

No. 697,407.

Patented Apr. 8, 1902.

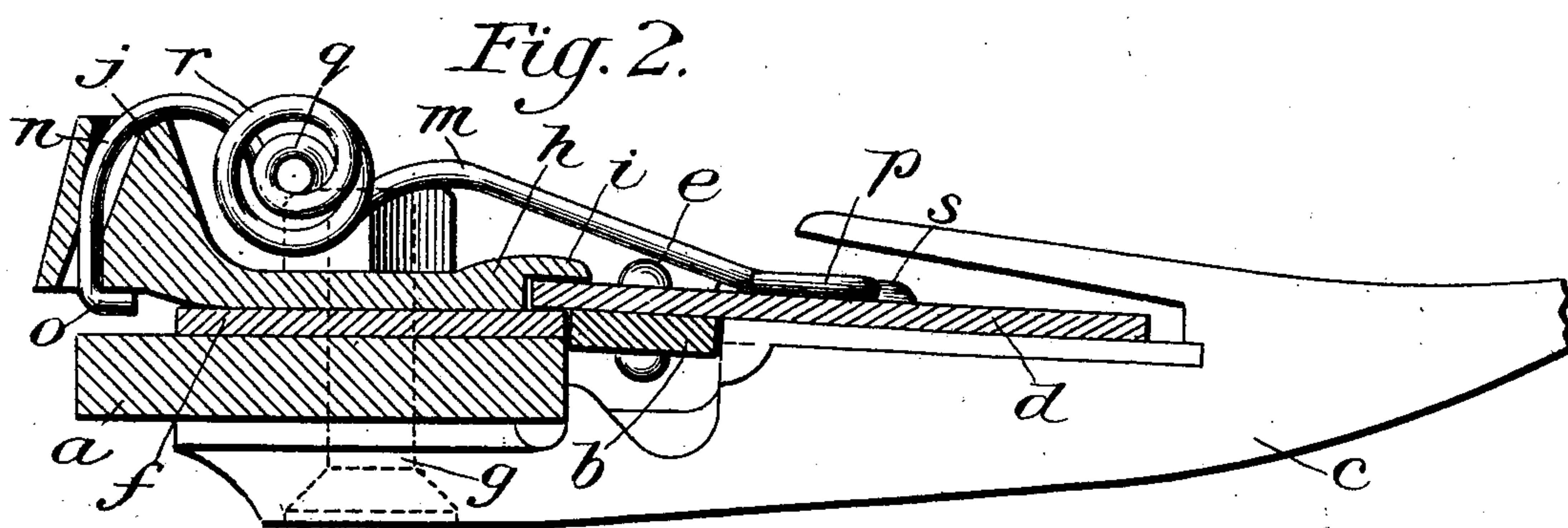
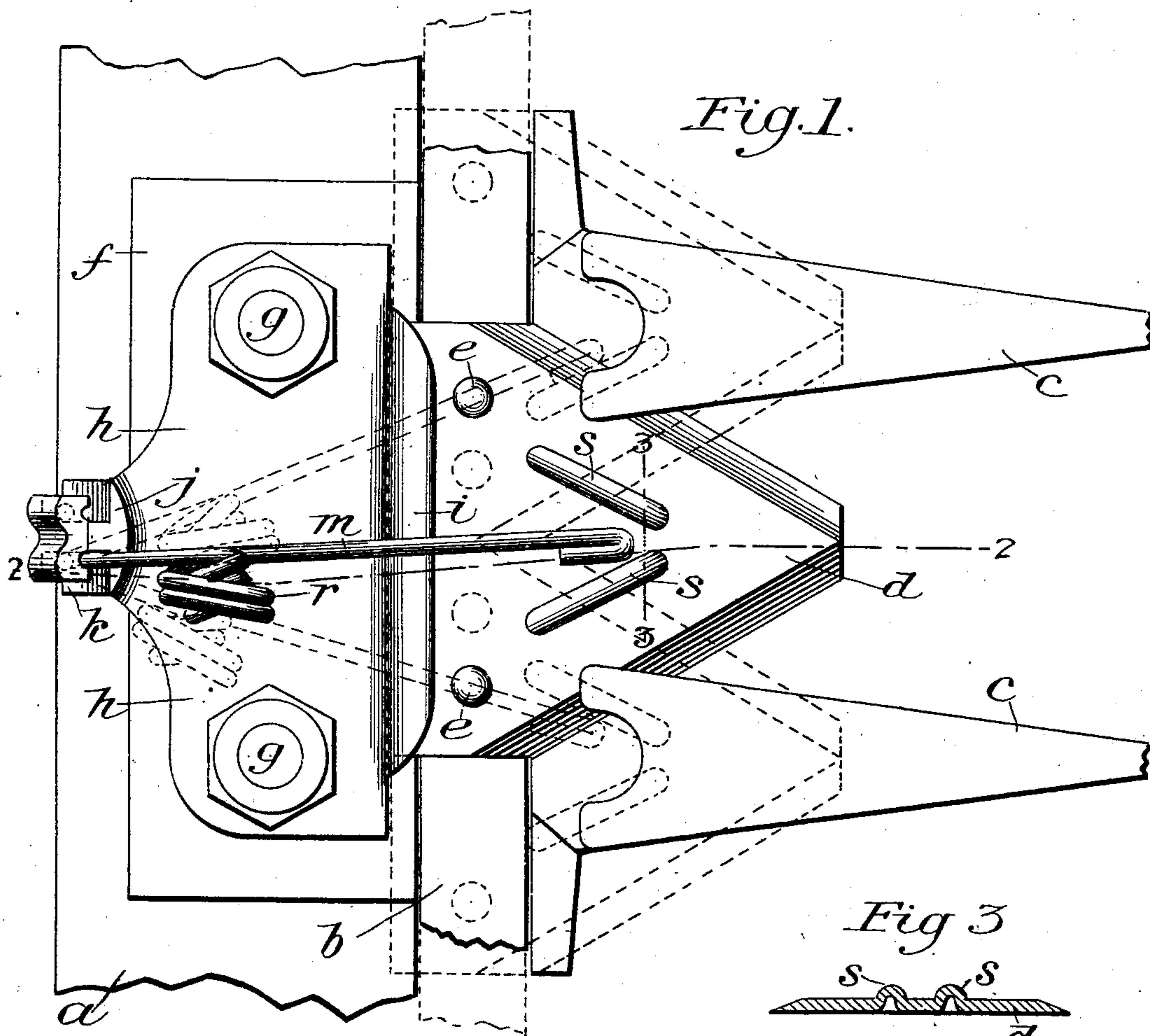
H. L. HOPKINS.

