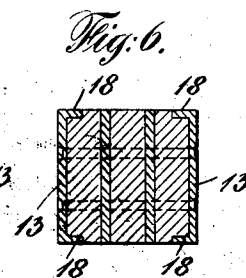
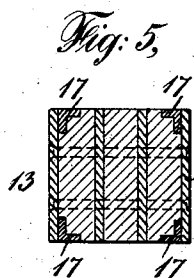
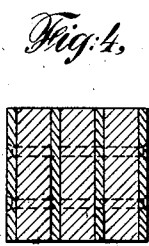
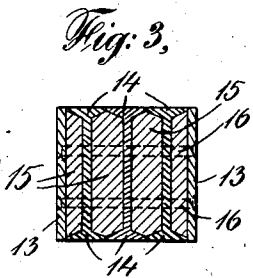
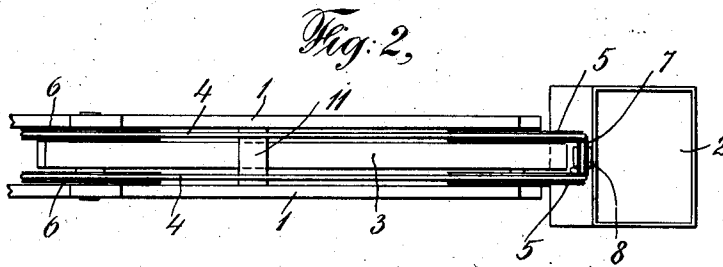
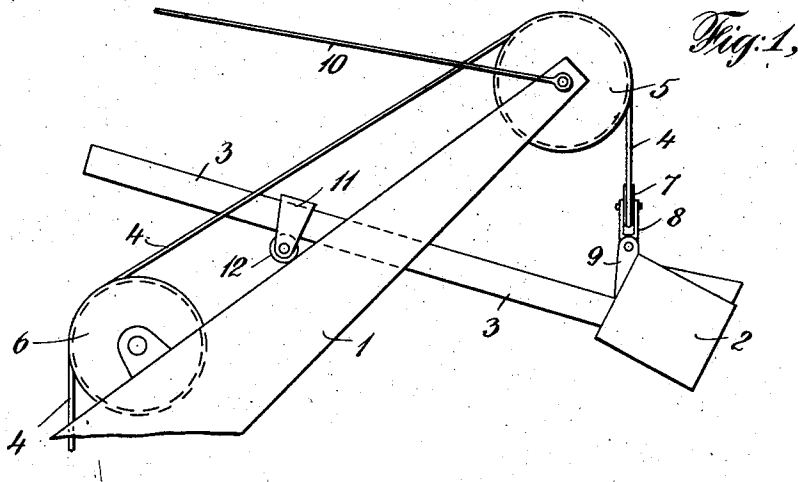


A. W. ROBINSON.
 DIPPER ARM FOR STEAM SHOVELS, DREDGES, AND THE LIKE.
 APPLICATION FILED FEB. 19, 1912.

1,047,991.

Patented Dec. 24, 1912.



Witnesses:
Wm. A. Doring
F. M. Omsback

Arthur W. Robinson Inventor
By his Attorney
Phillips Abbott

UNITED STATES PATENT OFFICE.

ARTHUR W. ROBINSON, OF MONTREAL, QUEBEC, CANADA.

DIPPER-ARM FOR STEAM SHOVELS, DREDGES, AND THE LIKE.

1,047,991.

Specification of Letters Patent.

Patented Dec. 24, 1912.

Application filed February 19, 1912. Serial No. 678,689.

To all whom it may concern:

Be it known that I, ARTHUR W. ROBINSON, a citizen of the Dominion of Canada, and a resident of the city of Montreal, county of Hochelaga, Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Dipper-Arms for Steam Shovels, Dredges, and the Like Excavating Machinery, of which the following is a full, clear, and exact description.

It is the purpose of this invention to so construct the dipper arm that the flexures to which it is liable in use may not result in injury either to it or to other parts of the mechanism.

In the drawings, Figure 1 illustrates an elevation of that part of the machine, which co-acts with the dipper arm; Fig. 2 illustrates a plan view of that which is shown in Fig. 1; Figs. 3, 4, 5 and 6 illustrate respectively cross sectional views of dipper arms embodying modified constructions of the invention.

Figs. 1 and 2 are introduced merely to show generally the parts which co-act with the dipper arm and the relation it bears to the other parts of the mechanism, that a more clear understanding of the invention may be had. The dipper arm may be made in a variety of ways all embodying the fundamental features of the invention. Four of them are illustrated respectively in Figs. 3, 4, 5 and 6.

Referring first to Figs. 1 and 2, 1 represents the boom. In the illustration shown this is a duplex or two part structure shown better in Fig. 2. At its lower end it is suitably supported upon the usual turntable, or equivalent device, not shown. 2 is the dipper, 3 the dipper arm, 4 one part of a duplex, or two part hoisting rope, shown better in Fig. 2, the two parts of which pass over guide sheaves 5, 5, and 6, 6; 7 is a spreading and equalizing sheave for the duplex hoisting rope which may be connected to the dipper by a pivoted frame 8 and bracket 9, as shown. 10 is a stay rod. 11 is a strap for the confinement of the dipper arm, 12 is a roller with which the dipper arm engages for its more smooth operation.

