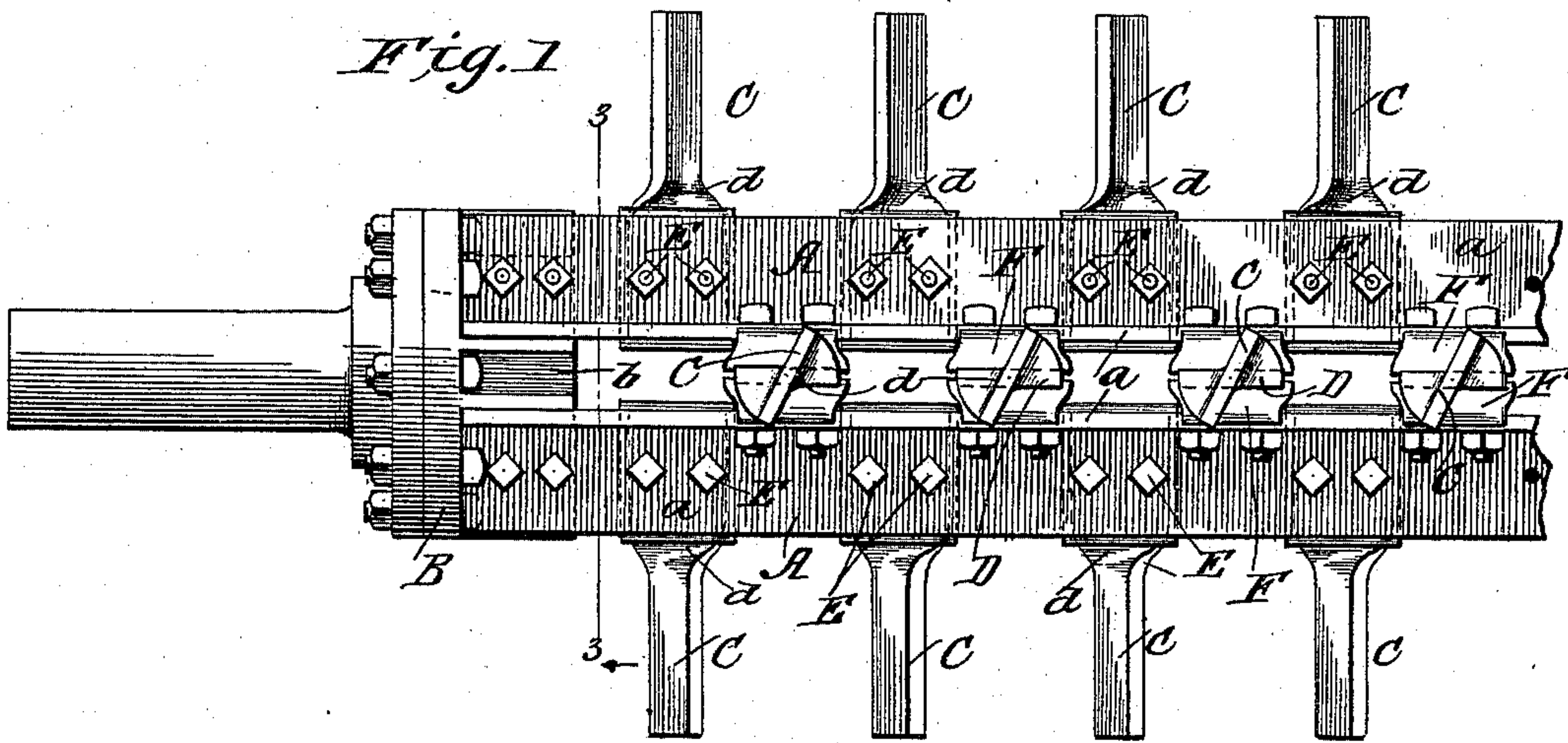
(No Model.)

2 Sheets—Sheet 1.

S. C. McLANAHAN & W. F. KIRK.  
ORE WASHER.

No. 470,587.

Patented Mar. 8, 1892.



WITNESSES:

*Fred G. Dietrich*  
*P. B. Swain*

INVENTORS:

*S. C. McLanahan.*  
*W. F. Kirk.*  
BY *Mum*  
ATTORNEYS

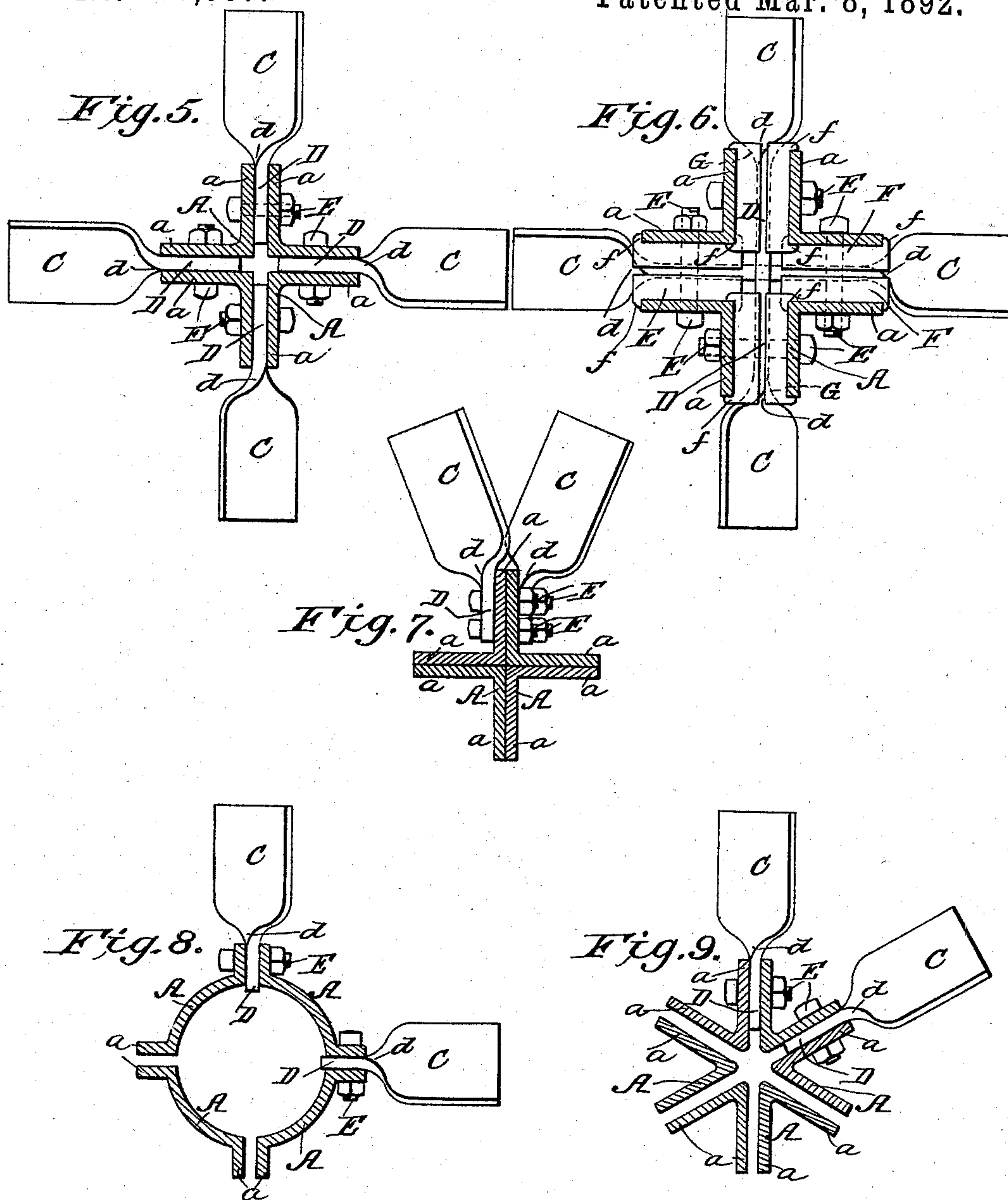
(No Model.)

2 Sheets—Sheet 2.

S. C. McLANAHAN & W. F. KIRK.  
ORE WASHER.

No. 470,587.

Patented Mar. 8, 1892.



WITNESSES:

*Fred. G. Dieterich*  
*P. B. Turpin*

INVENTORS:

*S. C. McLanahan*  
*Wm F. Kirk*  
BY *Munroe*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

SAMUEL C. McLANAHAN AND WILLIAM F. KIRK, OF HOLLIDAYSBURG,  
PENNSYLVANIA.

## ORE-WASHER.

SPECIFICATION forming part of Letters Patent No. 470,587, dated March 8, 1892.

Application filed October 5, 1891. Serial No. 407,816. (No model.)

*To all whom it may concern:*

Be it known that we, SAMUEL C. McLANAHAN and WILLIAM F. KIRK, of Hollidaysburg, in the county of Blair and State of Pennsylvania, have invented a new and useful Improvement in Ore-Washers, of which the following is a specification.

This invention is an improvement in that class of ore-washers in which one or more shafts having radial blades revolve in a box or tank, the said blades serving to agitate and carry the ore forward to the discharge; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a side view, and Fig. 2 a cross-section, of our shaft. Fig. 3 is a cross-section on about line 3 3, Fig. 1, showing the connection between the cap or end plate and the angle-plate sections. Fig. 4 is a detail section on about line 4 4 of Fig. 2; and Figs. 5, 6, 7, 8, and 9 show modified constructions and arrangements within some of the broad principles of our invention.

Our improved stirrer-shaft is formed with longitudinal sections A, of angle-iron or steel, having the radial flanges *a* extended throughout their lengths. These sections are secured at their ends to the cap-plates B, preferably by providing the plates B with inwardly-projecting lugs or portions *b*, which fit and are secured between the flanges *a* of the adjacent sections A, as shown.