CUTTING APPARATUS FOR MOWERS, REAPERS, OR THE LIKE.

(Application filed Nov. 8, 1901.)

(No Model.)

2 Sheets—Sheet I.



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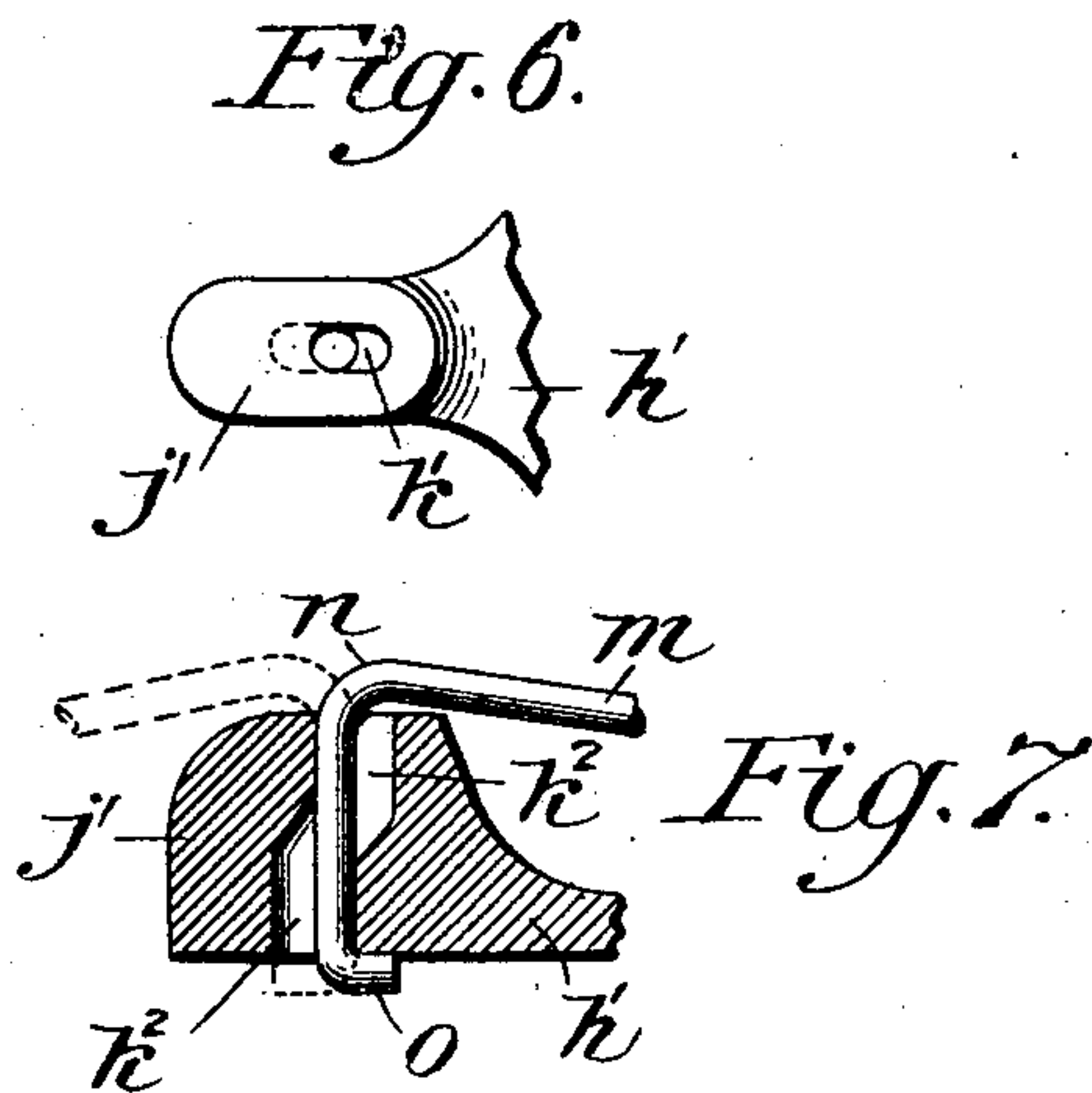
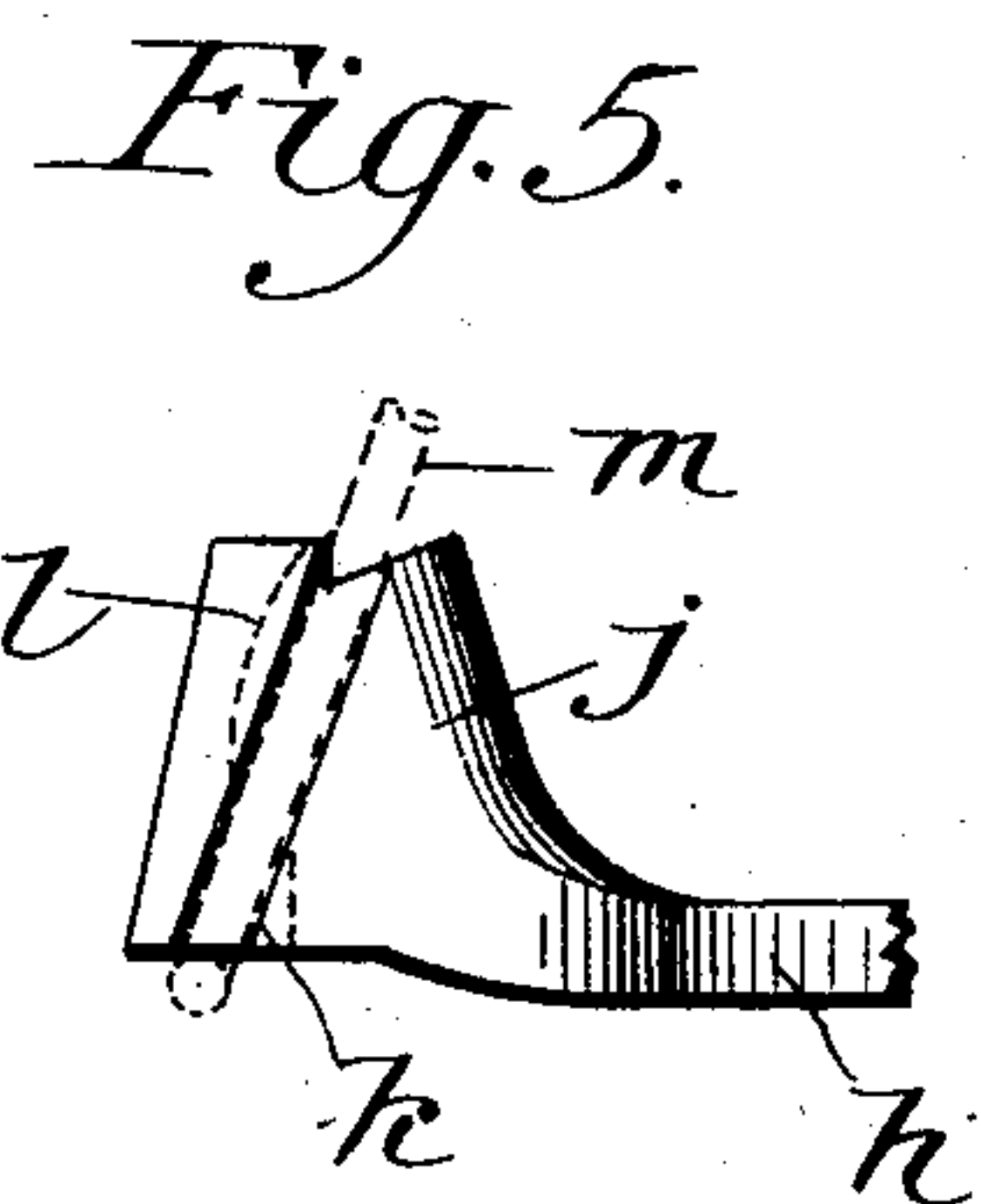
