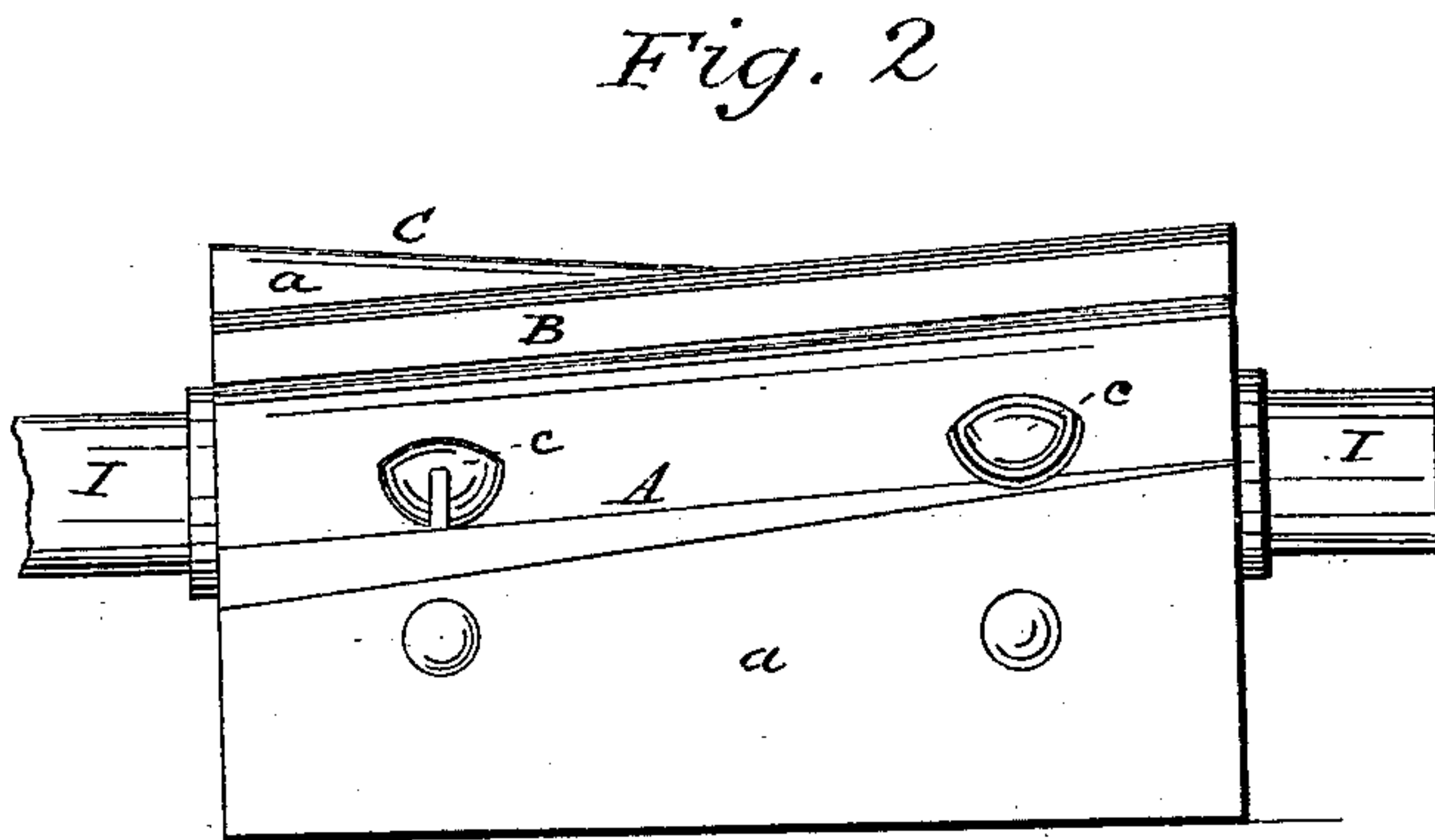