The blades or paddles C have stems or shanks D, and are preferably twisted at the juncture of such shanks at *d*; but it is manifest that, if desired, the blades might be cast in such form as to provide suitable stems or shanks without twisting them; but the construction shown is preferred, because it enables the convenient formation of the blades from flat plates of steel, and also provides a simple strong form of blade, which may be easily applied and when applied will be set accurately at the desired inclination. These blades are connected with the flanges *a* by the bolts E, which bolts also operate to unite the adjacent flanges *a*, as shown. Now it will be seen that this is an important feature, inasmuch as by it the same bolts which connect the blades with the shaft-sections also oper-

ate to unite such sections by bolting together the adjacent flanges, as shown. At the same time the arrangement of the bolt heads and nuts alongside the radial flanges is such that they are but slightly acted on by the ore in the operation of the machine, and consequently do not wear out rapidly.

While, as shown in Fig. 5, the blades may be secured between the flanges *a* and in contact therewith, it is preferred to employ the filling-blocks F. (Shown in Figs. 1 and 2.) These blocks F have flanges *f f* at their inner and outer ends, which lap alongside the edges of the wing or flange *a*, and they also have on their inner faces flanges *f' f'*, which fit alongside the edges of the blade stem or shank. On their inner faces the filling-blocks are conformed to the shape of the blades or paddles, being formed at G with seats to receive the twists *d* of the said blades, as shown. These filling-blocks are greatly preferred for two reasons. In the first place they separate the flanges *a* of the adjacent sections A to such an extent as to enable the use of lugs or portions *b* on the cap-plates B, of such size as to furnish a strong connection between the parts. Another advantage resulting from the filling-blocks is that they enable the twists *d* to be set in close to the shaft, as shown.

Where desired, the blades may be made in pairs integral with each other, as shown in Fig. 6. It will also be understood that the form of the angle-iron in the sections A may be varied from that shown in Fig. 2 to that shown in Figs. 8 or 9 or to other suitable shape of angle-iron without departing from some of the broad principles of the invention.

It should also be understood that while it is preferred to insert the stems or shanks of the blades between the adjacent flanges *a* we may in some instances secure such stems or shanks to the outer sides of the flanges, as shown in Fig. 7, the blades being in such instance secured by the bolts, which unite the flanges *a*, the same as in the preferred construction before described.

In practice it is preferred to make the angle-sections A, the blades or paddles, filling-blocks, and cap-plates of steel.

Having thus described our invention, what we claim as new is—



1. The combination, substantially as herein described, of the longitudinal shaft-sections formed of angle-iron having radial flanges, the blades or paddles, and the bolts uniting the flanges of the adjacent sections and securing the blades or paddles in connection therewith, all substantially as and for the purposes set forth.

2. The combination, substantially as described, of the longitudinal shaft-sections having radial flanges, the blades or paddles having their stems or shanks inserted between the flanges of the adjacent sections, and bolts uniting such flanges and connecting the blades or paddles therewith, all substantially as and for the purposes described.

3. The combination, substantially as described, of the longitudinal shaft-sections having radial flanges, the blades or paddles having their stems or shanks held between the flanges of the adjacent sections, and the end or cap plates provided with inwardly-projecting lugs or portions fitting and held between the flanges of the adjacent shaft-sections, substantially as and for the purposes set forth.

4. The combination of the longitudinal shaft-sections having radial flanges, the blades or paddles having their stems or shanks inserted between the flanges of the adjacent sections, the filling pieces or blocks interposed between the said stems or shanks and the flanges, and fastening-bolts, substantially as set forth.

5. The combination of the shaft-sections having radial flanges, the blades or paddles having their stems or shanks inserted between the flanges of the adjacent sections, the filling pieces or blocks interposed between the said stems or shanks and the flanges, and the end or cap plates provided with inwardly-projected lugs or portions fitting and held between the flanges of the adjacent sections, substantially as set forth.

6. The combination, substantially as de-

scribed, of the longitudinal shaft-sections having radial flanges, the blades or paddles having their stems or shanks inserted between the flanges and twisted at the juncture of such stems, and the filling-blocks interposed between the stems and the flanges and conformed on their inner faces to the twist of the blade or paddle, all substantially as and for the purposes set forth.

7. The combination, substantially as described, of the shaft-sections having radial flanges, the blades or paddles formed from flat plates of metal twisted at the juncture of their stems or shanks, and fastening-bolts for connecting such stems or shanks with the flanges of the sections, substantially as set forth.

8. The improved shaft for ore-washers, substantially as described, comprising the shaft-sections having longitudinal radially-projected flanges, and the blades or paddles having their shanks arranged in planes parallel with the flanges of the shaft-sections and secured thereto and their main portions arranged obliquely to said flanges, the paddles being twisted at the juncture of their stems and main portions, all substantially as and for the purposes set forth.

9. The combination, substantially as herein described, of the shaft-sections formed of angle-iron, with radial flanges at their edges, the blades or paddles having their stems arranged parallel to said flanges and their main portions arranged oblique thereto, and the bolts securing said stems to the flanges, the same bolts being arranged to unite the adjacent flanges, all substantially as and for the purposes set forth.

SAMUEL C. McLANAHAN.  
WILLIAM F. KIRK.

Witnesses:

DAVID OVER,  
FRANK J. OVER.