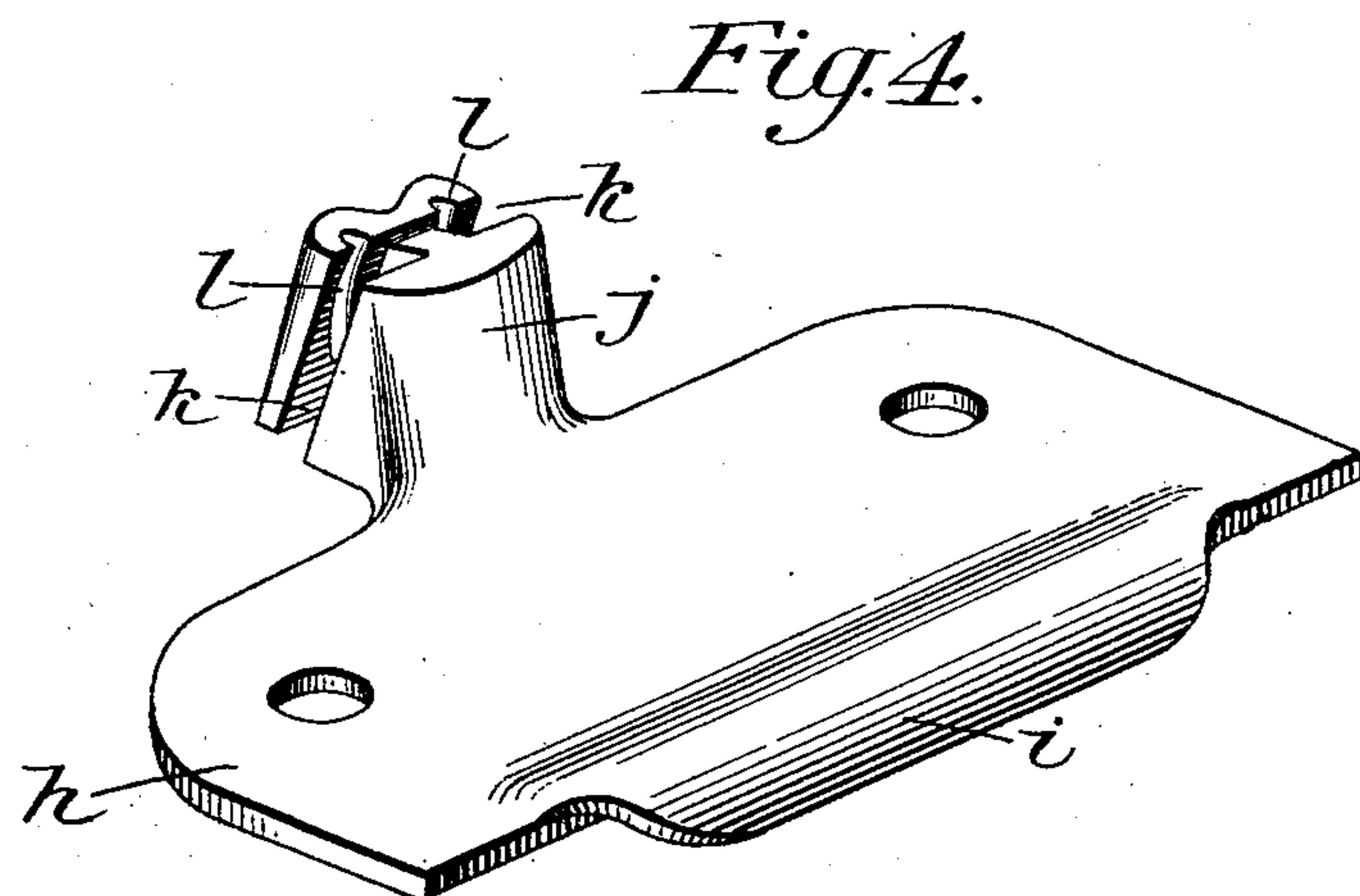
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CUTTING APPARATUS FOR MOWERS, REAPERS, OR THE LIKE.