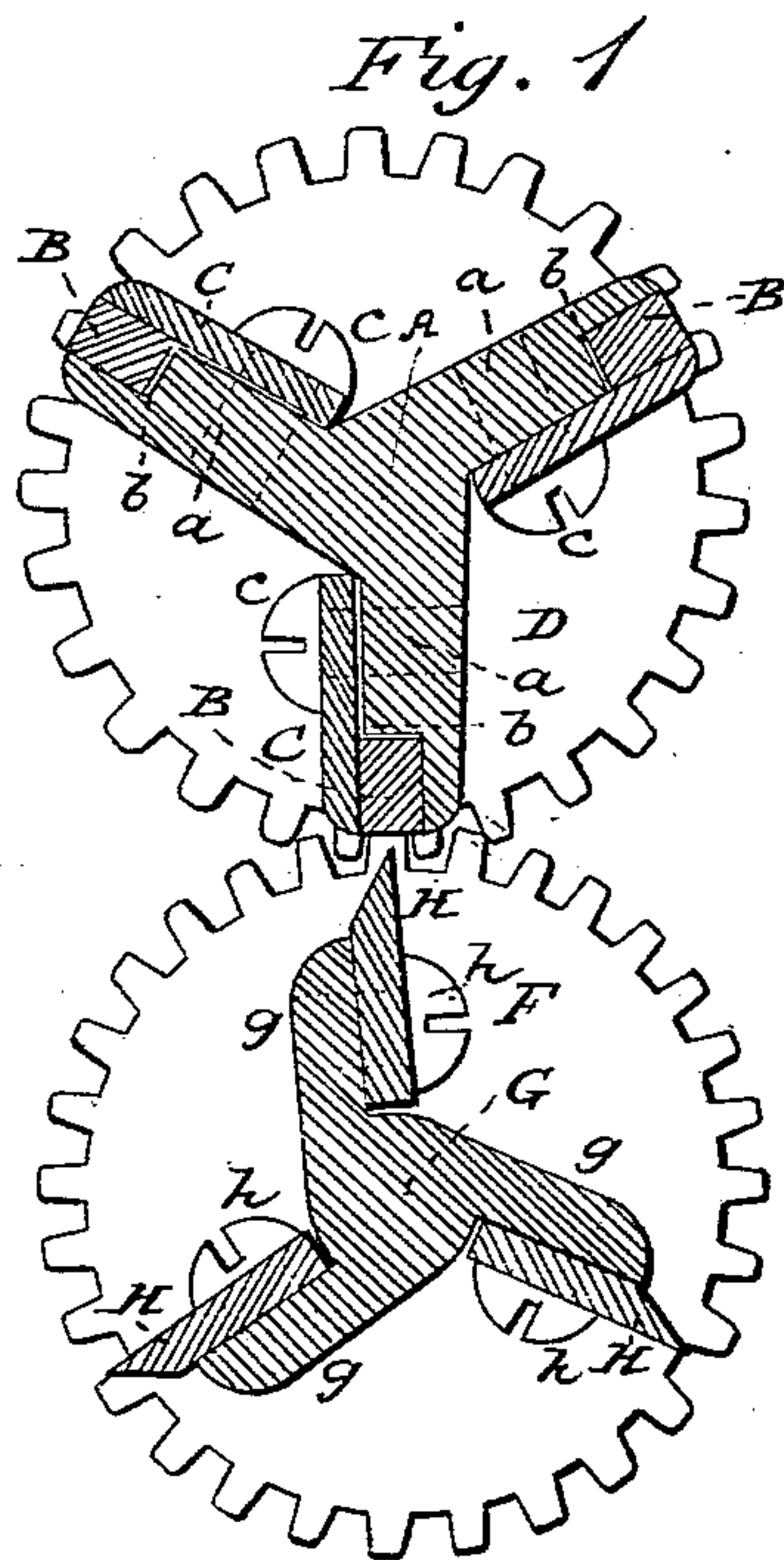