Referring now to Figs. 3, 4, 5 and 6, dipper arms must necessarily have a certain amount of flexibility, because in operation they are inevitably subjected to many twist-

ing and bending strains and as heretofore constructed, they usually lack the requisite degree of flexibility, with the frequent result that the arm has either broken or else has attained a set, as it is called, and refused to return to initial shape and condition; in other words, the material of which the arm is composed has been so affected by the excessive twisting or bending as to attain and retain permanently a distorted form and it is the purpose of this invention to construct dipper arms on a new principle; that is to say, built up of a succession of plates or laminae which may be all metal or all wood, but preferably combined metal and wood, so arranged that when the deforming strains are applied to the arm, in recovering therefrom these laminae will slightly slip or slide over each other, thus individually adjusting themselves to the strain somewhat after the manner of the several leaves of the semi-elliptic spring. Thus, when the weight and strain are relieved, these several laminae will individually exert their resiliency and secure an effective return of the arm to its original shape and condition, and in order that this action of the laminae may more effectively result, I prefer that they should be arranged vertically and the bolts connecting them horizontally, that is to say, extend from side to side. This construction is not arbitrary, because the advantages of the invention may be realized, measurably at least, if the laminae and the bolts run in the reverse directions.

The degree of movement or sliding of the laminae over each other will be necessarily slight and the engagement of the bolts with the several laminae, particularly if some of them are made of wood, is such that there will be sufficient give and take to avoid any injurious shearing action.

Referring now to Figs. 3 to 6, inclusive, it will be understood that the roller 12 shown in Fig. 1 or its equivalent, engages with the under surface of the arms illustrated in these figures. In Fig. 3 the arm is built up of laminae as follows: 13, 13, are the two side plates, preferably of steel, or other suitable metal. 14, 14, are eye beams. In this instance there are three. Between these metal parts, wooden or timber laminae 15, 15, are fitted, and the whole is bound together by cross bolts 16, 16, which pass from side to side through all the laminae and are suitable headed or riveted, as shown. It

will be noted that when twisting or lateral bending strains are applied, these several laminae will each individually bend or twist, as necessity may require, slightly sliding
5 over each other in so doing. The flanges at the top and bottom of the eye beams 14 are so narrow that they also will flex to the degree necessary without rupture or attaining a set.

10 The construction shown in Fig. 4 is substantially the same as that illustrated in Fig. 3, except that the metal laminae are in this instance shown as all in the form of flat plates and the wooden laminae are correspondingly shaped to effect a continuous
15 square outline or shape of the structure.

In Fig. 5 I illustrate a combination of that which is shown in Figs. 3 and 4, that is to say, the outside plates 13, 13, are reinforced
20 at the corners with small angle iron strips 17, 17, which are riveted, bolted or welded to the plates 13. These angle irons at the corners will not interfere with the desired flexibility of the arm because the flanges
25 of the angle irons are so narrow as not to interfere with the bending or twisting of the arm and, indeed, will add to its elasticity, thus aiding in its return to initial conditions. These angle irons also increase the
30 area of metal surface at the corners of the arm, thus strengthening it and adding to its durability.

In Fig. 6 I show a construction which is similar to that shown in Fig. 5, excepting
35 that the side plates 13 have narrow flanges 18 made integral with them instead of being separate pieces attached to them, as in Fig. 5.

I prefer to use in the machines equipped
40 with my improved dipper arm a duplex or two part hoist, as shown in Figs. 1 and 2, so that the boom being equipped with suitable guiding sheaves, as shown in those figures, the two parts of the hoist may be
45 spread apart, so that the dipper arm will

work between them. Obviously, however, if a single hoisting rope or chain be preferred, then any suitable guiding devices for it may be provided, or preferably the dipper arm may be made as a bifurcated or two part
50 structure, the two parts of which are separated from each other by a space sufficient to permit the single hoist to work between them. In this event, as will be readily understood, each of the halves of the dipper
55 arm will embody the laminated constructions illustrated and described above.

It will be obvious to those who are familiar with such matters that modifications other than those disclosed herein may be
60 made in the details of construction without departing from the essentials of the invention. I therefore do not limit myself to the specific constructions shown. They are presented as examples only of many forms
65 in which the invention may be embodied.

I claim:

1. A dipper arm composed of a series of alternating wood and metal laminae bound together by bolts running horizontally and
70 all in the same direction, the metal laminae being upon the outer side surface.

2. A dipper arm composed of a series of alternating laminae of wood and metal suitably bound together, some of the metal
75 laminae having narrow flanges at their edges.

3. A dipper arm composed of a series of alternating wood and metal laminae bound together by horizontally extending bolts, all running in the same direction, the outer side
80 laminae being metal and provided with narrow flanges which inclose the corners of the arm.

In testimony whereof I have signed my name to this specification in the presence of
85 two subscribing witnesses.

ARTHUR W. ROBINSON.

Witnesses:

E. M. CORBET,
D. S. CHRISTIE.