(Application filed Nov. 6, 1901.)

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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

HARVEY L. HOPKINS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HOPKINS PATENT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CUTTING APPARATUS FOR MOWERS, REAPERS, OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 697,407, dated April 8, 1902.

Application filed November 6, 1901. Serial No. 81,328. (No model.)

To all whom it may concern:

Be it known that I, HARVEY L. HOPKINS, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Cutting Apparatus for Mowers, Reapers, or the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to that portion of the cutting apparatus for mowers, reapers, and the like concerning which other improvements were set forth in my patent of January 9, 1900, No. 640,768, and later in the patent granted to me January 8, 1901, No. 665,527.

I do not deem it necessary to repeat herein the advantages of a cutter-cap that moves with the sections over one that is rigidly connected, as these advantages are clearly set forth in my two patents above referred to. The present invention is more particularly an improvement upon these constructions. Together with other advantages it combines the free oscillating feature of the former patent with the elastic pressure of the latter patent. The free oscillating of the springs prevents their crystallization. In the construction illustrated and described in my patent of January 8, 1901, the portion of the spring bearing down on the cutters was out of line with the point of attachment of the other end of the spring to the finger-bar; but in the present arrangement I have so modified the coiling of the spring as to bring its two arms substantially in line with each other. In that patent also the rear end of the pressure-spring was held rigidly in place by a clip, while in my present arrangement the rear end of the spring is set in a socket and acts as a pivot about which the forward part of the spring oscillates. Furthermore, in the same patent the forward end of the spring was confined to its position on the section by a V-shaped socket riveted thereon. In my present improvement certain ribs forged out of the section itself and greatly strengthening and stiff-

ening the same take the place of the former socket and furnish important advantages over that construction.

The improvement is illustrated in the accompanying drawings, where—

Figure 1 shows a fragment of the cutter and finger bars of a mowing-machine with my latest improved spring cutter-cap attached. Fig. 2 is a cross-section of the same on the line 2 2. Fig. 3 is a cross-section of one of the cutters or sections of the cutter-bar on the line 3 3. Fig. 4 is a perspective view of the preferred form of clip or spring-holder for attaching the spring to the finger-bar. Fig. 5 is a fragmentary detail of the socket portion of this clip, showing the manner of inserting the spring. Figs. 6 and 7 are respectively plan and section views of the same portion of a clip having a modified construction of socket or spring-seat.

In all these views like letters indicate corresponding parts.