W. GALE.
Straw Cutter.

No. 61,617.

Patented Jan. 29, 1867.



Witnesses:

Charles Jones
Jas. A. Ramsay.

Inventor:

Warren Gale
By his atty
J. S. Brown

United States Patent Office.

WARREN GALE, OF CHICOPEE FALLS, MASSACHUSETTS.

Letters Patent No. 61,617, dated January 29, 1867.

IMPROVEMENT IN STRAW CUTTERS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, WARREN GALE, of Chicopee Falls, in the county of Hampden, and State of Massachusetts, have invented a new and useful improvement in Machines for Cutting Straw, Hay, Corn-Stalks, Sugar-Cane, and other materials; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a transverse section of the cutting apparatus of a revolving-knife straw cutter, showing my improvement applied thereto.

Figure 2, a side view of the pressure cylinder thereof, to which my said improvement is applied.

Like letters designate corresponding parts in both figures.

My improvement is upon that general class of straw cutters, in which the knives are attached to a revolving cutter cylinder, and cut against a revolving pressure cylinder. The nature of my invention consists in making that part of the pressure cylinder against which the knife (or knives) cuts, of strips of copper, or any suitable alloy thereof with another metal or metals, which does not, to an injurious extent, depart from those peculiar properties that copper alone of metals possesses, and that render it especially applicable to this purpose, when the knife and pressure cylinders are geared together. These essential properties of copper are, first, a peculiar tenacity or toughness, which prevents abrasion and yielding; second, a sufficient degree of softness, not to injure the cutting edges of the knives acting against the same; and, third, at the same time, as much firmness and elasticity under pressure and wear, as are ever found to be necessary, in addition to the other properties mentioned, to fulfill the purpose intended. These leading properties combined I do not find in any other metal or composition of metals, as proved by numerous and various experiments, extending through a considerable number of years, and thoroughly tested. All other metals and alloys soft enough not to act injuriously on the cutters, are too soft and yielding, not possessing sufficient firmness and tenacity to prevent abrasion—breaking, especially when applied in strips, or yielding to the pressure to which the surface is subjected, under the knives. Nor does any other material whatever known, possess these qualities which insure the utmost perfection and durability of surface. I find that any alloy of copper with zinc or other metals, loses more and more of these indispensable properties, the greater the proportion of the alloying metal or metals combined with the copper; and that, while a small proportion of other metals does not very materially diminish the full excellence of these qualities, and hence a small degree of alloy may be used without bad effect, yet I believe that any addition of other metals to the copper, sufficient to perceptibly change its properties, is injurious to the proper effect. Therefore the indefinite mention or use of other alloys or compositions of metal, or simple soft metals, for this purpose, since all such known to commerce are unfit for this use, as compared with copper, entirely misleads and fails to reach the discovery which I have made, and which I have but recently fully proved; and consequently, they do not anticipate my invention founded on this knowledge, now first made known. It is obvious that, as before stated, it matters not what may be the form of the pressure cylinder to which the copper strips are affixed, for the knife or knives to cut against, the principle being the same under all circumstances; yet, since I have used them upon the flanged cylinder straw cutters, I will here describe their application thereto, in connection with the accompanying drawings. Fig. 1 shows a cross-section of the pressure cylinder A, with its flanches *a a a*, and of the cutting cylinder G, with its knives H H H. I cast the copper in narrow strips, B B B, of about the size and form indicated in this figure and fig. 2, and fit them in rabbet grooves, *b b b*, made in the flanches, so that clamp-plates, C C C, may be applied flush against them and the sides of the flanches, to hold the strips in place, as between jaws, by screws, *c c c*. The outer surfaces of the strips are even with the edges of the clamp jaws holding them. The edges of the knives H H H fit close to the surfaces of the strips, or in contact therewith, as indicated in fig. 1. The strips of copper, after casting, should be annealed, thus taking away any undue hardness which otherwise they might possess. They require no finish, except to smooth the faces and adjust them in form to the edges of the knives which are to cut against them. Other modes of attaching the copper strips may be adopted; but the above is simple and convenient, and allows ready adjustment and replacement of the strips. It is essential, however, no matter what method of fastening may be used, that the copper strips shall rest directly and firmly on the surface of the cylinder. Another important consideration is to be observed in the use of the copper-pressure surfaces. It is necessary that the knife cylinder

and pressure cylinder should be geared together, as indicated in fig. 1, the two gear-wheels D E thereon being of equal size. This makes the knives cut always on the same line upon the faces of the strips, and they thus soon cause the line of contact or cut on said surface to conform to their edges, so that there is no danger of injuring the edges of the knives; and much less power is required to drive the cutter, since there is no unnecessary pressure anywhere acting as a brake upon the movement. Not only is copper the only material that has the proper qualities for a long-enduring pressure surface, as above explained, but it is also exceedingly cheap and economical, for a very narrow and thin strip suffices, and hence the first cost is but trifling. Besides, it wears many years without requiring replacement, when the knife and pressure cylinders are geared together, whereas any other material which can be used, such as "raw-hide," or other soft metals, soon wears away, or requires repairs or removal. The copper is also proof against the weather and dampness, so destructive of raw-hide facings. The knives and copper-faced flanches are arranged upon their respective cylinders in spiral form, as shown in the drawings, so that only a part of the knife edge will be brought in contact with the copper facing at one time. The amount or degree of spiral may be varied, but it never should be so little that more than one-fourth of the length of the knife can be brought in contact with the copper at once. Although I am not aware that, previous to my invention, copper or any alloy of copper has ever been used in straw cutters for the knives to cut against, and believe myself to be the first to discover and make known its advantages for this purpose, yet I shall confine my claim to the use of strips of copper, or a suitable alloy thereof, to cut against, when the knife and pressure surface cylinders or shafts are geared together, or so arranged in connection with each other that the knife edges and pressure surfaces shall move at equal speed, since I have found that in this way only can the invention be made of practical utility; but when so arranged, the copper is superior to any other material for the purpose known to me; therefore,

What I claim as my invention, and desire to secure by Letters Patent, is—

A revolving pressure cylinder, whose pressure surfaces are faced with or made of strips of copper, or some alloy thereof possessing equivalent properties, in combination with and geared to a revolving cutter cylinder or shaft, substantially as and for the purpose herein set forth.

I also claim a spiral or oblique flanged pressure cylinder, faced with copper, in combination with a revolving knife-cylinder, substantially as described.

In witness that the above is a true specification of my improved straw cutter, I hereunto set my hand this 16th day of August, 1865.

WARREN GALE.

Witnesses:

ANDREW GALE,
J. N. THAYER.