Referring first to Figs. 1 and 2, *a* denotes the finger-bar; *b*, the cutter-bar; *c*, the guards, and *d* one of the cutters or knife-sections that are secured to the cutter or knife bar by rivets *e* or in any other suitable manner. Excepting only the cutter-section *d* these parts may be of any ordinary or approved construction and no particular description thereof is necessary, the relation and conjoint action of the parts being now well understood and the present improvement being applicable to other forms of cutting apparatus.

In Figs. 1 and 2, *f* denotes a chafe-iron or wear-plate, which is seated upon the finger-bar with one edge flush with the front edge of the latter in the ordinary manner. Upon this chafe-iron or wear-plate and secured to the finger-bar by bolts *g g*, passing through the finger-bar and chafe-iron, is a clip or spring-holder, which is of the generally rectangular form illustrated in the drawings and has a lip *i* on its front edge, which overlaps the rear edge of the cutters, as best illustrated in Fig. 2, this edge of the cutter on the under side bearing upon the chafe-iron *f*, so that the front edge of the iron and the overhanging lip of the clip form a race or guideway in

which this part of the cutter reciprocates. At its rear edge, and preferably midway between the bolts which secure it to the finger-bar, the clip *h* is provided with an upstanding enlargement *j*, forming a box or bearing for the attachment thereto of a spring, which will be presently described in detail. This box or enlargement is provided with a socket *k*, extending vertically and preferably inclined upwardly, as best illustrated in Figs. 2 and 4. This socket is preferably rectangular in cross-section and is open at the side, as shown in Figs. 1 and 4. In the rear wall of the socket there is preferably provided a groove or recess *l*, extending vertically, as shown in the drawings, and having a function which will be described later on. It is desirable to provide the box or enlargement *j* with two of these sockets or seats for the spring, and Figs. 1 and 4 of the drawings show them duplicated. Of course only one of these sockets is employed at a time, but as there is considerable wear upon them, due to the constant vibration of the spring, the projection *j* may, if desired, be provided with duplicate sockets in order that the spring may be changed from one to the other as either becomes worn. The two sockets are in all respects alike and the provision of the extra one is only a precautionary measure.

The construction of the spring which I now employ is clearly illustrated in Figs. 1 and 2, where it is denoted as a whole by the letter *m*. At its rear end it has a downwardly-extending portion *n*, which is journaled in the socket *k* and has a projecting hook *o* at its extremity, which may extend forwardly or backwardly. The forward portion of the spring extends substantially in line with the rear part and has its front end preferably turned around and back upon itself, as indicated at *p* in Fig. 2, the object of this arrangement being to double the life of the forward end of the spring where it wears upon the section. This fold or bend causes the spring to present twice as much substance to be worn away by frictional contact with the section and furnishes added life to that part of the device. In my patent of January 8, 1901, the rear end of the spring was held rigidly to its place in relation to the finger-bar. A large number of lateral coils were necessary to give proper elasticity and to prevent the vibrations of the spring from crystallizing it by reason of the constantly-reversing tension to which its particles were subjected. The spring in my second patent was therefore called upon both to exercise the proper pressure upon the section and to withstand the reciprocating strains imparted by the cutter-bar. The rear end of the present spring being free to oscillate in its socket is practically relieved from all torsional strain. Intermediate of its ends and preferably at a point about midway of its length the spring is coiled upon itself in a peculiar manner, as illustrated in Figs. 1 and 2. As there shown,

I form two coils, one within the other—that is to say, the rear portion of the spring is provided with a small coil *q*, which takes two or three or more turns and then is expanded into a larger coil *r*, which is given two or three or about an equal number of turns around the smaller coil in the reverse direction, so that the front portion of the spring will lie in substantially a line with the portion in rear of the coils. In this manner I secure in the first place a sufficient length of wire in the spring for the required elasticity of the front end of the spring, and in the next place I obviate the tendency that would otherwise arise in practice for the spring as it reciprocates to slightly roll or lift the coils endwise bodily with a sort of torsional twist, lifting the front or cutter-cap end of the coil above the other and throwing it slightly out of the line of its greatest efficiency. The whole spring is thus free to turn around its pivotal attachment to the clip with the result that it vibrates much more easily than in the former construction. It is entirely relieved from any tendency to crystallize from the reciprocating motions of the cutter, and all this is accomplished without in the least impairing the strength and elasticity of the downward pressure with which it holds the cutter on the guards.

In my patent of January 8, 1901, the cutter was provided with a socket having a slot or opening in its rear end into which the forward end of the spring was engaged, the socket being separate from the cutter-section and riveted or otherwise secured thereto. I have found that in practice it is desirable to avoid the cutting of slots or formation of recesses, which tend to weaken the section and at times to become clogged with dirt or grass. Such riveted parts are liable to become loose or get knocked off, and I therefore provide the cutter or section in the present invention with rearwardly-diverging upwardly-projecting ribs *s*, which are integral with and struck up from the metal of the section and are preferably parallel with the inclined beveled edges thereof. This arrangement forms an abutment for the spring at each side of the median line of the section and has no reentrant or covered angles which could become clogged. The ribs stiffen and strengthen the sections materially, thereby preventing the bending thereof, and while they provide abutments to limit the movement of the spring the latter is quickly and easily connected and disconnected for the insertion or removal of the knife. The length of these projections is of no particular importance, provided they extend sufficiently to prevent any liability of the front end of the spring becoming disengaged therefrom at the extremities of its lateral movement. When the cutter-bar is at rest with the cutters or sections standing midway between the guards *c c*, the front end of the spring bears down upon this section at a point between the projections *s s*, as illustrated in

Fig. 1, not bearing upon either projection. When the reciprocation of the cutter-bar begins, there is some little movement permitted before either projection contacts with the end of the spring; but when the cutter-bar has moved enough one or the other of the projections contacts with the spring and carries it along during the remainder of its travel.

It is desirable that the spring should be secured to the clip without the employment of screws, bolts, or rivets, and also that it be readily connected and disconnected from its socket, and it is for the purpose of supporting and holding the spring in this way that I have provided the clip *h* with the socket or bearing-box above described. The manner of seating and securing the spring in this socket is illustrated in Fig. 5, where it will be seen that the rear end of the spring is inserted in the open side of the socket, while the spring itself extends in the direction of the length of the finger-bar and clip *h*. The open side of the socket permits the insertion of the rear end of the spring when held in this position, as clearly shown in Fig. 5, and the spring is then securely fastened in the socket by simply turning it at right angles to the finger-bar, when the hook *o* on its lower rear extremity catches under the projection *j* at the front side of the socket and the bend at end engages the groove *l* in the rear side of the socket. This arrangement permits the machine to be shipped from the factory without having the springs attached to the finger-bar. They are therefore not subject to breakage or damage in transit, and the farmer can easily slip them into their sockets in a few minutes without disconnecting the clip or spring-holder from the finger-bar, and this need be done only when ready for work in the field.

The present improvement is not limited to any particular socket for attaching the spring to the clip. Indeed it is not limited to any specific means for attaching the spring at all. The above-described socket has, however, proven satisfactory in operation and is susceptible of some modification without departing from the spirit of the invention, which includes, broadly, any socket or bearing by means of which the spring may be securely attached without the employment of extraneous fastening devices.

In Figs. 6 and 7 I have illustrated a modification of the socket *k*. In these figures *h'* denotes the clip, and *j'* the upstanding projection at its rear edge. The socket is indicated by *k'*; Fig. 6, and it is to be noted that instead of being open at one side, as in the other construction, it is closed on all sides. It is, however, constructed as indicated in Fig. 7 in order to permit the attachment of the spring—that is to say, it consists of an elongated slot *k'*, extending through the projection *j'* in a generally inclined direction or with two straight reaches *k² k²*, connected by an inclined reach or portion, so that the hook *o* at the rear extremity of the spring may pass

into the socket when the position of the spring is reversed, as indicated in dotted lines. In passing the spring into the socket in this modification the elongated form of the socket permits the hook *o* to pass downwardly there-through, and when the spring is turned around in the position to bear upon the cutter the hook engages the under side of the projection and the upper part of the spring abuts against the rear wall of the socket, these two bearing-points being in all respects the same in effect as the corresponding bearing-points in the construction first described.

The construction of my latest improved spring-cap being as thus described, it is believed that no further description of the operation of the same is required. The extreme positions of the knife-section and the spring are indicated in dotted lines in Fig. 1, and it will be understood from this illustration that the spring in effect has a pivotal connection to the clip and vibrates bodily around this center as the knife-bar reciprocates. In this lateral movement of the spring there is practically no sidewise stretching of the coils and perfect relief from any crystallizing tendency. The spring bears downwardly with a uniform pressure, be it in one position or another in its movement, and it is prevented from leaving the knife-section by the stiffening and retaining ribs thereof.

It will be understood that the object of putting a coil in the spring is to secure the proper elasticity with sufficient downward pressure upon the section and that a spring without an intermediate coil or a spring in any way so constructed as to journal in the clip to contact properly with the knife-section to possess the requisite elasticity and to produce the proper downward pressure would be included within the scope of my invention.

What I claim as my invention is—

1. In a cutting apparatus for mowers, reapers and the like, the combination with the finger and cutter bars, of a spring the rear end of which is vertically journaled on the finger-bar, and the front end extends forward and bears downwardly on the cutter so as to move laterally when the cutter-bar reciprocates.

2. In a cutting apparatus for mowers, reapers and the like, the combination with the finger and cutter bars, of a spring having a coil intermediate of its length, one end of the spring being secured to the finger-bar and the other extending forward substantially in line with the first and bearing downwardly on the cutter so as to move laterally as the cutter-bar reciprocates.

3. In a cutting apparatus for mowers, reapers, and the like, the combination with the finger and cutter bars, of a spring secured at one end to the finger-bar and at the other bearing downwardly on the cutter so as to move laterally as the cutter-bar reciprocates, said spring having two coils intermediate of its length, one of said coils lying within the other.

4. In a cutting apparatus for mowers, reap-

ers and the like, the combination with the finger and cutter bars, of a clip having a socket, a spring journaled in said socket and free to oscillate therein, and a cutter or sickle section having ribs or projections on its upper surface struck up from the metal.

5. In a cutter-cap for mowers, reapers and the like, the combination of a clip for attachment to the finger-bar, said clip having a vertical socket, and a spring having a vertical portion pivoted in the socket of the clip and a portion extending forwardly beyond the clip in position to bear downwardly on the cutter-section.

6. In a cutter-cap for mowers, reapers and the like, the combination of a clip for attachment to the finger-bar, said clip having a vertical socket, and a spring having a vertical portion pivoted in the socket, and a portion extending forwardly beyond the clip in position to bear downwardly on the cutter-section, said vertical portion of the spring having a hook to engage the clip and hold the pivotal portion in the socket in all operative positions of the spring.

7. In a cutter-cap for mowers, reapers and the like, the combination of a clip for attachment to the finger-bar, said clip having a vertical socket, and a spring having a vertical portion pivoted in the socket, and a portion extending forwardly beyond the clip in position to bear downwardly on the cutter-section, said vertical portion having a hook which holds it in the socket in all vertical positions of the spring, and is releasable only when the spring is in an inoperative position.

8. A spring for the cutter-caps of mowers, reapers, and the like, having a vertical por-

tion provided with a hook-like lock at its end, a coil intermediate of its length, and a forward portion to bear downwardly on the cutter-section.

9. A spring for the cutter-caps of mowers, reapers, and the like, having a hook at its rear end, one or more coils intermediate of its length, and a forward portion folded or doubled upon itself and adapted to bear downwardly upon the cutter-section.

10. In mowers, reapers and the like, in combination with the finger and cutter bars thereof, a spring cutter-cap comprising a clip or spring-holder having a substantially vertical socket, and a spring having a substantially horizontal portion projecting forwardly to bear downwardly on the cutter, a substantially vertical portion to extend into the socket to form a journal for the spring, and a hook to engage the holder and hold the spring in place.

11. In mowers, reapers and the like, in combination with the finger and cutter bars thereof, a spring cutter-cap comprising a clip or spring-holder having a substantially vertical open-ended socket, and a spring having a substantially vertical portion adapted to be passed into the socket and provided with a hook at its lower end to engage the holder at the lower end of the socket and hold the spring in place.

In testimony whereof I affix my signature in presence of two witnesses.

HARVEY L. HOPKINS.

Witnesses:

J. JEROME LIGHTFOOT,
J. A. GOLDSBOROUGH.